# Air monitoring report 2011 – Compliance with the National Environment Protection (Ambient Air Quality) Measure

Environment Report

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## Overview

This report presents the results of air quality monitoring in Victoria in 2011 and assesses them against the requirements of the *Ambient Air Quality National Environment Protection Measure*[1] (AAQ NEPM). EPA also produces an annual air quality summary and data tables on its website[2].

The AAQ NEPM establishes:

- requirements for monitoring air quality
- air quality standards that are levels of specified pollutants against which air quality can be assessed
- a goal that the air quality standards be met to the extent specified in the NEPM. Recognising that certain events can impact on air quality, the NEPM specifies a maximum number of days on which it is permissible to exceed the standard.

Victoria's air quality in 2011 was generally good. The major impacts on Victoria's air quality during the year were associated with urban emissions during stable atmospheric conditions.

In the Port Phillip region in 2011 the goal was met for particles as $PM_{10}$ at all NEPM stations for the second successive year. The goal for particles as $PM_{10}$ was also met at Traralgon in the Latrobe Valley. An issue-specific station not included in the NEPM network, located in Brooklyn, did not report good air quality due to impacts from local sources[3].

The maximum number of days when the levels were measured above the $PM_{10}$ air quality standard at a single station (two) occurred at the Geelong South monitoring station in the Port Phillip region. This was still below the goal of no more than five days having levels above the standard.

The causes at South Geelong were attributed to urban **sources**, typically from vehicle traffic and/or domestic wood heaters.

The 24-hour advisory reporting standard for particles as $PM_{2.5}$ was not exceeded at Alphington or Footscray in the Port Phillip region. The annual reporting standard for $PM_{2.5}$ was met at both Alphington and Footscray.

The goals for ozone ($O_3$) were met at all stations under typical summer smog formation conditions where sufficient air monitoring data was available. $O_3$ monitoring was stopped at Point Henry in March 2011 as the Point Henry site was not representative of the general population-average exposure. Also, regional air-shed modelling using TAPM showed ozone levels at EPA's Geelong South site were comparable to the Point Henry site.

Monitoring in 2011 showed the AAQ NEPM goals and standards were met for carbon monoxide (CO), nitrogen dioxide ($NO_2$) and sulfur dioxide ($SO_2$) where sufficient air monitoring data was available. A lack of air monitoring data prevented assessment of CO at Richmond in Quarter 3 (Q3).

Monitoring was performed in accordance with a modified form of Victoria's monitoring plan[4], AAQ NEPM Technical Papers and EPA's NATA accreditation. Data capture targets were achieved at all stations, except for CO at Richmond (Q3) due to technical problems with equipment, while $O_3$ monitoring was stopped at Point Henry during Quarter 1 (Q1).

1 *National Environment Protection Measure for Ambient Air Quality*, National Environment Protection Council publication, available from www.ephc.gov.au
2 www.epa.vic.gov.au/air/monitoring
3 Environment Report-Air monitoring at Brooklyn year 2: November 2010 to October 2011, available from www.epa.vic.gov.au/air/brooklyn_estate.asp
4 *Ambient Air Quality NEPM Monitoring Plan Victoria* (EPA publication 763) available from www.epa.vic.gov.au/publications.

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# A Monitoring summary

## Current performance monitoring stations

Victoria's AAQ NEPM air monitoring plan was approved by the National Environment Protection Council Ministers in February 2001. Data presented in this report has been produced in accordance with the monitoring plan, except where 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 ($PM_{2.5}$).

Eight regions are defined in the monitoring plan. Consistent with the monitoring plan:

- Port Phillip and Latrobe Valley regions have permanent performance monitoring stations.
- Campaign monitoring has been conducted in Ballarat, Bendigo, Shepparton, Warrnambool and Mildura.
- Data from New South Wales monitoring at Albury has been used for Wodonga.

Stations at which monitoring was conducted in 2011 are shown in Figures 1 and 2.

The monitoring stations, pollutants monitored and site types are summarised in Table 2. Site types are defined as: *generally representative upper bound* for community exposure sites and *population-average* sites[5].

## Description of exposed population

The exposed population represented by each monitoring station is described qualitatively by the location category column in Tables 1 and 2. Further information is given in Appendix C of the monitoring plan.

## Investigative monitoring stations

A short term, targeted air monitoring program for particles was also conducted in Brooklyn and Sunshine West to measure dust impacts from a local industrial estate in the Brooklyn area. These sites are not included in Victoria's NEPM monitoring plan and are reported in separate environment reports.

## Table 1: Victorian performance monitoring stations

| Region | Location category | Site type | | | | |
|---|---|---|---|---|---|---|
| **Performance monitoring station** | | **CO** | **$NO_2$** | **$O_3$** | **$SO_2$** | **$PM_{10}$** |
| Port Phillip | | | | | | |
| Alphington | Res/LI | G* | G* | Pop | Pop* | G* |
| Altona North | I/Res | | | | G | |
| Brighton | Res | | G | Pop* | | Pop |
| Dandenong | LI | | | Pop | | Pop |
| Footscray | I/Res | | G* | G* | | G* |
| Geelong South | LI/Res | G* | G* | Pop* | G* | G* |
| Melton | Res | | | G | | |
| Mooroolbark | Res | | | Pop | | Pop |
| Point Cook | Rur/Res | | Pop* | G* | | |
| Point Henry[c] | I/Rur | | | Pop | | |
| Richmond | Res | G | | | | G |
| RMIT (CBD)[a] | CBD | G* | G* | | G | G* |
| Latrobe Valley | | | | | | |
| Moe[b] | Res | | Pop | G | G | G |
| Traralgon | Res | | G* | G* | G* | G* |

| | | | |
|---|---|---|---|
| RMIT (CBD) | RMIT University (central business district) | I | Industrial |
| LI | Light industrial | Res | Residential |
| Rur | Rural | G | Generally representative upper bound |
| Pop | Population-average | * | Trend station |
| a | RMIT station closed in 2006 | | |
| b | Moe closed in 2009 | | |
| c | Point Henry closed in 2011 | | |

Alternatives for RMIT, Moe and Point Henry will be considered as part of an overall review of Victoria's monitoring plan.

5 National Environment Protection (Ambient Air Quality) Measure Technical Paper No. 3, *Monitoring Strategy*, www.ephc.gov.au/taxonomy/term/74.

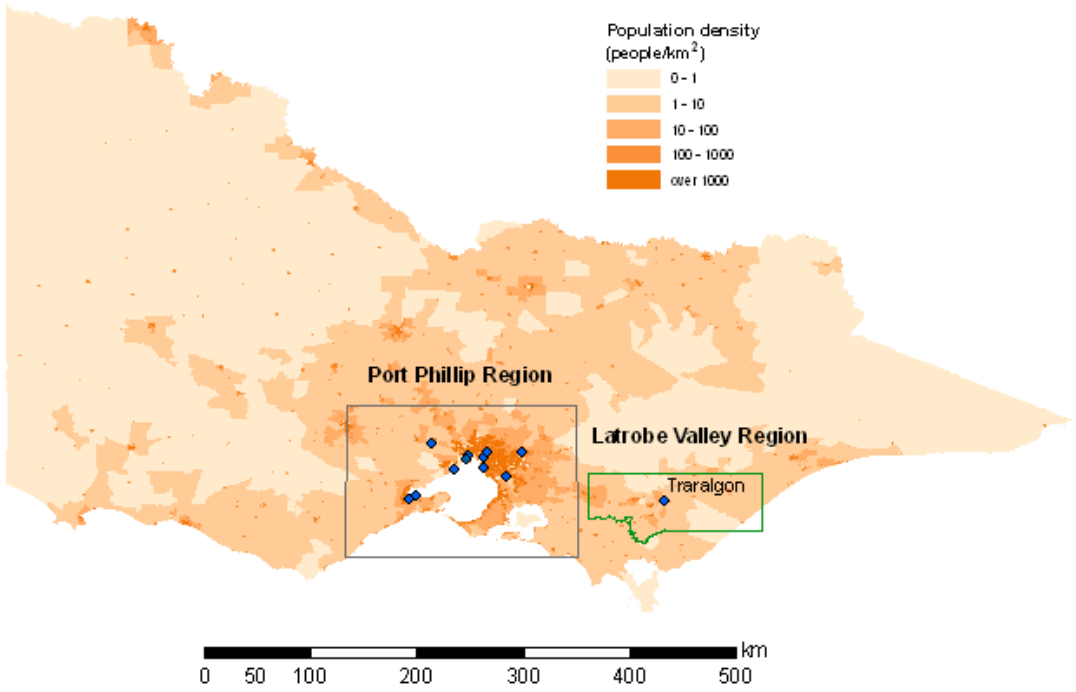



Figure 1: AAQ NEPM regions and population density in Victoria.

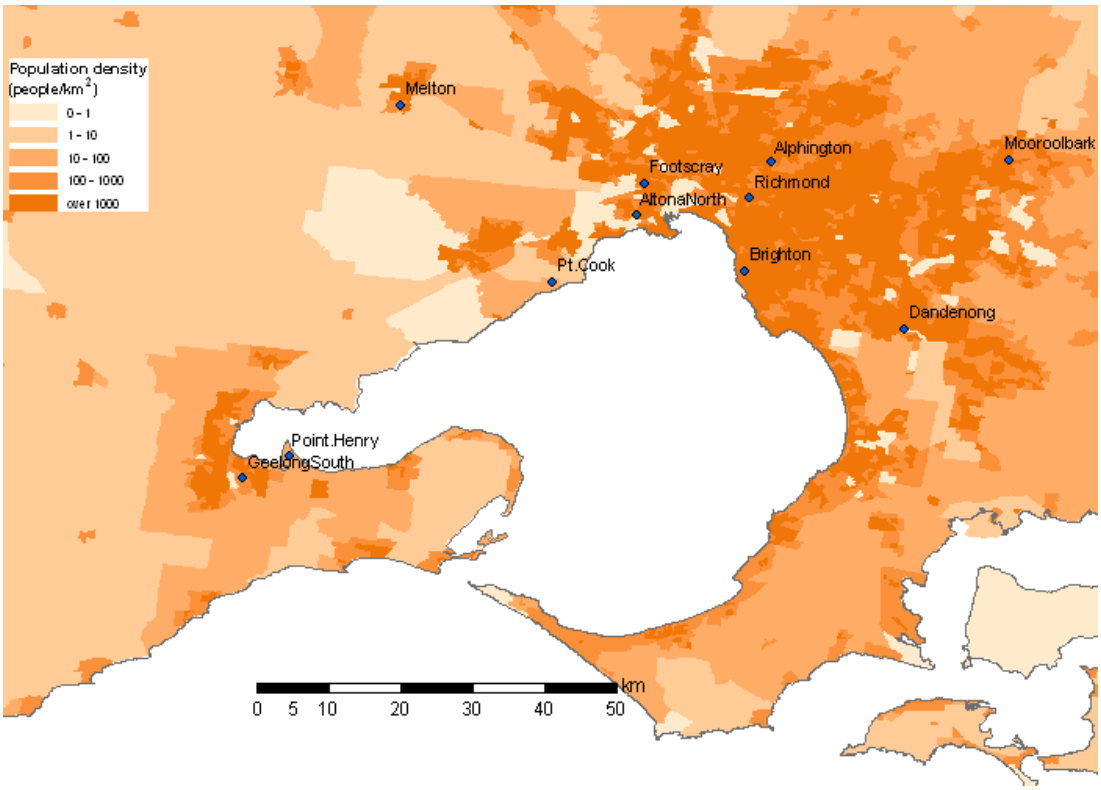



Figure 2: Monitoring stations and population density in the Port Phillip region.

## Table 2: Summary of stations' siting compliance with AS 3580.1.1–2007

| Region Station | Location category | Height above ground | Minimum distance to support structure | Clear sky angle of 120° | Unrestricted airflow of 270°/360° | 20 m from trees | No boilers or incinerators nearby | Minimum distance from road or traffic |
|---|---|---|---|---|---|---|---|---|
| Port Phillip | | | | | | | | |
| Alphington | Res/LI | ☑ | ☑ | ☑ | ☑ | ☒ | ☑ | ☑ |
| Altona North | I/Res | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ |
| Brighton | Res | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ |
| Dandenong | LI | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ |
| Footscray | I/Res | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ |
| Geelong South | LI/Res | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ |
| Melton | Res | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ |
| Mooroolbark | Res | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ |
| Point Cook | Rur/Res | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ |
| Point Henry | I/Rur | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ |
| Richmond | Res | ☑ | ☑ | ☑ | ☑ | ☒ | ☑ | ☑ |
| Latrobe Valley | | | | | | | | |
| Traralgon | Res | ☑ | ☑ | ☑ | ☑ | ☒ | ☑ | ☑ |

I Industrial LI Light industrial Res Residential Rur Rural

### Implementation of the monitoring plan

Victoria's air quality monitoring program is continually examined and options for current and future monitoring are considered yearly, depending on needs and the findings of reviews. Since implementing the AAQ NEPM monitoring plan for Victoria[3], a number of modifications and reviews of components of the original plan have been made. A review of the monitoring plan is underway and the monitoring plan will be finalised by the end of the 2012–13 financial year.

Monitoring ceased at the CBD station (at RMIT University) in October 2006, when the lease was terminated due to building extensions. The station at Paisley was renamed Altona North in June 2006 to better reflect its geographic location.

The peak station for lead, in Collingwood, was closed in December 2004 because levels were so low compared to the air quality objective. This change to Victoria's monitoring plan was approved in accordance with NEPM procedures[6].

The station at Moe was closed in October 2009 when the lease was terminated due to building construction works, and following a review which found the Traralgon station was comparable to Moe and representative of Latrobe Valley.

Ozone monitoring was stopped at Point Henry in March 2011 as the Point Henry site was not representative of the general population-average exposure. Also, regional air-shed modelling using TAPM showed ozone levels at EPA's Geelong South site were comparable to the Point Henry site.

Each of the monitoring stations meet the recommendations of the Australian Standard for siting of sampling units as shown in Table 2. Alphington, Richmond and Traralgon continue to have minor non-compliances

6 National Environment Protection (Ambient Air Quality) Measure Technical Paper No. 9, *Lead Monitoring*, available from www.ephc.gov.au/taxonomy/term/74.

due to the proximity of trees. Only a few small trees are within the 20 metre requirement at the Richmond site. An assessment of the impact of the trees on the Alphington and Traralgon sites, which have trees close to the station, is being conducted to determine whether the sites need to be relocated close by.

### Monitoring methods

Victorian monitoring is conducted in accordance with the Standards shown in Table 3. Data not meeting the requirements of these Standards and EPA's quality assurance procedures is identified as invalid and not included in reporting.

Particle concentration units of $\mu g/m^3$ refer to volumes at 0 °C and one atmosphere of pressure.

TEOM $PM_{10}$ data included in this report has been adjusted according to the approved procedure[7], 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.

7 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/taxonomy/term/74.

## Table 3: Methods for monitoring the NEPM pollutants

| Pollutant | | Standard | Title | Method used |
|---|---|---|---|---|
| Carbon monoxide | CO | AS3580.7.1–2011 | *Ambient air – Determination of carbon monoxide – Direct reading instrument method* | Gas filter correlation/infrared |
| Nitrogen dioxide | $NO_2$ | AS3580.5.1–2011 | *Ambient air – Determination of oxides of nitrogen – Chemiluminescence method* | Gas phase chemiluminescence |
| Photochemical oxidant (ozone) | $O_3$ | AS3580.6.1–2011 | *Ambient air – Determination of ozone – Direct reading instrument method* | Non-dispersive ultraviolet |
| Sulfur dioxide | $SO_2$ | AS3580.4.1–2008 | *Ambient air – Determination of sulfur dioxide – Direct reading instrument method* | Pulsed fluorescence |
| Particles | $PM_{10}$ | AS3580.9.8–2001 | *Determination of suspended particulate matter – $PM_{10}$ continuous direct mass method using a tapered element oscillating microbalance analyser* | Tapered element oscillating microbalance (TEOM) |
| | $PM_{2.5}$ | AS/NZS3580.9.10–2006a | *Reference method for the determination of fine particulate matter as $PM_{2.5}$ in the atmosphere* | Gravimetric reference method |
| | $PM_{2.5}$ | AS3580.9.8–2001b | *Technical paper on monitoring for particles as $PM_{2.5}$* | TEOM |

a Modified for use in the $PM_{2.5}$ Equivalence Program according to the NEPM Technical Paper.

### NATA status

All current performance monitoring stations operated by EPA are covered by its NATA accreditation (Number 15119). EPA was successfully reaccredited in 2011.

Monitoring in the Latrobe Valley region was performed for EPA by Aurecon under its NATA accreditation (Number 4669).

### Screening

The monitoring plan outlines processes to demonstrate whether levels of pollutants are consistently below the standards. Monitoring is not required, or may be at fewer than the specified number of stations, if screening procedures are satisfied[8]. Screening procedures conducted in accordance with the NEPM have been satisfied for Victorian regions, except for $PM_{10}$, at Ballarat, Bendigo, Mildura, Shepparton, Wodonga and Warrnambool.

Details of screening arguments are given in the monitoring plan and previous annual reports.

Regional campaign monitoring has recorded elevated concentrations of $PM_{10}$ that do not meet screening criteria. This issue will be considered further in the current review of monitoring.

### $PM_{2.5}$ monitoring

In 2003 the NEPM was varied to include advisory reporting standards for $PM_{2.5}$. Victoria monitors $PM_{2.5}$ by the reference method specified in the NEPM (on a one-day-in-three basis) at two stations (Alphington and Footscray).

Victoria also participates in the $PM_{2.5}$ Equivalence Program, with TEOM monitors located at Alphington and Footscray. Alphington was substituted for Mooroolbark, which was originally proposed. 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[9].

8 National Environment Protection (Ambient Air Quality) Measure Technical Paper No. 4, *Screening Procedures* (Revision 1, 2007), available from www.ephc.gov.au/taxonomy/term/74.

9 *National Environment Protection (Ambient Air Quality) Measure Technical Paper on Monitoring for $PM_{2.5}$*, available from www.ephc.gov.au/search/node/pm2.5.

# B Assessment of compliance with standards and goals

Air quality is assessed against the AAQ NEPM standards and the associated goals shown in Table 5.

- Standards are concentrations, in parts per million (ppm) or micrograms per cubic metre ($\mu g/m^3$), against which air quality can be assessed.
- The goal of the AAQ NEPM is to achieve the National Environment Protection Standards within ten years from commencement (that is, by 2008), as assessed in accordance with the monitoring protocol to the extent specified in Schedule 2 of the AAQ NEPM. The extent is expressed as a maximum allowable number of exceedances for each standard (shown in column four of Table 5).

The number of allowable exceedances associated with the standards has been set to account for unusual meteorological conditions and, in the case of particles, natural events such as bushfires and dust storms that cannot be controlled through normal air quality management strategies.

Air quality monitoring data from each monitoring site is assessed against these standards and the associated goals.

The AAQ NEPM also specifies advisory reporting standards for $PM_{2.5}$, with a daily (25 $\mu g/m^3$) and annual (8 $\mu g/m^3$) standard. The goal for $PM_{2.5}$ is to collect sufficient data to allow a review of the $PM_{2.5}$ standards.

## Table 5: AAQ NEPM air quality standards and goal

| Pollutant | Averaging period | Standard | Goal max. allowable exceedances |
|---|---|---|---|
| Carbon monoxide | 8 hours | 9.0 ppm | 1 day a year |
| Nitrogen dioxide | 1 hour<br>1 year | 0.12 ppm<br>0.03 ppm | 1 day a year<br>none |
| Ozone | 1 hour | 0.10 ppm | 1 day a year |
| | 4 hours | 0.08 ppm | 1 day a year |
| Sulfur dioxide | 1 hour | 0.20 ppm | 1 day a year |
| | 1 day | 0.08 ppm | 1 day a year |
| | 1 year | 0.02 ppm | none |
| Particles as $PM_{10}$ | 1 day | 50 $\mu g/m^3$ | 5 days a year |
| Lead | 1 year | 0.50 $\mu g/m^3$ | none |
| Particles as $PM_{2.5}$ | 1 day<br>1 year | 25 $\mu g/m^3$<br>8 $\mu g/m^3$ | not applicable<br>not applicable |

The following tables summarise compliance with the standards and associated goals of the AAQ NEPM.

Air quality is assessed as complying with the NEPM if the number of exceedances 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 shows pollutant levels are reasonably expected to be consistently below the relevant standards.

Air quality is assessed as 'not demonstrated' if there has been insufficient data collected to demonstrate that the standards and goal have been met or not met.

Regions may also be assessed as 'not demonstrated' if screening has not been completed.

### Carbon monoxide

## Table 6: 2011 compliance summary for carbon monoxide in Victoria

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

| Region / Performance monitoring station | Data availability rates (% of hours) | | | | | Number of exceedances (days) | Performance against the standard and goal |
|---|---|---|---|---|---|---|---|
| | Q1 | Q2 | Q3 | Q4 | Annual | | |
| Port Phillip | | | | | | | |
| Alphington | 92.4 | 90.5 | 92.8 | 91.5 | 91.8 | 0 | met |
| Geelong South | 94.8 | 94.4 | 94.7 | 94.1 | 94.5 | 0 | met |
| Richmond | 94.7 | 90.2 | *70.5* | 86.0 | 85.3 | 0 | ND |

ND: Not demonstrated by monitoring. See comments below.

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

Compliance was not demonstrated (ND) at Richmond (Q3) due to technical problems with equipment.

At all other stations operated during 2011, the carbon monoxide standard was not exceeded and compliance was demonstrated.

### Nitrogen dioxide

## Table 7: 2011 compliance summary for nitrogen dioxide in Victoria

AAQ NEPM standards: 0.12 ppm (one-hour average); 0.03 ppm (one-year average)
AAQ NEPM goal: one-hour standard exceeded on no more than one day per year

| Region / Performance monitoring station | Data availability rates (% of hours) | | | | | Number of exceedances (days) | Annual mean (ppm) | Performance against the standards and goal | |
|---|---|---|---|---|---|---|---|---|---|
| | Q1 | Q2 | Q3 | Q4 | Annual | | | 1-hour | 1-year |
| Port Phillip | | | | | | | | | |
| Alphington | 92.9 | 89.2 | 92.9 | 92.0 | 91.8 | 0 | 0.010 | met | met |
| Brighton | 94.8 | 95.1 | 94.7 | 92.4 | 94.3 | 0 | 0.008 | met | met |
| Footscray | 94.7 | 94.7 | 84.4 | 94.5 | 92.1 | 0 | 0.011 | met | met |
| Geelong South | 94.8 | 94.3 | 94.7 | 94.1 | 94.5 | 0 | 0.007 | met | met |
| Point Cook | 78.7 | 88.9 | 91.3 | 93.1 | 88.1 | 0 | 0.005 | met | met |
| Latrobe Valley | | | | | | | | | |
| Traralgon | 95.3 | 95.4 | 94.4 | 95.5 | 95.2 | 0 | 0.007 | met | met |

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

At all stations operating during 2011, the nitrogen dioxide standards were not exceeded and compliance was demonstrated.

### Ozone

## Table 8: 2011 compliance summary for ozone in Victoria

AAQ NEPM standards: 0.10 ppm (one-hour average); 0.08 ppm (four-hour average)
AAQ NEPM goal: standards exceeded on no more than one day per year

| Region / Performance monitoring station | Data availability rates (% of hours) | | | | | Number of exceedances (days) | | Performance against the standards and goal | |
|---|---|---|---|---|---|---|---|---|---|
| | Q1 | Q2 | Q3 | Q4 | Annual | 1-hour | 4-hour | 1-hour | 4-hour |
| Port Phillip | | | | | | | | | |
| Alphington | 92.9 | 92.3 | 93.9 | 91.9 | 92.8 | 0 | 0 | met | met |
| Brighton | 94.8 | 95.1 | 94.8 | 91.5 | 94.1 | 0 | 0 | met | met |
| Dandenong | 94.5 | 94.6 | 94.4 | 94.8 | 94.6 | 0 | 0 | met | met |
| Footscray | 93.1 | 94.7 | 90.6 | 94.5 | 93.2 | 0 | 0 | met | met |
| Geelong South | 94.8 | 94.3 | 94.7 | 94.1 | 94.5 | 0 | 0 | met | met |
| Melton | 88.5 | 92.7 | 94.2 | 94.0 | 92.4 | 0 | 0 | met | met |
| Mooroolbark | 94.8 | 94.9 | 94.8 | 94.5 | 94.7 | 0 | 0 | met | met |
| Point Cook | 89.8 | 76.3 | 93.9 | 92.8 | 88.2 | 0 | 0 | met | met |
| Point Henry | *66.9* | *0.0* | *0.0* | *0.0* | *16.5* | 0 | 0 | ND | ND |
| Latrobe Valley | | | | | | | | | |
| Traralgon | 95.3 | 95.4 | 95.4 | 95.5 | 95.4 | 0 | 0 | met | met |

ND: Not demonstrated by monitoring. See comments below.

Regions that do not require monitoring on the basis that screening shows pollutant levels are reasonably expected to be consistently below the relevant AAQ NEPM standards are Shepparton, Warrnambool, Wodonga and Mildura.

The goals for the one and four-hour ozone levels were met at all operating stations in 2011. Point Henry was closed in March of 2011 as the Point Henry site was not representative of the general population-average exposure. Also, regional air-shed modelling using TAPM showed ozone levels at EPA's Geelong South site were comparable to the Point Henry site.

### Sulfur dioxide

## Table 9: 2011 compliance summary for sulfur dioxide in Victoria

AAQ NEPM standards: 0.20 ppm (one-hour average); 0.08 ppm (24-hour average); 0.02 ppm (one-year average)
AAQ NEPM goal: one-hour and 24-hour standards exceeded on no more than one day per year

| Region / Performance monitoring station | Data availability rates (% of hours) | | | | | Exceedances (days) | | Annual mean (ppm) | Performance against the standards and goal | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Q1 | Q2 | Q3 | Q4 | Annual | 1-hour | 24-hour | | 1-hour | 24-hour | 1-year |
| Port Phillip | | | | | | | | | | | |
| Alphington | 81.1 | 88.9 | 90.4 | 88.2 | 87.2 | 0 | 0 | 0.000 | met | met | met |
| Altona North | 93.4 | 94.0 | 94.1 | 89.9 | 92.8 | 0 | 0 | 0.001 | met | met | met |
| Geelong South | 94.6 | 94.1 | 94.2 | 88.6 | 92.9 | 0 | 0 | 0.001 | met | met | met |
| Latrobe Valley | | | | | | | | | | | |
| Traralgon | 95.3 | 95.5 | 94.5 | 95.4 | 95.2 | 0 | 0 | 0.002 | met | met | met |

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

At all stations operating during 2011, the sulfur dioxide standards were not exceeded and compliance was demonstrated. Annual mean values were close to the limits of detection.

### Particles as $PM_{10}$

## Table 10: 2011 compliance summary for $PM_{10}$ in Victoria

AAQ NEPM standard: 50 μg/m³ (24-hour average)
AAQ NEPM goal: standard exceeded on no more than five days per year

| Region / Performance monitoring station | Data availability rates (% of days) | | | | | Number of exceedances (days) | Performance against the standard and goal |
|---|---|---|---|---|---|---|---|
| | Q1 | Q2 | Q3 | Q4 | Annual | | |
| Port Phillip | | | | | | | |
| Alphington | 97.8 | 96.7 | 100.0 | 93.5 | 97.0 | 1 | met |
| Brighton | 100.0 | 97.8 | 100.0 | 96.7 | 98.6 | 0 | met |
| Dandenong | 100.0 | 97.8 | 100.0 | 100.0 | 99.5 | 0 | met |
| Footscray | 100.0 | 100.0 | 95.7 | 100.0 | 98.9 | 0 | met |
| Geelong South | 100.0 | 97.8 | 100.0 | 97.8 | 98.9 | 2 | met |
| Mooroolbark | 97.8 | 100.0 | 100.0 | 98.9 | 99.2 | 1 | met |
| Richmond | 100.0 | 94.5 | 78.3 | 96.7 | 92.3 | 0 | met |
| Latrobe Valley | | | | | | | |
| Traralgon | 97.8 | 100.0 | 100.0 | 100.0 | 99.5 | 0 | met |

Monitoring was by TEOM.

Screening arguments that $PM_{10}$ levels are reasonably expected to be consistently below the relevant AAQ NEPM standard have not been satisfied for other regions (Ballarat, Bendigo, Shepparton, Wodonga and Mildura). These are assessed as 'not demonstrated'.

The $PM_{10}$ standard was exceeded at Footscray, Geelong South, Mooroolbark and Traralgon. These exceedances were the result of urban sources, as detailed in Section C. Compliance and the NEPM goal was met at all stations.

### Particles as $PM_{2.5}$

The NEPM was varied 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 must be reported.

Table 11 summarises Victoria's monitoring of $PM_{2.5}$ by the reference method. Only reference method monitoring is to be used for comparisons with the advisory reporting standards. 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 that commenced in 2005.

## Table 11: 2011 monitoring summary for $PM_{2.5}$ in Victoria

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

| Region / Performance monitoring station | Data availability rates (% of days) | | | | | Number of exceedances (days) | Annual mean (μg/m³) |
|---|---|---|---|---|---|---|---|
| | Q1 | Q2 | Q3 | Q4 | Annual | | |
| Port Phillip | | | | | | | |
| Alphington | 100.0 | 90.3 | 96.7 | 96.8 | 95.9 | 0 | 7.3 |
| Footscray | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 0 | 6.5 |

Monitoring by reference method (one-day-in-three).

No exceedances of the 24 hour $PM_{2.5}$ reporting standard were recorded in 2011.

Table 12 summarises Victoria's monitoring of $PM_{2.5}$ by TEOM for the Equivalence Program. TEOM $PM_{2.5}$ data is usually lower than the reference method, especially in the cooler months, due to the loss of the volatile component of $PM_{2.5}$. Details are given in Section C.

## Table 12: $PM_{2.5}$ Equivalence Program 2011 TEOM monitoring summary

| Region<br>Performance monitoring station | Data availability rates (% of days) | | | | | Annual mean |
|---|---|---|---|---|---|---|
| | Q1 | Q2 | Q3 | Q4 | Annual | ($\mu g/m^3$) |
| **Port Phillip** | | | | | | |
| Alphington | 97.8 | 95.6 | 91.3 | 75.0 | 89.9 | 4.9 |
| Footscray | 98.9 | 97.8 | 100.0 | 100.0 | 99.2 | 4.6 |

Monitoring by TEOM (daily).

### Lead

Following the phasing out of leaded petrol, concentrations at the peak station, Collingwood, were below the level specified for discontinuing monitoring[10]. Monitoring of lead in Melbourne ceased at the end of 2004. All other regions meet screening criteria as set out in the monitoring plan and all regions are assessed as complying with the standard and goal.

10 *National Environment Protection (Ambient Air Quality) Measure Technical Paper No. 9, Lead Monitoring*, available from www.ephc.gov.au/taxonomy/term/74.

# C Analysis of air quality monitoring

Annual summary statistics are presented in this section. The AAQ NEPM states that the short term standards should not be exceeded on more than one day per year for carbon monoxide, nitrogen dioxide, ozone and sulfur dioxide, or on more than five days per year for $PM_{10}$. The second highest non-overlapping daily value for the year (or the sixth for $PM_{10}$) can indicate the extent to which the standards are, or are not, met. In the following tables, concentrations exceeding the standard are highlighted in bold.

All occasions when a standard was exceeded are listed, as are the circumstances leading to the exceedance.

Tables of monitoring statistics presented in this section have been prepared according to AAQ NEPM guidelines[10].

### Carbon monoxide

## Table 13: 2011 summary statistics for daily peak eight-hour carbon monoxide in Victoria

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

| Region<br>Performance monitoring station | Number of valid days | Highest (ppm) | Highest (date:hour) | 2nd highest (ppm) | 2nd highest (date:hour) |
|---|---|---|---|---|---|
| Port Phillip | | | | | |
| Alphington | 347 | 2.9 | Jun 02:02 | 2.7 | Jun 01:24 |
| Geelong South | 358 | 2.1 | Jun 02:02 | 1.8 | Jun 01:24 |
| Richmond | 319 | 2.6 | Jun 02:02 | 2.3 | Jun 01:24 |

Carbon monoxide levels were well within the standard at all stations. The highest readings occurred at Alphington, where carbon monoxide reached 32 per cent of the standard.

10 *National Environment Protection (Ambient Air Quality) Measure Technical Paper No. 8*, Annual Reports, available from www.ephc.gov.au/taxonomy/term/74.

### Nitrogen dioxide

## Table 14: 2011 summary statistics for daily peak one-hour nitrogen dioxide in Victoria

AAQ NEPM standard: 0.12 ppm (one-hour average)
AAQ NEPM goal: standard exceeded on no more than one day per year

| Region<br>Performance monitoring station | Number of valid days | Highest (ppm) | Highest (date:hour) | 2nd highest (ppm) | 2nd highest (date:hour) |
|---|---|---|---|---|---|
| Port Phillip | | | | | |
| Alphington | 351 | 0.046 | Jun 01:19 | 0.042 | Apr 27:18 |
| Brighton | 362 | 0.042 | Jun 01:15 | 0.036 | Jun 15:21 |
| | | | | | Sep 02:20 |
| | | | | | Nov 05:22 |
| Footscray | 353 | 0.053 | Jun 01:14 | 0.051 | Jan 31:23 |
| Geelong South | 364 | 0.040 | Jun 15:08 | 0.035 | May 20:08 |
| Point Cook | 333 | 0.038 | Nov 05:23 | | |
| | | | Feb 01:01 | | |
| Latrobe Valley | | | | | |
| Traralgon | 363 | 0.034 | Aug 27:19 | 0.030 | Aug 24:19 |
| | | | | | Aug 04:18 |

Nitrogen dioxide levels were well within the standard at all stations. The highest one-hour average occurred at Footscray and was 44 per cent of the hourly standard. The highest annual average also occurred at Footscray and was 37 per cent of the standard (see Table 7).

### Ozone

## Table 15: 2011 summary statistics for daily peak one-hour ozone in Victoria

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

| Region<br>Performance monitoring station | Number of valid days | Highest (ppm) | Highest (date:hour) | 2nd highest (ppm) | 2nd highest (date:hour) |
|---|---|---|---|---|---|
| Port Phillip | | | | | |
| Alphington | 353 | 0.073 | Dec 23:17 | 0.060 | Dec 24:17 |
| Brighton | 360 | 0.074 | Dec 23:16 | 0.061 | Jan 06:18 |
| Dandenong | 364 | 0.063 | Jan 29:16 | 0.062 | Feb 02:17 |
| | | | | | Jan 06:17 |
| Footscray | 357 | 0.078 | Dec 23:16 | 0.056 | Jan 06:17 |
| Geelong South | 364 | 0.055 | Nov 05:17 | 0.052 | Nov 09:14 |
| | | | | | Dec 31:18 |
| Melton | 352 | 0.071 | Jan 06:19 | 0.070 | Dec 23:16 |
| Mooroolbark | 365 | 0.078 | Dec 24:16 | 0.071 | Jan 29:18 |
| Point Cook | 334 | 0.069 | Dec 23:15 | 0.057 | Nov 08:18 |
| Point Henry | 63 | 0.050 | Feb 15:15 | 0.048 | Mar 12:15 |
| Latrobe Valley | | | | | |
| Traralgon | 365 | 0.050 | Feb 26:16 | 0.042 | Dec 24:16 |

## Table 16: 2011 summary statistics for daily peak four-hour ozone in Victoria

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

| Region<br>Performance monitoring station | Number of valid days | Highest (ppm) | Highest (date:hour) | 2nd highest (ppm) | 2nd highest (date:hour) |
|---|---|---|---|---|---|
| Port Phillip | | | | | |
| Alphington | 354 | 0.069 | Dec 23:18 | 0.057 | Dec 24:17 |
| Brighton | 357 | 0.063 | Dec 23:17 | 0.056 | Nov 09:17 |
| Dandenong | 363 | 0.058 | Feb 02:18 | | |
| | | | Dec 23:17 | | |
| Footscray | 355 | 0.067 | Dec 23:17 | 0.048 | Nov 09:17 |
| | | | | | Jan 20:18 |
| Geelong South | 362 | 0.052 | Nov 05:17 | 0.050 | Nov 09:16 |
| Melton | 352 | 0.065 | Jan 06:20 | 0.062 | Dec 23:18 |
| Mooroolbark | 364 | 0.069 | Dec 24:18 | 0.059 | Jan 15:16 |
| | | | | | Jan 29:19 |
| Point Cook | 333 | 0.058 | Dec 23:17 | 0.052 | Dec 07:19 |
| | | | | | Nov 08:20 |
| | | | | | Nov 09:16 |
| Point Henry | 63 | 0.048 | Feb 15:17 | 0.043 | Mar 12:16 |
| Latrobe Valley | | | | | |
| Traralgon | 365 | 0.044 | Feb 26:18 | 0.038 | Sep 04:09 |
| | | | | | Oct 21:04 |

Ozone is generated by chemical reactions in strong sunlight as precursor chemicals are transported from the point of emission. Ozone events in Melbourne typically occur when air masses are recirculated back into the metropolitan area. Compared to their respective standards, the four-hour averages are usually proportionally higher than the one-hour averages, leading to more exceedances of the four-hour standard.

The standards for ozone were met at all stations during 2011 for the one-hour average and four-hour average ozone. There were no exceedances of the one-hour and four-hour standards. The highest one-hour average in the Port Phillip region, at Footscray and Mooroolbark, was 78 per cent of the standard and in the Latrobe Valley, at Traralgon, 50 per cent of the standard. The highest four-hour average in the Port Phillip region, at Alphington and Mooroolbark, was 86 per cent of the standard and in the Latrobe Valley, at Traralgon, 55 per cent of the standard.

## Table 17: 2011 ozone exceedances

AAQ NEPM standards: 0.10 ppm (one-hour average), 0.08 ppm (four-hour average)
AAQ NEPM goal: standards exceeded on no more than one day per year

| Date | Region | Station | Exceedance | Inferred cause |
|---|---|---|---|---|
| Averaging period one-hour | | | | |
| | Port Phillip | Alphington | none | none |
| | | Brighton | none | none |
| | | Dandenong | none | none |
| | | Footscray | none | none |
| | | Geelong South | none | none |
| | | Melton | none | none |
| | | Mooroolbark | none | none |
| | | Point Cook | none | none |
| | | Point Henry | none | none |
| | Latrobe Valley | Traralgon | none | none |
| Averaging period four-hour | | | | |
| | Port Phillip | Alphington | none | none |
| | | Brighton | none | none |
| | | Dandenong | none | none |
| | | Footscray | none | none |
| | | Geelong South | none | none |
| | | Melton | none | none |
| | | Mooroolbark | none | none |
| | | Point Cook | none | none |
| | | Point Henry | none | none |
| | Latrobe Valley | Traralgon | none | none |

### Sulfur dioxide

## Table 18: 2011 summary statistics for daily peak one-hour sulfur dioxide in Victoria

AAQ NEPM standard: 0.20 ppm (one-hour average)
AAQ NEPM goal: standard exceeded on no more than one day per year

| Region<br>Performance monitoring station | Number of valid days | Highest (ppm) | Highest (date:hour) | 2nd highest (ppm) | 2nd highest (date:hour) |
|---|---|---|---|---|---|
| Port Phillip | | | | | |
| Alphington | 344 | 0.011 | May 10:13 | 0.009 | Oct 17:21 |
| Altona North | 359 | 0.047 | Jul 07:11 | 0.046 | Apr 12:12 |
| Geelong South | 356 | 0.033 | Sep 10:18 | 0.030 | May 23:18 |
| | | | | | Aug 21:14 |
| | | | | | Jul 16:13 |
| Latrobe Valley | | | | | |
| Traralgon | 363 | 0.038 | Dec 14:17 | 0.025 | Mar 27:13 |

## Table 19: 2011 summary statistics for daily peak 24-hour sulfur dioxide in Victoria

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

| Region<br>Performance monitoring station | Number of valid days | Highest (ppm) | Highest (date) | 2nd highest (ppm) | 2nd highest (date) |
|---|---|---|---|---|---|
| Port Phillip | | | | | |
| Alphington | 344 | 0.003 | Apr 02 | 0.002 | Dec 12 |
| | | | | | Jan 18 |
| | | | | | May 30 |
| | | | | | Jun 28 |
| | | | | | Jul 07 |
| | | | | | Jul 14 |
| | | | | | Apr 03 |
| | | | | | May 14 |
| | | | | | Jun 01 |
| Altona North | 359 | 0.012 | Jun 08 | 0.010 | Mar 25 |
| | | | | | Apr 12 |
| Geelong South | 356 | 0.005 | Sep 17 | | |
| | | | Oct 29 | | |
| | | | Apr 12 | | |
| | | | May 04 | | |
| Latrobe Valley | | | | | |
| Traralgon | 363 | 0.005 | Dec 29 | | |
| | | | Dec 14 | | |
| | | | Jul 11 | | |

Sulfur dioxide levels were well below the standards at all stations. Maximum one-hour averages are higher relative to the standard than the 24-hour or annual averages. The highest one-hour reading occurred at Altona North and was 24 per cent of the one-hour standard. The highest 24-hour reading also occurred at Altona North and was 15 per cent of the 24-hour standard. The maximum one-hour average at Traralgon was 19 per cent of the one-hour standard. The maximum 24-hour average at Traralgon was six per cent of the 24-hour standard. Annual averages at all stations (see Table 9) are close to the limit of detection.

### Particles as $PM_{10}$

## Table 20: 2011 summary statistics for 24-hour $PM_{10}$ in Victoria

AAQ NEPM standard: 50 μg/m³ (24-hour average)
AAQ NEPM goal: standard exceeded on no more than five days per year

| Region<br>Performance monitoring station | Number of valid days | Highest (μg/m³) | Highest (date) | 6th highest (μg/m³) | 6th highest (date) |
|---|---|---|---|---|---|
| Port Phillip | | | | | |
| Alphington | 354 | 50.3 | Jun 01 | 31.5 | Jul 23 |
| | | | | | |
| Brighton | 330 | 41.9 | Jun 01 | 29.2 | Oct 17 |
| Dandenong | 363 | 43.5 | Mar 21 | 33.2 | Dec 21 |
| | | | | | Jul 15 |
| Footscray | 361 | 49.6 | Jun 01 | 35.7 | Aug 25 |
| Geelong South | 361 | 57.4 | May 20 | 45.1 | Aug 25 |
| Mooroolbark | 362 | 50.1 | May 20 | 36.1 | Jan 31 |
| Richmond | 337 | 42.4 | Jun 06 | 33.2 | Aug 11 |
| Latrobe Valley | | | | | |
| Traralgon | 363 | 41.8 | Mar 08 | 31.3 | Jun 03 |
| | | | | | Apr 09 |

The NEPM goal was achieved at all stations (see Table 10) in the Port Phillip region and at Traralgon in the Latrobe Valley.

In addition to TEOM monitoring, $PM_{10}$ was monitored every sixth day at Alphington and Footscray by a high-volume sampler. The highest high-volume sampler readings were 30 μg/m³ at Alphington (31 Jan) and 22 μg/m³ at Footscray (11 Aug).

In 2011, $PM_{10}$ exceedances occurred on the days listed in Table 21. The likely causes have been inferred, with the exceedances all attributed to the build up of pollution in stable atmospheric conditions with low winds (three days).

Overall there has been a significant reduction in exceedances since 2009. In 2011 there were four exceedances over three days compared to 11 exceedances over 11 days in 2010, and 90 exceedances over 32 days in 2009.

## Table 21: 2011 $PM_{10}$ exceedances

AAQ NEPM standard: 50μg/m$^3$ (24-hour average)
AAQ NEPM goal: standard exceeded on no more than five days per year

| Date | Port Phillip | | | | | | | Latrobe Valley | Inferred cause[a] |
|---|---|---|---|---|---|---|---|---|---|
| | Alphington | Brighton | Dandenong | Footscray | Geelong South | Mooroolbark | Richmond | Traralgon | |
| May 19 | | | | | **52.8** | | | | urban |
| May 20 | | | | | **57.4** | **50.1** | | | urban |
| Jun 1 | **50.3** | | | | | | | | urban |
| Total | 1 | 0 | 0 | 0 | 2 | 1 | 0 | 0 | |

All readings in μg/m$^3$
a Dust = windborne crustal dust, often from distant sources
fire = smoke from bushfires, planned burning or agricultural burning
urban = particles accumulating in stable atmospheric conditions, typically from motor vehicles or domestic wood heaters.

### Particles as $PM_{2.5}$

## Table 22: 2011 summary statistics for 24-hour $PM_{2.5}$ in Victoria

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

| Region<br>Performance monitoring station | Number of valid days | Highest (μg/m³) | Highest (date) |
|---|---|---|---|
| Port Phillip | | | |
| Alphington | 117 | **21.2** | Jul 15 |
| Footscray | 122 | **18.1** | Jun 15 |

Monitoring by reference method (one day in three).

The 24-hour reporting standard for $PM_{2.5}$ was not exceeded at Alphington or Footscray during 2011.

The annual reporting standard (8 μg/m³) was achieved at both stations (see Table 11).

Results of $PM_{2.5}$ monitoring by TEOM (see Table 23) are not adjusted for loss of volatiles. The highest readings at Alphington and Footscray (Jun 1) occurred on a day where particles accumulated typically from vehicle traffic or domestic wood heaters.

## Table 23: $PM_{2.5}$ Equivalence Program 2011 TEOM monitoring – daily statistics

| Region<br>Performance monitoring station | Number of valid days | Highest (μg/m³) | Highest (date) |
|---|---|---|---|
| Port Phillip | | | |
| Alphington | 328 | 20.2 | Jun 01 |
| Footscray | 362 | 15.7 | Jun 01 |

### Summary of progress towards achieving the AAQ NEPM goals

**Compliance in 2011**

The AAQ NEPM goals for carbon monoxide, nitrogen dioxide, ozone, sulfur dioxide, lead and $PM_{10}$ are to achieve the standards, to the extent specified by the number of times allowed to exceed the standard.

In 2011, the goals were met at all stations where there was sufficient data captured. The exceptions were carbon monoxide where there was insufficient data at Richmond (Q3) and ozone where there was insufficient data at Point Henry (station removed).

All of the days when $PM_{10}$ exceedances were recorded in the Port Phillip region were attributed to the accumulation of urban emissions (three days).

The one-hour average and four-hour average ozone standards and the goals for ozone ($O_3$) were met at all stations where there was sufficient data captured during 2011 in the Port Phillip region and at Traralgon in the Latrobe Valley. There were no exceedances of the one-hour and four-hour standards.

The 24-hour advisory reporting standard for $PM_{2.5}$ was not exceeded in the Port Phillip region. The annual reporting standard (8 μg/m³) was met for $PM_{2.5}$.

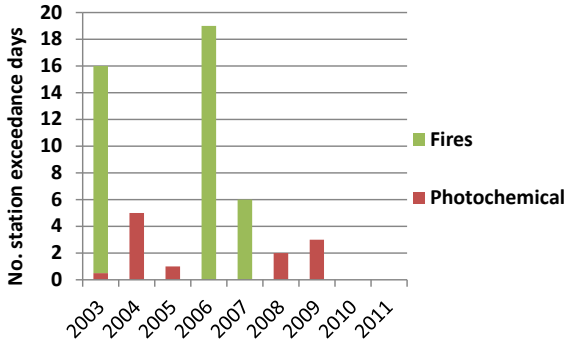
**Trends in compliance**

An analysis of Victoria's compliance with the NEPM has been performed taking into account monitoring over 2003–11[11] and screening (summarised in Table 4).

Between 2003–11, the goals and standards have been consistently met in Victoria for carbon monoxide, nitrogen dioxide, sulfur dioxide and lead.

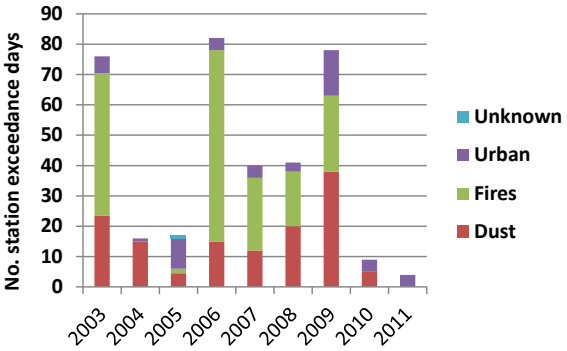
For ozone, the NEPM goal was met in five of the last nine years in the Port Phillip region (2004, 2005, 2007, 2010 and 2011) and in eight of the last nine years in the Latrobe Valley region (2003, 2004, 2005, 2007, 2008, 2009, 2010 and 2011)[12]. Exceedances of both the four-hour and (less frequently) one-hour standards have been recorded. Major bushfires in 2003, 2006 and 2007 caused or exacerbated many of the ozone exceedances observed (see Figure 3)[13]. Ozone monitoring in other rural regions did not record any exceedances and all except Ballarat satisfied screening criteria.

11 Prior to 2003 Victoria's monitoring network was not fully established for ozone and particles.
12 A region achieves the goal in any year if all stations in the region achieve the goal.
13 The regional exceedances shown in Figures 3 to 5 are the sum of the exceedance days recorded at all stations in the region. This number cannot be compared with the AAQ NEPM goal.




## Figure 3: Inferred causes of exceedances of the ozone four-hour standard (Port Phillip region 2003–11)

In the Port Phillip region, the particles as $PM_{10}$ goal has only been met in 2010 and 2011 during the period 2003–11. The elevated particle levels above the air quality standard were attributed (see Figure 4) to fires (bushfires or planned burning) as the most frequent cause, followed by windborne dust (either locally raised dust or dust storms with transport over larger distances). 2003, 2006 and 2009 were particularly affected by fires, with no station in the Port Phillip region meeting the goal. In other years, although some stations did not meet the goal, the majority of stations in the region met the goal.

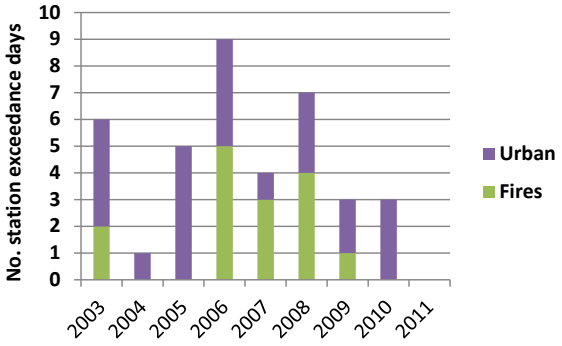



## Figure 4: Inferred causes of exceedances of the $PM_{10}$ standard (Port Phillip region 2003–11)

In the Latrobe Valley region, the particles as $PM_{10}$ goal was not met for the years 2003, 2006, 2007, 2008 and 2009 during the period 2002-11.

The major cause of the elevated particle levels were mainly attributed to fire – bushfires and/or planned burning – followed by windborne dust (either locally raised dust or dust storms with transport over larger distances).

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 review of the NEPM. $PM_{2.5}$ has been monitored at two stations (Alphington and Footscray) in the Port Phillip region since 2002. Exceedances of the 24-hour $PM_{2.5}$ standard have occurred at these stations (see Figure 5), attributed to urban as well as bushfire and planned burning sources.




## Figure 5: Inferred causes of exceedances of the $PM_{2.5}$ 24-hour standard (Port Phillip region 2003–11)

### Data capture

Compliance with the standards and associated goals can only be demonstrated if data capture is at least 75 per cent in each quarter of the year[14]. In 2011 this requirement was achieved for all pollutants at all stations except Richmond (Q3) for carbon monoxide and Point Henry (station closure) for ozone. Point Henry was closed as the site was not representative of the general population-average exposure. Also, regional air-shed modelling using TAPM showed ozone levels at EPA's Geelong South site were comparable to the Point Henry site.

### Screening

Screening indicates that pollutant levels will meet the goal for carbon monoxide, nitrogen dioxide and ozone for the rural regions of Ballarat, Bendigo, Mildura, Shepparton, Wodonga, and Warrnambool. Campaign monitoring in these regions (with the exception of Mildura) showed that $PM_{10}$ met the goal although levels exceeded the air quality standard on some days. Monitoring at Mildura indicated the region did not meet the goal during the monitoring period due to frequent dust storms.

[14] *National Environment Protection (Ambient Air Quality) Measure Technical paper No. 8,* Annual Reports, available from www.ephc.gov.au/taxonomy/term/74.

# D Trends and pollutant distributions

Results and further analysis of the monitoring data are presented in this section. Percentiles of 2011 daily peak concentrations are provided for each station and standard. In these tables, daily peak values are formed only when at least 75 per cent of the data for the day are valid. Data for stations with less than 15 per cent data in the year are omitted and stations with less than 75 per cent data are shown in italics. Exceedances are shown in bold. The percentiles for eight-hour carbon monoxide and four-hour ozone are based on running averages, including those that overlap from one day to the next.

Percentiles of the daily peak concentrations in Port Phillip Region are plotted after 2001, when monitoring according to the NEPM protocol ensured greater continuity of stations operating each year. The values plotted are averages of the percentiles from stations having at least 75 per cent of data in the year. Different stations and different statistics can suggest different trend behaviour; no estimates of statistical significance are presented.

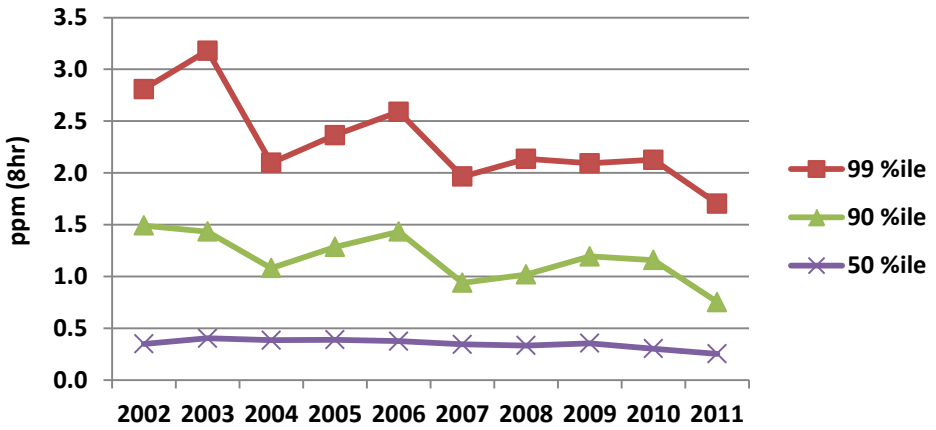
Annual statistics are also presented in tables for each station with at least five years of data. Trend data for lead is presented, although monitoring ceased in 2004.

### Carbon monoxide

## Table 24: 2011 percentiles of daily peak eight-hour carbon monoxide concentrations in Victoria

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

| Region | Data availability | Max | Percentiles (ppm) | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Performance monitoring station** | **(% of days)** | **(ppm)** | **99th** | **98th** | **95th** | **90th** | **75th** | **50th** |
| Port Phillip | | | | | | | | |
| Alphington | 95.1 | 2.9 | 1.8 | 1.6 | 1.2 | 0.8 | 0.3 | 0.1 |
| Geelong South | 98.1 | 2.1 | 1.5 | 1.1 | 0.7 | 0.6 | 0.4 | 0.3 |
| Richmond | 87.4 | 2.6 | 1.8 | 1.5 | 1.2 | 0.9 | 0.6 | 0.4 |




## Figure 6: Percentiles of daily maximum eight-hour carbon monoxide (average of Port Phillip stations 2002–11)

In interpreting trends, it should be noted that monitoring at RMIT ceased in October 2006. This CBD station tended to record higher carbon monoxide, so averages in later years may be relatively lower.

## Table 25: Percentiles of daily maximum eight-hour carbon monoxide at Alphington (1995–2011)

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

| Year | Data availability | No. of exceedances | Max | Percentiles (ppm) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (% of days) | (days) | (ppm) | 99th | 98th | 95th | 90th | 75th | 50th |
| 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 |
| 1997 | 98.9 | 0 | 6.5 | 5.5 | 4.4 | 3.4 | 2.6 | 1.5 | 0.8 |
| 1998 | 95.3 | 0 | 6.8 | 6.0 | 5.1 | 3.9 | 2.7 | 1.7 | 0.7 |
| *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 |
| 2001 | 92.9 | 0 | 5.2 | 3.8 | 3.4 | 2.9 | 2.0 | 1.1 | 0.6 |
| 2002 | 93.7 | 0 | 3.8 | 3.5 | 3.1 | 2.7 | 2.0 | 0.9 | 0.4 |
| 2003 | 96.7 | 0 | 5.4 | 3.9 | 3.5 | 2.7 | 1.8 | 0.9 | 0.5 |
| 2004 | 97.0 | 0 | 3.7 | 2.4 | 2.3 | 1.7 | 1.3 | 0.8 | 0.5 |
| 2005 | 93.7 | 0 | 3.1 | 2.5 | 2.4 | 2.0 | 1.6 | 0.9 | 0.6 |
| 2006 | 89.6 | 0 | 3.6 | 3.2 | 3.0 | 2.5 | 1.9 | 1.0 | 0.6 |
| 2007 | 98.6 | 0 | 2.8 | 2.3 | 1.9 | 1.6 | 1.2 | 0.8 | 0.5 |
| 2008 | 98.4 | 0 | 3.2 | 2.7 | 2.3 | 1.7 | 1.4 | 0.8 | 0.4 |
| 2009 | 97.5 | 0 | 2.6 | 2.1 | 2.0 | 1.8 | 1.3 | 0.7 | 0.3 |
| 2010 | 97.5 | 0 | 2.8 | 2.4 | 2.1 | 1.8 | 1.4 | 0.4 | 0.1 |
| 2011 | 95.1 | 0 | 2.9 | 1.8 | 1.6 | 1.2 | 0.8 | 0.3 | 0.1 |

Years with data availability below 75 per cent shown in italics.

## Table 26: Percentiles of daily maximum eight-hour carbon monoxide at Geelong South (1995–2011)

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

| Year | Data availability | No. of exceedances | Max | Percentiles (ppm) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (% of days) | (days) | (ppm) | 99th | 98th | 95th | 90th | 75th | 50th |
| 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* | *0.0* | | | | | | | | |
| *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[a] | 1.7 | 1.6 | 0.9 | 0.6 | 0.4 | 0.1 |
| 2005 | 96.4 | 0 | 3.5 | 1.8 | 1.5 | 0.9 | 0.7 | 0.2 | 0.1 |
| 2006 | 92.3 | 0 | 2.2 | 1.9 | 1.6 | 1.2 | 0.7 | 0.3 | 0.1 |
| 2007 | 98.1 | 0 | 1.9 | 1.3 | 1.1 | 0.7 | 0.6 | 0.4 | 0.2 |
| 2008 | 94.5 | 0 | 2.2 | 1.8 | 1.6 | 1.0 | 0.5 | 0.3 | 0.2 |
| 2009 | 98.6 | 0 | 2.6 | 1.6 | 1.2 | 1.0 | 0.7 | 0.4 | 0.3 |
| 2010 | 98.1 | 0 | 1.8 | 1.3 | 1.2 | 0.8 | 0.7 | 0.5 | 0.3 |
| 2011 | 98.1 | 0 | 2.1 | 1.5 | 1.1 | 0.7 | 0.6 | 0.4 | 0.3 |

a Recorded on a day with less than 75 per cent of valid eight-hour averages.

Years with data availability below 75 per cent shown in italics.

## Table 27: Percentiles of daily maximum eight-hour carbon monoxide at Richmond (2001–11)

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

| Year | Data availability | No. of exceedances | Max | Percentiles (ppm) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (% of days) | (days) | (ppm) | 99th | 98th | 95th | 90th | 75th | 50th |
| 2001 | 89.3 | 0 | 4.0 | 3.4 | 3.1 | 2.7 | 2.0 | 1.1 | 0.5 |
| 2002 | 93.2 | 0 | 5.0 | 3.1 | 2.8 | 2.4 | 1.9 | 0.8 | 0.3 |
| 2003 | 96.4 | 0 | 6.4 | 4.0 | 3.6 | 2.6 | 1.7 | 0.8 | 0.3 |
| 2004 | 96.2 | 0 | 3.9 | 2.4 | 2.2 | 1.8 | 1.2 | 0.6 | 0.3 |
| 2005 | 96.2 | 0 | 3.8 | 3.1 | 2.8 | 2.2 | 1.5 | 0.6 | 0.2 |
| 2006 | 95.3 | 0 | 3.2 | 2.9 | 2.8 | 2.3 | 1.7 | 0.7 | 0.3 |
| 2007 | 97.3 | 0 | 2.9 | 2.3 | 1.9 | 1.5 | 1.0 | 0.5 | 0.3 |
| 2008 | 95.4 | 0 | 3.7 | 1.9 | 1.6 | 1.5 | 1.2 | 0.6 | 0.4 |
| 2009 | 95.3 | 0 | 3.3[a] | 2.5 | 2.3 | 2.0 | 1.5 | 0.8 | 0.5 |
| 2010 | 94.0 | 0 | 3.8 | 2.7 | 1.9 | 1.6 | 1.4 | 0.7 | 0.5 |
| 2011 | 87.4 | 0 | 2.6 | 1.8 | 1.5 | 1.2 | 0.9 | 0.6 | 0.4 |

a Recorded on a day with less than 75 per cent of valid eight-hour averages.

## Table 28: Percentiles of daily maximum eight-hour carbon monoxide at RMIT (CBD) (1995–2006)

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

| Year | Data availability | No. of exceedances | Max | Percentiles (ppm) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (% of days) | (days) | (ppm) | 99th | 98th | 95th | 90th | 75th | 50th |
| *1995* | *2.7* | | | | | | | | |
| 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 |
| 2005 | 95.3 | 0 | 2.4 | 2.1 | 2.0 | 1.7 | 1.3 | 0.9 | 0.6 |
| 2006 | 77.0 | 0 | 2.9 | 2.5 | 2.0 | 1.7 | 1.5 | 1.0 | 0.6 |

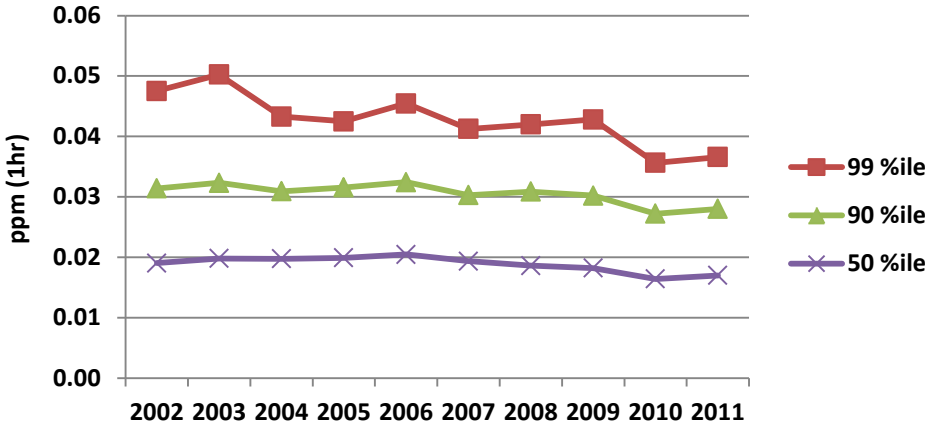
Years with data availability below 75 per cent shown in italics.

### Nitrogen dioxide

## Table 29: 2011 percentiles of daily peak one-hour nitrogen dioxide concentrations in Victoria

AAQ NEPM standard: 0.12 ppm (one-hour average)
AAQ NEPM goal: standard exceeded on no more than one day per year

| Region | Data availability | Max | Percentiles (ppm) | | | | | |
|---|---|---|---|---|---|---|---|---|
| Performance monitoring station | (% of days) | (ppm) | 99th | 98th | 95th | 90th | 75th | 50th |
| Port Phillip | | | | | | | | |
| Alphington | 96.2 | 0.046 | 0.040 | 0.035 | 0.031 | 0.029 | 0.026 | 0.021 |
| Brighton | 99.2 | 0.042 | 0.035 | 0.034 | 0.032 | 0.030 | 0.025 | 0.018 |
| Footscray | 96.7 | 0.053 | 0.044 | 0.038 | 0.035 | 0.032 | 0.027 | 0.021 |
| Geelong South | 99.7 | 0.040 | 0.031 | 0.030 | 0.028 | 0.025 | 0.020 | 0.013 |
| Point Cook | 91.2 | 0.038 | 0.033 | 0.031 | 0.027 | 0.024 | 0.019 | 0.012 |
| Latrobe Valley | | | | | | | | |
| Traralgon | 99.5 | 0.034 | 0.028 | 0.027 | 0.025 | 0.023 | 0.019 | 0.013 |




## Figure 7: Percentiles of daily maximum one-hour nitrogen dioxide (average of Port Phillip stations 2002–11)

In interpreting trends, it should be noted that monitoring at RMIT ceased in October 2006. This CBD station tended to record higher nitrogen dioxide, so averages in later years may be relatively lower.

## Table 30: Percentiles of daily maximum one-hour nitrogen dioxide at Alphington (1995–2011)

AAQ NEPM standard: 0.12 ppm (one-hour average)
AAQ NEPM goal: standard exceeded on no more than one day per year

| Year | Data availability | No. of exceedances | Max | Percentiles (ppm) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (% of days) | (days) | (ppm) | 99th | 98th | 95th | 90th | 75th | 50th |
| *1995* | *72.6* | *0* | *0.052* | *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 |
| 2005 | 94.8 | 0 | 0.050 | 0.043 | 0.039 | 0.035 | 0.033 | 0.027 | 0.022 |
| 2006 | 90.7 | 0 | 0.069 | 0.044 | 0.042 | 0.038 | 0.034 | 0.030 | 0.024 |
| 2007 | 100.0 | 0 | 0.052 | 0.046 | 0.039 | 0.035 | 0.033 | 0.029 | 0.024 |
| 2008 | 97.8 | 0 | 0.060 | 0.043 | 0.039 | 0.035 | 0.032 | 0.028 | 0.022 |
| 2009 | 98.4 | 0 | 0.051 | 0.043 | 0.042 | 0.035 | 0.031 | 0.026 | 0.020 |
| 2010 | 98.4 | 0 | 0.038 | 0.034 | 0.034 | 0.031 | 0.028 | 0.024 | 0.019 |
| 2011 | 96.2 | 0 | 0.046 | 0.040 | 0.035 | 0.031 | 0.029 | 0.026 | 0.021 |

Years with data availability below 75 per cent shown in italics.

## Table 31: Percentiles of daily maximum one-hour nitrogen dioxide at Brighton (1995–2011)

AAQ NEPM standard: 0.12 ppm (one-hour average)
AAQ NEPM goal: standard exceeded on no more than one day per year

| Year | Data availability | No. of exceedances | Max | Percentiles (ppm) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (% of days) | (days) | (ppm) | 99th | 98th | 95th | 90th | 75th | 50th |
| 1995 | 85.2 | 0 | 0.060 | 0.049 | 0.042 | 0.038 | 0.034 | 0.028 | 0.022 |
| 1996 | 82.8 | 0 | 0.056 | 0.044 | 0.044 | 0.038 | 0.034 | 0.028 | 0.022 |
| 1997 | 90.7 | 0 | 0.075 | 0.063 | 0.058 | 0.047 | 0.042 | 0.034 | 0.026 |
| 1998 | 85.5 | 0 | 0.054 | 0.048 | 0.044 | 0.040 | 0.035 | 0.028 | 0.022 |
| 1999 | 99.7 | 0 | 0.054 | 0.047 | 0.043 | 0.040 | 0.035 | 0.030 | 0.024 |
| 2000 | 92.3 | 0 | 0.061 | 0.054 | 0.044 | 0.038 | 0.033 | 0.028 | 0.022 |
| 2001 | 81.9 | 0 | 0.058 | 0.049 | 0.043 | 0.037 | 0.035 | 0.029 | 0.022 |
| 2002 | 94.8 | 0 | 0.053 | 0.049 | 0.044 | 0.038 | 0.033 | 0.028 | 0.021 |
| 2003 | 98.1 | 0 | 0.074 | 0.053 | 0.045 | 0.037 | 0.033 | 0.027 | 0.021 |
| 2004 | 96.4 | 0 | 0.049 | 0.042 | 0.039 | 0.035 | 0.031 | 0.025 | 0.019 |
| 2005 | 99.2 | 0 | 0.054 | 0.040 | 0.038 | 0.034 | 0.032 | 0.027 | 0.020 |
| 2006 | 94.0 | 0 | 0.052 | 0.045 | 0.040 | 0.036 | 0.032 | 0.026 | 0.019 |
| 2007 | 99.7 | 0 | 0.048 | 0.040 | 0.038 | 0.034 | 0.032 | 0.026 | 0.020 |
| 2008 | 98.9 | 0 | 0.053 | 0.042 | 0.039 | 0.035 | 0.033 | 0.027 | 0.021 |
| 2009 | 97.0 | 0 | 0.049 | 0.041 | 0.038 | 0.034 | 0.031 | 0.026 | 0.020 |
| 2010 | 99.7 | 0 | 0.045 | 0.036 | 0.035 | 0.032 | 0.029 | 0.024 | 0.018 |
| 2011 | 99.2 | 0 | 0.042 | 0.035 | 0.034 | 0.032 | 0.030 | 0.025 | 0.018 |

## Table 32: Percentiles of daily maximum one-hour nitrogen dioxide at Footscray (1995–2011)

AAQ NEPM standard: 0.12 ppm (one-hour average)
AAQ NEPM goal: standard exceeded on no more than one day per year

| Year | Data availability | No. of exceedances | Max | Percentiles (ppm) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (% of days) | (days) | (ppm) | 99th | 98th | 95th | 90th | 75th | 50th |
| 1995 | 87.1 | 0 | 0.056 | 0.051 | 0.048 | 0.043 | 0.038 | 0.031 | 0.024 |
| 1996 | 91.5 | 0 | 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 | 0 | 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 |
| 2005 | 99.5 | 0 | 0.053 | 0.046 | 0.043 | 0.038 | 0.034 | 0.027 | 0.021 |
| 2006 | 87.7 | 0 | 0.071 | 0.051 | 0.046 | 0.040 | 0.034 | 0.028 | 0.022 |
| 2007 | 99.7 | 0 | 0.056 | 0.050 | 0.045 | 0.038 | 0.035 | 0.030 | 0.025 |
| 2008 | 100.0 | 0 | 0.064 | 0.048 | 0.045 | 0.038 | 0.034 | 0.029 | 0.022 |
| 2009 | 99.5 | 0 | 0.064 | 0.052 | 0.047 | 0.041 | 0.036 | 0.029 | 0.023 |
| 2010 | 99.7 | 0 | 0.062 | 0.045 | 0.043 | 0.036 | 0.032 | 0.026 | 0.020 |
| 2011 | 96.7 | 0 | 0.053 | 0.044 | 0.038 | 0.035 | 0.032 | 0.027 | 0.021 |

Years with data availability below 75 per cent shown in italics.

## Table 33: Percentiles of daily maximum one-hour nitrogen dioxide at Geelong South (1995–2011)

AAQ NEPM standard: 0.12 ppm (one-hour average)
AAQ NEPM goal: standard exceeded on no more than one day per year

| Year | Data availability | No. of exceedances | Max | Percentiles (ppm) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (% of days) | (days) | (ppm) | 99th | 98th | 95th | 90th | 75th | 50th |
| *1995* | *68.8* | *0* | *0.048* | *0.039* | *0.038* | *0.034* | *0.031* | *0.025* | *0.021* |
| 1996 | 86.6 | 0 | 0.044 | 0.041 | 0.038 | 0.033 | 0.028 | 0.024 | 0.018 |
| *1997* | *0.0* | | | | | | | | |
| *1998* | *68.5* | *0* | *0.067* | *0.039* | *0.037* | *0.034* | *0.032* | *0.026* | *0.020* |
| 1999 | 93.7 | 0 | 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 | 0 | 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 |
| 2005 | 98.1 | 0 | 0.048 | 0.038 | 0.034 | 0.029 | 0.026 | 0.021 | 0.015 |
| 2006 | 92.9 | 0 | 0.043 | 0.036 | 0.034 | 0.028 | 0.026 | 0.022 | 0.016 |
| 2007 | 99.7 | 0 | 0.037 | 0.032 | 0.030 | 0.028 | 0.026 | 0.022 | 0.015 |
| 2008 | 99.5 | 0 | 0.052 | 0.039 | 0.033 | 0.029 | 0.027 | 0.021 | 0.015 |
| 2009 | 97.8 | 0 | 0.048 | 0.036 | 0.032 | 0.028 | 0.025 | 0.021 | 0.014 |
| 2010 | 98.6 | 0 | 0.039 | 0.029 | 0.028 | 0.025 | 0.023 | 0.020 | 0.013 |
| 2011 | 99.7 | 0 | 0.040 | 0.031 | 0.030 | 0.028 | 0.025 | 0.020 | 0.013 |

Years with data availability below 75 per cent shown in italics.

## Table 34: Percentiles of daily maximum one-hour nitrogen dioxide at Point Cook (1995–2011)

AAQ NEPM standard: 0.12 ppm (one-hour average)
AAQ NEPM goal: standard exceeded on no more than one day per year

| Year | Data availability | No. of exceedances | Max | Percentiles (ppm) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (% of days) | (days) | (ppm) | 99th | 98th | 95th | 90th | 75th | 50th |
| 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* | *0.0* | | | | | | | | |
| 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 |
| 2005 | 96.7 | 0 | 0.043 | 0.039 | 0.037 | 0.032 | 0.027 | 0.021 | 0.014 |
| 2006 | 89.6 | 0 | 0.049 | 0.047 | 0.043 | 0.033 | 0.028 | 0.022 | 0.014 |
| 2007 | 97.0 | 0 | 0.046 | 0.038 | 0.034 | 0.029 | 0.025 | 0.020 | 0.013 |
| 2008 | 99.7 | 0 | 0.065 | 0.037 | 0.035 | 0.032 | 0.028 | 0.020 | 0.013 |
| 2009 | 98.1 | 0 | 0.055 | 0.041 | 0.036 | 0.032 | 0.028 | 0.021 | 0.014 |
| 2010 | 89.3 | 0 | 0.037 | 0.033 | 0.032 | 0.027 | 0.024 | 0.010 | 0.012 |
| 2011 | 91.2 | 0 | 0.038 | 0.033 | 0.031 | 0.027 | 0.024 | 0.019 | 0.012 |

Years with data availability below 75 per cent shown in italics.

## Table 35: Percentiles of daily maximum one-hour nitrogen dioxide at RMIT (CBD) (1996–2006)

AAQ NEPM standard: 0.12 ppm (one-hour average)
AAQ NEPM goal: standard exceeded on no more than one day per year

| Year | Data availability | No. of exceedances | Max | Percentiles (ppm) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (% of days) | (days) | (ppm) | 99th | 98th | 95th | 90th | 75th | 50th |
| 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 |
| 2005 | 98.1 | 0 | 0.058 | 0.050 | 0.047 | 0.041 | 0.037 | 0.032 | 0.027 |
| 2006 | 78.9 | 0 | 0.056 | 0.051 | 0.048 | 0.044 | 0.040 | 0.033 | 0.028 |

## Table 36: Percentiles of daily maximum one-hour nitrogen dioxide at Moe (1995–2009)

AAQ NEPM standard: 0.12 ppm (one-hour average)
AAQ NEPM goal: standard exceeded on no more than one day per year

| Year | Data availability | No. of exceedances | Max | Percentiles (ppm) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (% of days) | (days) | (ppm) | 99th | 98th | 95th | 90th | 75th | 50th |
| *1995* | *74.8* | *0* | *0.031* | *0.028* | *0.026* | *0.024* | *0.022* | *0.018* | *0.014* |
| *1996* | *26.8* | *0* | *0.027* | *0.021* | *0.018* | *0.016* | *0.013* | *0.012* | *0.009* |
| *1997* | *69.6* | *0* | *0.036* | *0.031* | *0.031* | *0.026* | *0.023* | *0.020* | *0.016* |
| 1998 | 87.9 | 0 | 0.049 | 0.036 | 0.033 | 0.029 | 0.026 | 0.022 | 0.016 |
| 1999 | 86.0 | 0 | 0.049 | 0.035 | 0.032 | 0.028 | 0.025 | 0.022 | 0.017 |
| *2000* | *73.5* | *0* | *0.050* | *0.040* | *0.036* | *0.027* | *0.024* | *0.020* | *0.015* |
| 2001 | 95.1 | 0 | 0.036 | 0.028 | 0.026 | 0.024 | 0.022 | 0.018 | 0.014 |
| 2002 | 96.7 | 0 | 0.036 | 0.030 | 0.029 | 0.027 | 0.026 | 0.021 | 0.014 |
| 2003 | 98.4 | 0 | 0.034 | 0.031 | 0.029 | 0.027 | 0.024 | 0.020 | 0.014 |
| 2004 | 100.0 | 0 | 0.032 | 0.026 | 0.024 | 0.023 | 0.021 | 0.018 | 0.014 |
| 2005 | 99.5 | 0 | 0.039 | 0.034 | 0.032 | 0.027 | 0.024 | 0.019 | 0.014 |
| 2006 | 81.1 | 0 | 0.058 | 0.030 | 0.029 | 0.026 | 0.024 | 0.020 | 0.016 |
| 2007 | 98.4 | 0 | 0.032 | 0.028 | 0.027 | 0.024 | 0.022 | 0.019 | 0.014 |
| 2008 | 99.7 | 0 | 0.046 | 0.028 | 0.026 | 0.023 | 0.021 | 0.017 | 0.013 |
| 2009 | 81.6 | 0 | 0.062 | 0.025 | 0.025 | 0.022 | 0.020 | 0.017 | 0.012 |

Years with data availability below 75 per cent shown in italics.

## Table 37: Percentiles of daily maximum one-hour nitrogen dioxide at Traralgon (1995–2011)

AAQ NEPM standard: 0.12 ppm (one-hour average)
AAQ NEPM goal: standard exceeded on no more than one day per year

| Year | Data availability | No. of exceedances | Max | Percentiles (ppm) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (% of days) | (days) | (ppm) | 99th | 98th | 95th | 90th | 75th | 50th |
| 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 |
| 2005 | 91.5 | 0 | 0.040 | 0.032 | 0.030 | 0.028 | 0.026 | 0.023 | 0.016 |
| 2006 | 99.2 | 0 | 0.045 | 0.027 | 0.026 | 0.025 | 0.023 | 0.020 | 0.015 |
| 2007 | 97.5 | 0 | 0.032 | 0.029 | 0.027 | 0.026 | 0.024 | 0.019 | 0.015 |
| 2008 | 99.5 | 0 | 0.039 | 0.033 | 0.029 | 0.026 | 0.024 | 0.020 | 0.014 |
| 2009 | 99.7 | 0 | 0.067 | 0.030 | 0.028 | 0.027 | 0.025 | 0.020 | 0.013 |
| 2010 | 99.2 | 0 | 0.031 | 0.026 | 0.026 | 0.025 | 0.023 | 0.019 | 0.014 |
| 2011 | 99.5 | 0 | 0.034 | 0.028 | 0.027 | 0.025 | 0.023 | 0.019 | 0.013 |

Years with data availability below 75 per cent shown in italics.

### Ozone

## Table 38: 2011 percentiles of daily peak one-hour ozone concentrations in Victoria

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

| Region | Data availability | Max | Percentiles (ppm) | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Performance monitoring station** | **(% of days)** | **(ppm)** | **99th** | **98th** | **95th** | **90th** | **75th** | **50th** |
| Port Phillip | | | | | | | | |
| Alphington | 96.7 | 0.073 | 0.053 | 0.052 | 0.045 | 0.038 | 0.031 | 0.026 |
| Brighton | 98.6 | 0.074 | 0.057 | 0.053 | 0.044 | 0.038 | 0.031 | 0.027 |
| Dandenong | 99.7 | 0.063 | 0.059 | 0.054 | 0.047 | 0.038 | 0.032 | 0.027 |
| Footscray | 97.8 | 0.078 | 0.050 | 0.049 | 0.044 | 0.037 | 0.030 | 0.026 |
| Geelong South | 99.7 | 0.055 | 0.050 | 0.046 | 0.040 | 0.036 | 0.030 | 0.026 |
| Melton | 96.4 | 0.071 | 0.054 | 0.050 | 0.043 | 0.038 | 0.031 | 0.028 |
| Mooroolbark | 100.0 | 0.078 | 0.060 | 0.051 | 0.043 | 0.037 | 0.031 | 0.026 |
| Point Cook | 91.5 | 0.069 | 0.054 | 0.052 | 0.047 | 0.041 | 0.032 | 0.028 |
| *Point Henry* | *17.3* | *0.050* | *0.049* | *0.047* | *0.040* | *0.038* | *0.035* | *0.022* |
| Latrobe Valley | | | | | | | | |
| Traralgon | 100.0 | 0.050 | 0.040 | 0.039 | 0.035 | 0.031 | 0.027 | 0.022 |

Stations with data availability below 75 per cent shown in italics.

## Table 39: 2011 percentiles of daily peak four-hour ozone concentrations in Victoria

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

| Region | Data availability | Max | Percentiles (ppm) | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Performance monitoring station** | **(% of days)** | **(ppm)** | **99th** | **98th** | **95th** | **90th** | **75th** | **50th** |
| Port Phillip | | | | | | | | |
| Alphington | 97.0 | 0.069 | 0.048 | 0.045 | 0.042 | 0.036 | 0.029 | 0.025 |
| Brighton | 97.8 | 0.063 | 0.053 | 0.047 | 0.041 | 0.036 | 0.030 | 0.026 |
| Dandenong | 99.5 | 0.058 | 0.054 | 0.051 | 0.044 | 0.037 | 0.031 | 0.026 |
| Footscray | 97.3 | 0.067 | 0.045 | 0.044 | 0.041 | 0.034 | 0.029 | 0.024 |
| Geelong South | 99.2 | 0.052 | 0.045 | 0.043 | 0.037 | 0.034 | 0.029 | 0.025 |
| Melton | 96.4 | 0.065 | 0.051 | 0.047 | 0.041 | 0.036 | 0.030 | 0.027 |
| Mooroolbark | 99.7 | 0.069 | 0.053 | 0.046 | 0.039 | 0.035 | 0.029 | 0.024 |
| Point Cook | 91.2 | 0.058 | 0.051 | 0.048 | 0.044 | 0.039 | 0.031 | 0.027 |
| *Point Henry* | *17.3* | *0.048* | *0.045* | *0.042* | *0.037* | *0.035* | *0.031* | *0.021* |
| Latrobe Valley | | | | | | | | |
| Traralgon | 100.0 | 0.044 | 0.037 | 0.036 | 0.033 | 0.030 | 0.026 | 0.021 |

Stations with data availability below 75 per cent shown in italics.

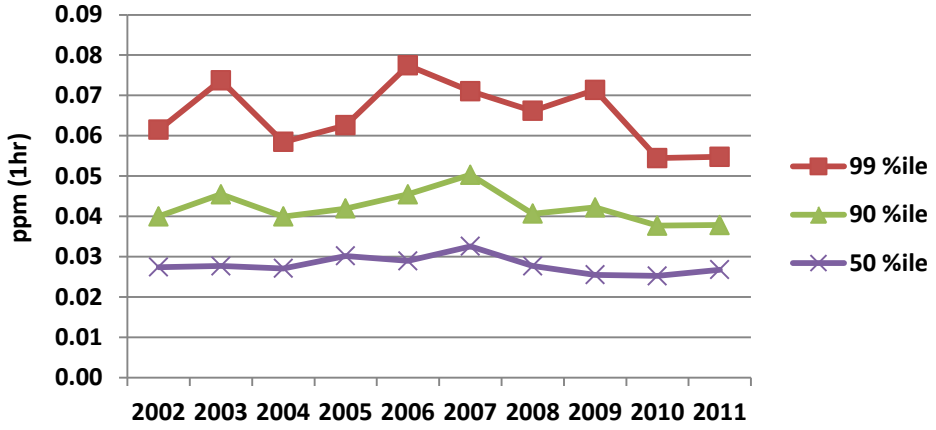



Figure 8: Percentiles of daily maximum one-hour ozone (average of Port Phillip stations 2002–11)

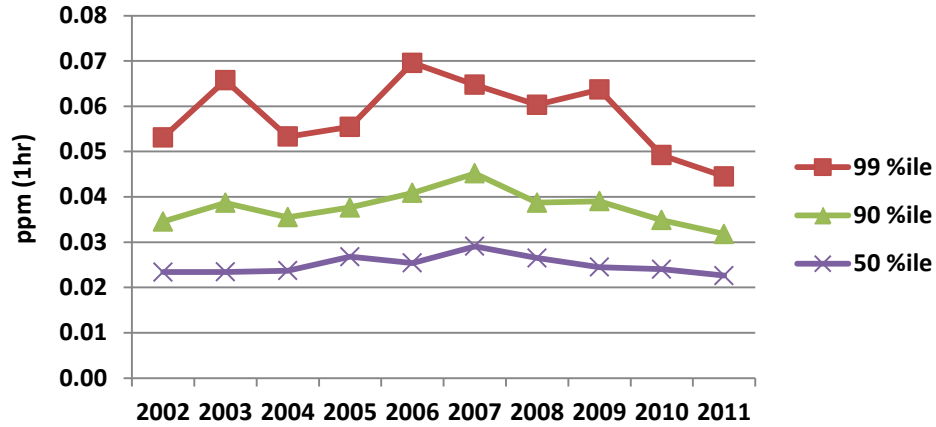



Figure 9: Percentiles of daily maximum four-hour ozone (average of Port Phillip stations 2002–11)

## Table 40: Percentiles of daily maximum one-hour ozone at Alphington (1995–2011)

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

| Year | Data availability | No. of exceedances | Max | Percentiles (ppm) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (% of days) | (days) | (ppm) | 99th | 98th | 95th | 90th | 75th | 50th |
| 1995 | 95.9 | 0 | 0.089 | 0.057 | 0.050 | 0.041 | 0.034 | 0.027 | 0.022 |
| 1996 | 97.3 | 0 | 0.076 | 0.062 | 0.060 | 0.044 | 0.038 | 0.026 | 0.021 |
| 1997 | 91.2 | 0 | 0.099 | 0.076 | 0.069 | 0.050 | 0.036 | 0.026 | 0.020 |
| 1998 | 96.2 | 0 | 0.088 | 0.061 | 0.056 | 0.044 | 0.035 | 0.023 | 0.018 |
| 1999 | 97.8 | 0 | 0.074 | 0.063 | 0.057 | 0.047 | 0.035 | 0.026 | 0.020 |
| 2000 | 98.1 | 0 | 0.067 | 0.055 | 0.049 | 0.045 | 0.034 | 0.024 | 0.020 |
| 2001 | 92.1 | 0 | 0.077 | 0.054 | 0.051 | 0.042 | 0.036 | 0.026 | 0.021 |
| 2002 | 89.6 | 0 | 0.051 | 0.048 | 0.046 | 0.040 | 0.036 | 0.027 | 0.023 |
| 2003 | 96.4 | 1 | **0.102** | 0.064 | 0.059 | 0.050 | 0.041 | 0.030 | 0.025 |
| 2004 | 96.7 | 0 | 0.073 | 0.048 | 0.046 | 0.040 | 0.037 | 0.028 | 0.023 |
| 2005 | 92.9 | 0 | 0.077 | 0.058 | 0.051 | 0.045 | 0.039 | 0.031 | 0.026 |
| 2006 | 90.1 | 3 | **0.127** | 0.084 | 0.068 | 0.059 | 0.048 | 0.033 | 0.026 |
| 2007 | 98.9 | 1 | **0.121** | 0.072 | 0.067 | 0.060 | 0.048 | 0.034 | 0.029 |
| 2008 | 97.3 | 0 | 0.075 | 0.056 | 0.051 | 0.044 | 0.037 | 0.028 | 0.023 |
| 2009 | 96.7 | 0 | 0.084 | 0.070 | 0.055 | 0.045 | 0.040 | 0.028 | 0.023 |
| 2010 | 88.2 | 0 | 0.061 | 0.048 | 0.044 | 0.040 | 0.035 | 0.027 | 0.022 |
| 2011 | 96.7 | 0 | 0.073 | 0.053 | 0.052 | 0.045 | 0.038 | 0.031 | 0.026 |

Exceedances shown in bold.

## Table 41: Percentiles of daily maximum one-hour ozone at Brighton (1995–2011)

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

| Year | Data availability | No. of exceedances | Max | Percentiles (ppm) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (% of days) | (days) | (ppm) | 99th | 98th | 95th | 90th | 75th | 50th |
| 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 |
| 2005 | 97.8 | 0 | 0.088 | 0.067 | 0.053 | 0.047 | 0.040 | 0.032 | 0.028 |
| 2006 | 92.9 | 1 | **0.114** | 0.080 | 0.072 | 0.059 | 0.046 | 0.032 | 0.026 |
| 2007 | 99.7 | 1 | **0.122** | 0.076 | 0.069 | 0.060 | 0.053 | 0.039 | 0.032 |
| 2008 | 98.9 | 0 | 0.090 | 0.073 | 0.071 | 0.050 | 0.044 | 0.034 | 0.029 |
| 2009 | 95.3 | 0 | 0.077 | 0.072 | 0.064 | 0.052 | 0.042 | 0.030 | 0.025 |
| 2010 | 80.5 | 0 | 0.060 | 0.053 | 0.051 | 0.043 | 0.038 | 0.030 | 0.026 |
| 2011 | 98.6 | 0 | 0.074 | 0.057 | 0.053 | 0.044 | 0.038 | 0.031 | 0.027 |

Exceedances shown in bold.

## Table 42: Percentiles of daily maximum one-hour ozone at Dandenong (1995–2011)

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

| Year | Data availability | No. of exceedances | Max | Percentiles (ppm) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (% of days) | (days) | (ppm) | 99th | 98th | 95th | 90th | 75th | 50th |
| 1995 | 97.0 | 0 | 0.098 | 0.057 | 0.052 | 0.043 | 0.036 | 0.029 | 0.025 |
| 1996 | 94.0 | 0 | 0.075 | 0.063 | 0.055 | 0.047 | 0.038 | 0.028 | 0.023 |
| 1997 | 93.2 | 2 | **0.107** | 0.078 | 0.073 | 0.049 | 0.039 | 0.030 | 0.025 |
| 1998 | 98.9 | 0 | 0.096 | 0.078 | 0.063 | 0.049 | 0.039 | 0.029 | 0.024 |
| 1999 | 98.9 | 0 | 0.077 | 0.070 | 0.065 | 0.053 | 0.042 | 0.032 | 0.025 |
| *2000* | *63.6* | *0* | *0.071* | *0.065* | *0.062* | *0.052* | *0.043* | *0.028* | *0.023* |
| 2001 | 75.9 | 0 | 0.073 | 0.062 | 0.058 | 0.048 | 0.041 | 0.032 | 0.026 |
| 2002 | 84.9 | 0 | 0.078 | 0.064 | 0.054 | 0.047 | 0.040 | 0.032 | 0.027 |
| 2003 | 97.5 | 0 | 0.098 | 0.079 | 0.061 | 0.053 | 0.044 | 0.028 | 0.024 |
| 2004 | 96.4 | 0 | 0.080 | 0.064 | 0.049 | 0.042 | 0.038 | 0.029 | 0.024 |
| 2005 | 92.6 | 0 | 0.072 | 0.062 | 0.054 | 0.045 | 0.041 | 0.033 | 0.028 |
| 2006 | 98.9 | 1 | **0.108** | 0.067 | 0.065 | 0.057 | 0.046 | 0.033 | 0.027 |
| 2007 | 98.6 | 1 | **0.112** | 0.072 | 0.063 | 0.056 | 0.047 | 0.035 | 0.028 |
| 2008 | 100.0 | 0 | 0.074 | 0.063 | 0.056 | 0.048 | 0.041 | 0.031 | 0.027 |
| 2009 | 98.4 | 0 | 0.068 | 0.065 | 0.063 | 0.051 | 0.042 | 0.030 | 0.025 |
| 2010 | 97.8 | 0 | 0.077 | 0.059 | 0.053 | 0.044 | 0.038 | 0.029 | 0.024 |
| 2011 | 99.7 | 0 | 0.063 | 0.059 | 0.054 | 0.047 | 0.038 | 0.032 | 0.027 |

Exceedances shown in bold. Years with data availability below 75 per cent shown in italics.

## Table 43: Percentiles of daily maximum one-hour ozone at Footscray (1995–2011)

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

| Year | Data availability | No. of exceedances | Max | Percentiles (ppm) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (% of days) | (days) | (ppm) | 99th | 98th | 95th | 90th | 75th | 50th |
| 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 |
| 2005 | 99.2 | 0 | 0.082 | 0.063 | 0.052 | 0.044 | 0.039 | 0.031 | 0.027 |
| 2006 | 91.5 | 1 | **0.127** | 0.082 | 0.066 | 0.053 | 0.041 | 0.030 | 0.024 |
| 2007 | 99.2 | 1 | **0.127** | 0.067 | 0.063 | 0.057 | 0.049 | 0.035 | 0.029 |
| 2008 | 98.4 | 0 | 0.073 | 0.065 | 0.055 | 0.048 | 0.041 | 0.032 | 0.026 |
| 2009 | 94.2 | 0 | 0.085 | 0.071 | 0.060 | 0.051 | 0.043 | 0.030 | 0.025 |
| 2010 | 99.7 | 0 | 0.068 | 0.053 | 0.049 | 0.042 | 0.038 | 0.030 | 0.025 |
| 2011 | 97.8 | 0 | 0.078 | 0.050 | 0.049 | 0.044 | 0.037 | 0.030 | 0.026 |

Exceedances shown in bold. Years with data availability below 75 per cent shown in italics.

## Table 44: Percentiles of daily maximum one-hour ozone at Geelong South (1995–2011)

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

| Year | Data availability | No. of exceedances | Max | Percentiles (ppm) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (% of days) | (days) | (ppm) | 99th | 98th | 95th | 90th | 75th | 50th |
| 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* | *0.0* | | | | | | | | |
| 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 |
| 2005 | 97.8 | 0 | 0.080 | 0.059 | 0.056 | 0.046 | 0.039 | 0.031 | 0.028 |
| 2006 | 95.1 | 2 | **0.169** | 0.076 | 0.062 | 0.049 | 0.040 | 0.031 | 0.026 |
| 2007 | 99.7 | 0 | 0.088 | 0.068 | 0.063 | 0.053 | 0.045 | 0.035 | 0.030 |
| 2008 | 98.6 | 0 | 0.084 | 0.073 | 0.063 | 0.047 | 0.038 | 0.032 | 0.029 |
| 2009 | 99.5 | 0 | 0.083 | 0.066 | 0.059 | 0.050 | 0.038 | 0.030 | 0.026 |
| 2010 | 96.2 | 0 | 0.084 | 0.057 | 0.052 | 0.047 | 0.039 | 0.031 | 0.027 |
| 2011 | 99.7 | 0 | 0.055 | 0.050 | 0.046 | 0.040 | 0.036 | 0.030 | 0.026 |

Exceedances shown in bold. Years with data availability below 75 per cent shown in italics.

## Table 45: Percentiles of daily maximum one-hour ozone at Melton (2002–11)

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

| Year | Data availability | No. of exceedances | Max | Percentiles (ppm) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (% of days) | (days) | (ppm) | 99th | 98th | 95th | 90th | 75th | 50th |
| *2002* | *14.2* | | | | | | | | |
| 2003 | 97.8 | 1 | **0.112** | 0.083 | 0.074 | 0.056 | 0.046 | 0.032 | 0.029 |
| 2004 | 94.0 | 0 | 0.076 | 0.053 | 0.050 | 0.047 | 0.040 | 0.033 | 0.028 |
| 2005 | 94.0 | 0 | 0.079 | 0.063 | 0.056 | 0.048 | 0.043 | 0.036 | 0.031 |
| 2006 | 99.2 | 1 | **0.126** | 0.084 | 0.067 | 0.053 | 0.046 | 0.036 | 0.030 |
| 2007 | 89.6 | 0 | 0.085 | 0.076 | 0.071 | 0.064 | 0.054 | 0.037 | 0.032 |
| 2008 | 90.2 | 0 | 0.067 | 0.056 | 0.052 | 0.047 | 0.041 | 0.033 | 0.030 |
| 2009 | 97.5 | 0 | 0.092 | 0.074 | 0.065 | 0.054 | 0.044 | 0.032 | 0.027 |
| 2010 | 90.4 | 0 | 0.062 | 0.059 | 0.051 | 0.044 | 0.039 | 0.031 | 0.027 |
| 2011 | 96.4 | 0 | 0.071 | 0.054 | 0.050 | 0.043 | 0.038 | 0.031 | 0.028 |

Exceedances shown in bold. Years with data availability below 75 per cent shown in italics.

## Table 46: Percentiles of daily maximum one-hour ozone at Mooroolbark (2002–11)

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

| Year | Data availability | No. of exceedances | Max | Percentiles (ppm) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (% of days) | (days) | (ppm) | 99th | 98th | 95th | 90th | 75th | 50th |
| *2002* | *57.5* | *0* | *0.089* | *0.070* | *0.055* | *0.046* | *0.038* | *0.033* | *0.028* |
| 2003 | 99.7 | 0 | 0.098 | 0.072 | 0.065 | 0.055 | 0.047 | 0.031 | 0.026 |
| 2004 | 95.6 | 0 | 0.072 | 0.056 | 0.053 | 0.047 | 0.042 | 0.034 | 0.027 |
| 2005 | 97.8 | 0 | 0.089 | 0.064 | 0.053 | 0.045 | 0.042 | 0.035 | 0.029 |
| 2006 | 96.2 | 1 | **0.101** | 0.086 | 0.071 | 0.058 | 0.048 | 0.036 | 0.028 |
| 2007 | 99.7 | 0 | 0.084 | 0.076 | 0.072 | 0.057 | 0.051 | 0.038 | 0.031 |
| 2008 | 98.6 | 0 | 0.081 | 0.064 | 0.057 | 0.051 | 0.045 | 0.034 | 0.027 |
| 2009 | 96.7 | 0 | 0.087 | 0.077 | 0.068 | 0.055 | 0.048 | 0.036 | 0.027 |
| 2010 | 96.2 | 0 | 0.066 | 0.055 | 0.051 | 0.042 | 0.037 | 0.030 | 0.025 |
| 2011 | 100.0 | 0 | 0.078 | 0.060 | 0.051 | 0.043 | 0.037 | 0.031 | 0.026 |

Exceedances shown in bold. Years with data availability below 75 per cent shown in italics.

## Table 47: Percentiles of daily maximum one-hour ozone at Point Cook (1995–2011)

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

| Year | Data availability | No. of exceedances | Max | Percentiles (ppm) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (% of days) | (days) | (ppm) | 99th | 98th | 95th | 90th | 75th | 50th |
| 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 |
| 2005 | 97.0 | 0 | 0.092 | 0.068 | 0.059 | 0.047 | 0.038 | 0.031 | 0.027 |
| 2006 | 85.2 | 1 | **0.104** | 0.069 | 0.062 | 0.048 | 0.039 | 0.029 | 0.026 |
| 2007 | 99.5 | 0 | 0.095 | 0.070 | 0.064 | 0.057 | 0.047 | 0.038 | 0.034 |
| 2008 | 99.7 | 0 | 0.088 | 0.081 | 0.065 | 0.049 | 0.043 | 0.035 | 0.031 |
| 2009 | 96.2 | 2 | **0.102** | 0.085 | 0.071 | 0.057 | 0.045 | 0.032 | 0.026 |
| 2010 | 95.9 | 0 | 0.058 | 0.053 | 0.047 | 0.042 | 0.037 | 0.030 | 0.025 |
| 2011 | 91.5 | 0 | 0.069 | 0.054 | 0.052 | 0.047 | 0.041 | 0.032 | 0.028 |

Exceedances shown in bold.

## Table 48: Percentiles of daily maximum one-hour ozone at Point Henry (1995–2011)

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

| Year | Data availability | No. of exceedances | Max | Percentiles (ppm) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (% of days) | (days) | (ppm) | 99th | 98th | 95th | 90th | 75th | 50th |
| *1995* | *69.3* | *0* | *0.060* | *0.047* | *0.044* | *0.042* | *0.039* | *0.036* | *0.033* |
| 1996 | 98.1 | 1 | **0.104** | 0.065 | 0.058 | 0.047 | 0.036 | 0.032 | 0.029 |
| 1997 | 80.3 | 0 | 0.081 | 0.062 | 0.057 | 0.046 | 0.038 | 0.029 | 0.024 |
| *1998* | *27.7* | *0* | *0.087* | *0.072* | *0.067* | *0.052* | *0.043* | *0.032* | *0.025* |
| *1999* | *0.0* | | | | | | | | |
| *2000* | *14.2* | | | | | | | | |
| *2001* | *57.3* | *0* | *0.089* | *0.074* | *0.068* | *0.052* | *0.045* | *0.032* | *0.024* |
| 2002 | 97.0 | 0 | 0.069 | 0.065 | 0.059 | 0.045 | 0.040 | 0.030 | 0.027 |
| 2003 | 97.8 | 0 | 0.095 | 0.075 | 0.071 | 0.052 | 0.041 | 0.030 | 0.025 |
| 2004 | 97.3 | 0 | 0.093 | 0.060 | 0.054 | 0.043 | 0.037 | 0.029 | 0.025 |
| 2005 | 99.5 | 0 | 0.088 | 0.059 | 0.057 | 0.048 | 0.038 | 0.033 | 0.029 |
| 2006 | 98.9 | 1 | **0.144** | 0.070 | 0.057 | 0.047 | 0.039 | 0.030 | 0.026 |
| 2007 | 99.7 | 1 | **0.101** | 0.062 | 0.059 | 0.048 | 0.041 | 0.030 | 0.027 |
| 2008 | 98.6 | 0 | 0.080 | 0.064 | 0.057 | 0.043 | 0.036 | 0.030 | 0.027 |
| 2009 | 98.1 | 0 | 0.087 | 0.063 | 0.060 | 0.048 | 0.038 | 0.029 | 0.026 |
| 2010 | 81.1 | 0 | 0.077 | 0.053 | 0.049 | 0.043 | 0.038 | 0.031 | 0.026 |
| *2011* | *17.3* | *0* | *0.050* | *0.049* | *0.047* | *0.040* | *0.038* | *0.035* | *0.022* |

Exceedances shown in bold. Years with data availability below 75 per cent shown in italics.

## Table 49: Percentiles of daily maximum one-hour ozone at Moe (1995–2009)

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

| Year | Data availability | No. of exceedances | Max | Percentiles (ppm) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (% of days) | (days) | (ppm) | 99th | 98th | 95th | 90th | 75th | 50th |
| 1995 | 98.1 | 0 | 0.068 | 0.051 | 0.049 | 0.042 | 0.035 | 0.030 | 0.026 |
| 1996 | 98.4 | 0 | 0.052 | 0.042 | 0.038 | 0.034 | 0.030 | 0.025 | 0.022 |
| 1997 | 92.9 | 0 | 0.072 | 0.058 | 0.049 | 0.036 | 0.031 | 0.026 | 0.021 |
| 1998 | 94.2 | 0 | 0.046 | 0.043 | 0.039 | 0.031 | 0.028 | 0.022 | 0.018 |
| 1999 | 81.1 | 0 | 0.063 | 0.042 | 0.038 | 0.032 | 0.030 | 0.027 | 0.022 |
| 2000 | 86.6 | 0 | 0.066 | 0.055 | 0.049 | 0.040 | 0.034 | 0.029 | 0.025 |
| 2001 | 99.5 | 0 | 0.070 | 0.052 | 0.048 | 0.043 | 0.037 | 0.030 | 0.024 |
| 2002 | 96.4 | 0 | 0.059 | 0.050 | 0.046 | 0.041 | 0.036 | 0.031 | 0.027 |
| 2003 | 97.3 | 0 | 0.083 | 0.061 | 0.060 | 0.051 | 0.043 | 0.031 | 0.026 |
| 2004 | 100.0 | 0 | 0.055 | 0.052 | 0.049 | 0.044 | 0.039 | 0.031 | 0.027 |
| 2005 | 99.5 | 0 | 0.062 | 0.055 | 0.047 | 0.041 | 0.036 | 0.031 | 0.027 |
| 2006 | 89.0 | 1 | **0.104** | 0.077 | 0.069 | 0.051 | 0.041 | 0.030 | 0.027 |
| 2007 | 97.8 | 0 | 0.099 | 0.070 | 0.065 | 0.054 | 0.044 | 0.034 | 0.030 |
| 2008 | 100.0 | 0 | 0.057 | 0.052 | 0.047 | 0.038 | 0.031 | 0.024 | 0.021 |
| 2009 | 81.6 | 0 | 0.057 | 0.043 | 0.037 | 0.030 | 0.026 | 0.020 | 0.016 |

Exceedances shown in bold.

## Table 50: Percentiles of daily maximum one-hour ozone at Traralgon (1995–2011)

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

| Year | Data availability | No. of exceedances | Max | Percentiles (ppm) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (% of days) | (days) | (ppm) | 99th | 98th | 95th | 90th | 75th | 50th |
| 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 | 0 | 0.058 | 0.049 | 0.048 | 0.042 | 0.037 | 0.031 | 0.025 |
| 2005 | 86.3 | 0 | 0.067 | 0.050 | 0.046 | 0.040 | 0.035 | 0.031 | 0.026 |
| 2006 | 100.0 | 3 | **0.138** | 0.083 | 0.077 | 0.052 | 0.044 | 0.033 | 0.027 |
| 2007 | 99.2 | 0 | 0.094 | 0.067 | 0.061 | 0.052 | 0.041 | 0.031 | 0.027 |
| 2008 | 100.0 | 0 | 0.061 | 0.055 | 0.048 | 0.038 | 0.032 | 0.026 | 0.023 |
| 2009 | 95.3 | 1 | **0.104** | 0.053 | 0.050 | 0.040 | 0.034 | 0.027 | 0.024 |
| 2010 | 100.0 | 0 | 0.057 | 0.050 | 0.047 | 0.039 | 0.033 | 0.027 | 0.024 |
| 2011 | 100.0 | 0 | 0.050 | 0.040 | 0.039 | 0.035 | 0.031 | 0.027 | 0.022 |

Exceedances shown in bold. Years with data availability below 75 per cent shown in italics.

## Table 51: Percentiles of daily maximum four-hour ozone at Alphington (1995–2011)

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

| Year | Data availability | No. of exceedances | Max | Percentiles (ppm) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (% of days) | (days) | (ppm) | 99th | 98th | 95th | 90th | 75th | 50th |
| 1995 | 95.9 | 0 | 0.067 | 0.050 | 0.046 | 0.039 | 0.032 | 0.025 | 0.021 |
| 1996 | 97.3 | 0 | 0.064 | 0.053 | 0.052 | 0.042 | 0.036 | 0.025 | 0.020 |
| 1997 | 91.2 | 0 | 0.078 | 0.070 | 0.060 | 0.049 | 0.035 | 0.024 | 0.018 |
| 1998 | 96.4 | 0 | 0.075 | 0.055 | 0.050 | 0.040 | 0.033 | 0.022 | 0.016 |
| 1999 | 97.8 | 0 | 0.067 | 0.054 | 0.052 | 0.041 | 0.033 | 0.025 | 0.018 |
| 2000 | 97.3 | 0 | 0.060 | 0.047 | 0.046 | 0.042 | 0.033 | 0.022 | 0.018 |
| 2001 | 91.5 | 0 | 0.062 | 0.051 | 0.046 | 0.040 | 0.034 | 0.025 | 0.020 |
| 2002 | 89.3 | 0 | 0.046 | 0.044 | 0.043 | 0.038 | 0.033 | 0.026 | 0.021 |
| 2003 | 95.9 | 1 | **0.090** | 0.058 | 0.053 | 0.047 | 0.038 | 0.028 | 0.023 |
| 2004 | 96.4 | 0 | 0.069 | 0.045 | 0.044 | 0.038 | 0.034 | 0.026 | 0.022 |
| 2005 | 92.9 | 0 | 0.070 | 0.050 | 0.047 | 0.042 | 0.037 | 0.030 | 0.025 |
| 2006 | 90.1 | 3 | **0.116** | 0.073 | 0.063 | 0.054 | 0.045 | 0.031 | 0.025 |
| 2007 | 98.6 | 1 | **0.115** | 0.065 | 0.062 | 0.053 | 0.046 | 0.033 | 0.027 |
| 2008 | 97.3 | 0 | 0.063 | 0.050 | 0.047 | 0.038 | 0.035 | 0.027 | 0.022 |
| 2009 | 96.4 | 0 | 0.080 | 0.064 | 0.048 | 0.041 | 0.036 | 0.027 | 0.022 |
| 2010 | 87.9 | 0 | 0.057 | 0.044 | 0.041 | 0.037 | 0.033 | 0.026 | 0.021 |
| 2011 | 97.0 | 0 | 0.069 | 0.048 | 0.045 | 0.042 | 0.036 | 0.029 | 0.025 |

Exceedances shown in bold.

## Table 52: Percentiles of daily maximum four-hour ozone at Brighton (1995–2011)

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

| Year | Data availability | No. of exceedances | Max | Percentiles (ppm) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (% of days) | (days) | (ppm) | 99th | 98th | 95th | 90th | 75th | 50th |
| 1995 | 95.1 | 1 | **0.087** | 0.067 | 0.058 | 0.043 | 0.036 | 0.028 | 0.024 |
| 1996 | 95.6 | 0 | 0.078 | 0.065 | 0.056 | 0.044 | 0.035 | 0.027 | 0.022 |
| 1997 | 95.6 | 3 | **0.097** | 0.068 | 0.062 | 0.049 | 0.037 | 0.026 | 0.023 |
| 1998 | 95.6 | 1 | **0.082** | 0.062 | 0.055 | 0.042 | 0.034 | 0.026 | 0.021 |
| 1999 | 99.5 | 0 | 0.069 | 0.059 | 0.056 | 0.047 | 0.037 | 0.028 | 0.022 |
| 2000 | 96.4 | 0 | 0.064 | 0.061 | 0.052 | 0.044 | 0.038 | 0.026 | 0.022 |
| 2001 | 80.0 | 0 | 0.068 | 0.059 | 0.055 | 0.046 | 0.038 | 0.027 | 0.022 |
| 2002 | 93.2 | 0 | 0.072 | 0.056 | 0.048 | 0.039 | 0.034 | 0.028 | 0.023 |
| 2003 | 98.4 | 2 | **0.102** | 0.065 | 0.061 | 0.048 | 0.042 | 0.028 | 0.024 |
| 2004 | 94.5 | 1 | **0.092** | 0.057 | 0.051 | 0.042 | 0.036 | 0.029 | 0.024 |
| 2005 | 97.5 | 0 | 0.069 | 0.062 | 0.051 | 0.043 | 0.038 | 0.030 | 0.026 |
| 2006 | 92.9 | 3 | **0.105** | 0.075 | 0.065 | 0.054 | 0.043 | 0.031 | 0.025 |
| 2007 | 99.7 | 1 | **0.111** | 0.068 | 0.063 | 0.054 | 0.049 | 0.036 | 0.031 |
| 2008 | 98.6 | 0 | 0.079 | 0.068 | 0.066 | 0.047 | 0.041 | 0.033 | 0.028 |
| 2009 | 95.3 | 0 | 0.069 | 0.066 | 0.058 | 0.049 | 0.038 | 0.029 | 0.024 |
| 2010 | 80.0 | 0 | 0.055 | 0.048 | 0.046 | 0.039 | 0.035 | 0.029 | 0.024 |
| 2011 | 97.8 | 0 | 0.063 | 0.053 | 0.047 | 0.041 | 0.036 | 0.030 | 0.026 |

Exceedances shown in bold.

## Table 53: Percentiles of daily maximum four-hour ozone at Dandenong (1995–2011)

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

| Year | Data availability | No. of exceedances | Max | Percentiles (ppm) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (% of days) | (days) | (ppm) | 99th | 98th | 95th | 90th | 75th | 50th |
| 1995 | 97.0 | 1 | **0.082** | 0.052 | 0.049 | 0.041 | 0.033 | 0.028 | 0.023 |
| 1996 | 94.2 | 0 | 0.068 | 0.056 | 0.050 | 0.044 | 0.035 | 0.027 | 0.022 |
| 1997 | 93.2 | 1 | **0.092** | 0.068 | 0.062 | 0.047 | 0.035 | 0.028 | 0.024 |
| 1998 | 98.9 | 0 | 0.076 | 0.065 | 0.059 | 0.044 | 0.036 | 0.027 | 0.023 |
| 1999 | 98.6 | 0 | 0.074 | 0.062 | 0.058 | 0.048 | 0.039 | 0.030 | 0.023 |
| *2000* | *64.1* | *0* | *0.066* | *0.060* | *0.056* | *0.047* | *0.040* | *0.027* | *0.021* |
| 2001 | 75.3 | 0 | 0.063 | 0.055 | 0.054 | 0.045 | 0.038 | 0.030 | 0.025 |
| 2002 | 85.2 | 0 | 0.063 | 0.053 | 0.052 | 0.043 | 0.038 | 0.030 | 0.025 |
| 2003 | 97.8 | 2 | **0.093** | 0.067 | 0.059 | 0.047 | 0.040 | 0.027 | 0.023 |
| 2004 | 96.7 | 0 | 0.067 | 0.058 | 0.046 | 0.040 | 0.035 | 0.027 | 0.023 |
| 2005 | 92.6 | 0 | 0.067 | 0.054 | 0.052 | 0.043 | 0.039 | 0.031 | 0.026 |
| 2006 | 98.6 | 1 | **0.096** | 0.061 | 0.058 | 0.052 | 0.042 | 0.031 | 0.026 |
| 2007 | 98.6 | 1 | **0.106** | 0.064 | 0.060 | 0.052 | 0.044 | 0.033 | 0.027 |
| 2008 | 100.0 | 0 | 0.073 | 0.058 | 0.053 | 0.044 | 0.040 | 0.030 | 0.025 |
| 2009 | 98.4 | 0 | 0.063 | 0.059 | 0.054 | 0.047 | 0.039 | 0.028 | 0.024 |
| 2010 | 97.5 | 0 | 0.071 | 0.054 | 0.048 | 0.043 | 0.037 | 0.030 | 0.025 |
| 2011 | 99.5 | 0 | 0.058 | 0.054 | 0.051 | 0.044 | 0.037 | 0.031 | 0.026 |

Exceedances shown in bold. Years with data availability below 75 per cent shown in italics.

## Table 54: Percentiles of daily maximum four-hour ozone at Footscray (1995–2011)

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

| Year | Data availability | No. of exceedances | Max | Percentiles (ppm) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (% of days) | (days) | (ppm) | 99th | 98th | 95th | 90th | 75th | 50th |
| 1995 | 95.9 | 0 | 0.080 | 0.058 | 0.051 | 0.039 | 0.034 | 0.028 | 0.023 |
| 1996 | 96.2 | 0 | 0.070 | 0.062 | 0.057 | 0.043 | 0.036 | 0.027 | 0.023 |
| 1997 | 98.1 | 3 | **0.095** | 0.072 | 0.063 | 0.049 | 0.038 | 0.028 | 0.024 |
| 1998 | 94.2 | 1 | **0.089** | 0.055 | 0.051 | 0.041 | 0.035 | 0.027 | 0.022 |
| 1999 | 95.9 | 0 | 0.069 | 0.063 | 0.057 | 0.048 | 0.037 | 0.030 | 0.024 |
| 2000 | 87.7 | 0 | 0.055 | 0.052 | 0.047 | 0.043 | 0.035 | 0.026 | 0.021 |
| *2001* | *34.5* | *0* | *0.042* | *0.042* | *0.040* | *0.035* | *0.034* | *0.028* | *0.025* |
| 2002 | 96.7 | 0 | 0.080 | 0.051 | 0.046 | 0.038 | 0.034 | 0.027 | 0.023 |
| 2003 | 97.8 | 2 | **0.094** | 0.063 | 0.056 | 0.045 | 0.038 | 0.026 | 0.021 |
| 2004 | 94.8 | 1 | **0.083** | 0.051 | 0.045 | 0.039 | 0.034 | 0.027 | 0.022 |
| 2005 | 98.9 | 0 | 0.066 | 0.053 | 0.047 | 0.042 | 0.035 | 0.030 | 0.025 |
| 2006 | 91.2 | 3 | **0.103** | 0.070 | 0.059 | 0.047 | 0.040 | 0.028 | 0.023 |
| 2007 | 98.9 | 1 | **0.113** | 0.060 | 0.057 | 0.052 | 0.045 | 0.033 | 0.028 |
| 2008 | 98.1 | 0 | 0.064 | 0.059 | 0.053 | 0.042 | 0.039 | 0.030 | 0.025 |
| 2009 | 94.2 | 0 | 0.073 | 0.063 | 0.055 | 0.046 | 0.038 | 0.028 | 0.024 |
| 2010 | 99.7 | 0 | 0.061 | 0.050 | 0.045 | 0.040 | 0.034 | 0.029 | 0.024 |
| 2011 | 97.3 | 0 | 0.067 | 0.045 | 0.044 | 0.041 | 0.034 | 0.029 | 0.024 |

Exceedances shown in bold. Years with data availability below 75 per cent shown in italics.

## Table 55: Percentiles of daily maximum four-hour ozone at Geelong South (1995–2011)

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

| Year | Data availability | No. of exceedances | Max | Percentiles (ppm) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (% of days) | (days) | (ppm) | 99th | 98th | 95th | 90th | 75th | 50th |
| 1995 | 91.8 | 0 | 0.065 | 0.051 | 0.048 | 0.037 | 0.028 | 0.025 | 0.022 |
| 1996 | 86.8 | 0 | 0.076 | 0.058 | 0.051 | 0.039 | 0.031 | 0.026 | 0.021 |
| *1997* | *0.0* | | | | | | | | |
| 1998 | 95.1 | 0 | 0.076 | 0.048 | 0.042 | 0.033 | 0.029 | 0.026 | 0.022 |
| 1999 | 95.6 | 0 | 0.063 | 0.048 | 0.044 | 0.038 | 0.031 | 0.026 | 0.021 |
| 2000 | 89.0 | 0 | 0.057 | 0.052 | 0.045 | 0.035 | 0.030 | 0.020 | 0.016 |
| 2001 | 92.3 | 0 | 0.075 | 0.057 | 0.054 | 0.038 | 0.030 | 0.023 | 0.019 |
| 2002 | 89.3 | 0 | 0.053 | 0.048 | 0.046 | 0.038 | 0.031 | 0.024 | 0.020 |
| 2003 | 97.0 | 0 | 0.072 | 0.059 | 0.054 | 0.040 | 0.029 | 0.022 | 0.019 |
| 2004 | 91.3 | 1 | **0.085** | 0.054 | 0.052 | 0.041 | 0.034 | 0.028 | 0.023 |
| 2005 | 97.3 | 0 | 0.068 | 0.055 | 0.049 | 0.042 | 0.037 | 0.030 | 0.026 |
| 2006 | 94.2 | 2 | **0.142** | 0.070 | 0.059 | 0.047 | 0.038 | 0.030 | 0.025 |
| 2007 | 99.7 | 0 | 0.076 | 0.062 | 0.057 | 0.049 | 0.042 | 0.034 | 0.029 |
| 2008 | 98.1 | 0 | 0.076 | 0.067 | 0.060 | 0.045 | 0.038 | 0.031 | 0.028 |
| 2009 | 99.5 | 0 | 0.079 | 0.058 | 0.054 | 0.046 | 0.036 | 0.029 | 0.025 |
| 2010 | 95.9 | 0 | 0.067 | 0.048 | 0.044 | 0.039 | 0.035 | 0.029 | 0.024 |
| 2011 | 99.2 | 0 | 0.052 | 0.045 | 0.043 | 0.037 | 0.034 | 0.029 | 0.025 |

Exceedances shown in bold. Years with data availability below 75 per cent shown in italics.

## Table 56: Percentiles of daily maximum four-hour ozone at Melton (2002–11)

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

| Year | Data availability | No. of exceedances | Max | Percentiles (ppm) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | *(% of days)* | (days) | (ppm) | 99th | 98th | 95th | 90th | 75th | 50th |
| *2002* | *14.5* | | | | | | | | |
| 2003 | 97.8 | **4** | **0.099** | 0.077 | 0.063 | 0.052 | 0.042 | 0.032 | 0.028 |
| 2004 | 94.0 | 0 | 0.068 | 0.050 | 0.047 | 0.043 | 0.038 | 0.031 | 0.027 |
| 2005 | 94.2 | 0 | 0.075 | 0.054 | 0.051 | 0.045 | 0.041 | 0.034 | 0.030 |
| 2006 | 99.2 | 3 | **0.115** | 0.073 | 0.060 | 0.051 | 0.043 | 0.034 | 0.029 |
| 2007 | 89.9 | 0 | 0.080 | 0.068 | 0.066 | 0.057 | 0.050 | 0.036 | 0.031 |
| 2008 | 90.2 | 0 | 0.057 | 0.052 | 0.048 | 0.045 | 0.039 | 0.032 | 0.029 |
| 2009 | 97.5 | 0 | 0.078 | 0.063 | 0.057 | 0.049 | 0.042 | 0.031 | 0.026 |
| 2010 | 90.1 | 0 | 0.058 | 0.048 | 0.042 | 0.040 | 0.035 | 0.029 | 0.026 |
| 2011 | 96.4 | 0 | 0.065 | 0.051 | 0.047 | 0.041 | 0.036 | 0.030 | 0.027 |

Exceedances shown in bold. Years with data availability below 75 per cent shown in italics.

## Table 57: Percentiles of daily maximum four-hour ozone at Mooroolbark (2002–11)

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

| Year | Data availability | No. of exceedances | Max | Percentiles (ppm) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (% of days) | (days) | (ppm) | 99th | 98th | 95th | 90th | 75th | 50th |
| *2002* | *57.5* | *0* | *0.075* | *0.063* | *0.047* | *0.041* | *0.036* | *0.030* | *0.026* |
| 2003 | 98.9 | 3 | **0.090** | 0.065 | 0.056 | 0.050 | 0.044 | 0.030 | 0.025 |
| 2004 | 95.6 | 0 | 0.059 | 0.050 | 0.049 | 0.044 | 0.038 | 0.032 | 0.025 |
| 2005 | 97.8 | 0 | 0.072 | 0.055 | 0.049 | 0.043 | 0.039 | 0.033 | 0.028 |
| 2006 | 96.2 | 2 | **0.091** | 0.077 | 0.064 | 0.054 | 0.045 | 0.034 | 0.026 |
| 2007 | 99.5 | 0 | 0.077 | 0.072 | 0.066 | 0.054 | 0.047 | 0.036 | 0.030 |
| 2008 | 98.6 | 0 | 0.073 | 0.057 | 0.053 | 0.047 | 0.041 | 0.032 | 0.027 |
| 2009 | 96.7 | 0 | 0.076 | 0.066 | 0.062 | 0.050 | 0.045 | 0.033 | 0.026 |
| 2010 | 95.9 | 0 | 0.062 | 0.055 | 0.052 | 0.044 | 0.036 | 0.027 | 0.023 |
| 2011 | 99.7 | 0 | 0.069 | 0.053 | 0.046 | 0.039 | 0.035 | 0.029 | 0.024 |

Exceedances shown in bold. Years with data availability below 75 per cent shown in italics.

## Table 58: Percentiles of daily maximum four-hour ozone at Point Cook (1995–2011)

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

| Year | Data availability | No. of exceedances | Max | Percentiles (ppm) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (% of days) | (days) | (ppm) | 99th | 98th | 95th | 90th | 75th | 50th |
| 1995 | 99.7 | 1 | **0.095** | 0.063 | 0.057 | 0.043 | 0.036 | 0.030 | 0.026 |
| 1996 | 99.5 | 0 | 0.079 | 0.066 | 0.057 | 0.045 | 0.034 | 0.029 | 0.025 |
| 1997 | 86.8 | 2 | **0.113** | 0.073 | 0.057 | 0.044 | 0.034 | 0.028 | 0.024 |
| 1998 | 94.8 | 3 | **0.090** | 0.075 | 0.061 | 0.039 | 0.032 | 0.024 | 0.020 |
| 1999 | 91.2 | 0 | 0.069 | 0.065 | 0.060 | 0.047 | 0.035 | 0.026 | 0.022 |
| 2000 | 85.5 | 0 | 0.067 | 0.060 | 0.058 | 0.046 | 0.037 | 0.030 | 0.027 |
| 2001 | 91.0 | 1 | **0.095** | 0.063 | 0.057 | 0.048 | 0.040 | 0.029 | 0.024 |
| 2002 | 96.4 | 0 | 0.070 | 0.062 | 0.056 | 0.044 | 0.036 | 0.029 | 0.025 |
| 2003 | 96.2 | 1 | **0.093** | 0.072 | 0.063 | 0.048 | 0.038 | 0.029 | 0.024 |
| 2004 | 98.6 | 1 | **0.082** | 0.058 | 0.051 | 0.044 | 0.036 | 0.027 | 0.024 |
| 2005 | 96.7 | 1 | **0.082** | 0.062 | 0.050 | 0.043 | 0.037 | 0.030 | 0.026 |
| 2006 | 84.9 | 1 | **0.089** | 0.061 | 0.057 | 0.046 | 0.036 | 0.027 | 0.025 |
| 2007 | 99.5 | 1 | **0.086** | 0.067 | 0.060 | 0.052 | 0.044 | 0.037 | 0.033 |
| 2008 | 99.7 | 2 | **0.082** | 0.074 | 0.061 | 0.045 | 0.040 | 0.034 | 0.030 |
| 2009 | 95.9 | 2 | **0.095** | 0.074 | 0.069 | 0.053 | 0.042 | 0.030 | 0.025 |
| 2010 | 96.2 | 0 | 0.054 | 0.044 | 0.044 | 0.037 | 0.034 | 0.029 | 0.026 |
| 2011 | 91.2 | 0 | 0.058 | 0.051 | 0.048 | 0.044 | 0.039 | 0.031 | 0.027 |

Exceedances shown in bold.

## Table 59: Percentiles of daily maximum four-hour ozone at Point Henry (1995–2011)

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

| Year | Data availability | No. of exceedances | Max | Percentiles (ppm) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (% of days) | (days) | (ppm) | 99th | 98th | 95th | 90th | 75th | 50th |
| *1995* | *69.3* | *0* | *0.056* | *0.042* | *0.042* | *0.039* | *0.038* | *0.035* | *0.032* |
| 1996 | 98.1 | 1 | **0.097** | 0.058 | 0.054 | 0.042 | 0.034 | 0.031 | 0.028 |
| 1997 | 80.3 | 0 | 0.070 | 0.059 | 0.053 | 0.043 | 0.038 | 0.028 | 0.023 |
| *1998* | *27.7* | *0* | *0.076* | *0.064* | *0.060* | *0.043* | *0.038* | *0.030* | *0.023* |
| *1999* | *0.0* | | | | | | | | |
| *2000* | *14.2* | | | | | | | | |
| *2001* | *57.3* | *1* | ***0.085*** | *0.067* | *0.061* | *0.051* | *0.042* | *0.030* | *0.023* |
| 2002 | 96.7 | 0 | 0.064 | 0.058 | 0.052 | 0.042 | 0.036 | 0.029 | 0.026 |
| 2003 | 97.8 | 1 | **0.083** | 0.065 | 0.061 | 0.049 | 0.037 | 0.029 | 0.024 |
| 2004 | 97.3 | 1 | **0.085** | 0.056 | 0.048 | 0.041 | 0.035 | 0.027 | 0.024 |
| 2005 | 99.5 | 0 | 0.076 | 0.056 | 0.051 | 0.045 | 0.036 | 0.031 | 0.028 |
| 2006 | 98.4 | 1 | **0.126** | 0.067 | 0.053 | 0.043 | 0.036 | 0.029 | 0.025 |
| 2007 | 99.7 | 1 | **0.085** | 0.058 | 0.052 | 0.045 | 0.038 | 0.029 | 0.026 |
| 2008 | 98.6 | 0 | 0.073 | 0.058 | 0.050 | 0.041 | 0.035 | 0.029 | 0.026 |
| 2009 | 98.4 | 1 | **0.082** | 0.060 | 0.052 | 0.045 | 0.036 | 0.028 | 0.025 |
| 2010 | 81.1 | 0 | 0.067 | 0.052 | 0.046 | 0.042 | 0.034 | 0.029 | 0.025 |
| *2011* | *17.3* | *0* | *0.048* | *0.045* | *0.042* | *0.037* | *0.035* | *0.031* | *0.021* |

Exceedances shown in bold. Years with data availability below 75 per cent shown in italics.

## Table 60: Percentiles of daily maximum four-hour ozone at Moe (1995–2009)

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

| Year | Data availability | No. of exceedances | Max | Percentiles (ppm) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (% of days) | (days) | (ppm) | 99th | 98th | 95th | 90th | 75th | 50th |
| 1995 | 98.1 | 0 | 0.059 | 0.047 | 0.044 | 0.039 | 0.034 | 0.029 | 0.024 |
| 1996 | 98.4 | 0 | 0.047 | 0.038 | 0.036 | 0.032 | 0.029 | 0.025 | 0.021 |
| 1997 | 92.9 | 0 | 0.067 | 0.050 | 0.047 | 0.033 | 0.029 | 0.024 | 0.020 |
| 1998 | 94.2 | 0 | 0.044 | 0.038 | 0.035 | 0.030 | 0.025 | 0.020 | 0.017 |
| 1999 | 81.1 | 0 | 0.045 | 0.039 | 0.036 | 0.030 | 0.028 | 0.025 | 0.020 |
| 2000 | 86.6 | 0 | 0.056 | 0.051 | 0.045 | 0.037 | 0.033 | 0.028 | 0.024 |
| 2001 | 99.5 | 0 | 0.054 | 0.047 | 0.044 | 0.040 | 0.034 | 0.028 | 0.023 |
| 2002 | 96.7 | 0 | 0.056 | 0.046 | 0.041 | 0.037 | 0.035 | 0.030 | 0.026 |
| 2003 | 97.3 | 0 | 0.072 | 0.059 | 0.056 | 0.048 | 0.038 | 0.029 | 0.025 |
| 2004 | 100.0 | 0 | 0.051 | 0.046 | 0.044 | 0.040 | 0.036 | 0.030 | 0.025 |
| 2005 | 99.5 | 0 | 0.051 | 0.049 | 0.042 | 0.038 | 0.034 | 0.030 | 0.025 |
| 2006 | 88.8 | 3 | **0.094** | 0.065 | 0.056 | 0.047 | 0.038 | 0.030 | 0.025 |
| 2007 | 97.8 | 1 | **0.089** | 0.064 | 0.059 | 0.050 | 0.040 | 0.033 | 0.029 |
| 2008 | 100.0 | 0 | 0.057 | 0.048 | 0.043 | 0.036 | 0.029 | 0.023 | 0.020 |
| 2009 | 81.6 | 0 | 0.047 | 0.040 | 0.034 | 0.028 | 0.025 | 0.019 | 0.015 |

Exceedances shown in bold.

## Table 61: Percentiles of daily maximum four-hour ozone at Traralgon (1995–2011)

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

| Year | Data availability | No. of exceedances | Max | Percentiles (ppm) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (% of days) | (days) | (ppm) | 99th | 98th | 95th | 90th | 75th | 50th |
| 1995 | 93.2 | 0 | 0.048 | 0.040 | 0.038 | 0.032 | 0.028 | 0.024 | 0.020 |
| 1996 | 80.8 | 0 | 0.043 | 0.039 | 0.037 | 0.033 | 0.031 | 0.026 | 0.021 |
| *1997* | *60.5* | *0* | *0.064* | *0.055* | *0.051* | *0.045* | *0.039* | *0.029* | *0.024* |
| 1998 | 92.1 | 0 | 0.058 | 0.053 | 0.048 | 0.041 | 0.035 | 0.029 | 0.024 |
| *1999* | *31.8* | *0* | *0.053* | *0.051* | *0.044* | *0.040* | *0.033* | *0.026* | *0.021* |
| 2000 | 96.7 | 0 | 0.050 | 0.046 | 0.043 | 0.034 | 0.031 | 0.026 | 0.021 |
| 2001 | 97.3 | 0 | 0.052 | 0.047 | 0.045 | 0.037 | 0.031 | 0.026 | 0.022 |
| 2002 | 100.0 | 0 | 0.049 | 0.046 | 0.038 | 0.034 | 0.031 | 0.027 | 0.022 |
| 2003 | 97.3 | 0 | 0.067 | 0.056 | 0.052 | 0.046 | 0.035 | 0.027 | 0.023 |
| 2004 | 97.3 | 0 | 0.050 | 0.044 | 0.043 | 0.039 | 0.034 | 0.029 | 0.023 |
| 2005 | 86.1 | 0 | 0.055 | 0.046 | 0.039 | 0.035 | 0.033 | 0.029 | 0.024 |
| 2006 | 100.0 | 2 | **0.123** | 0.072 | 0.067 | 0.046 | 0.041 | 0.031 | 0.026 |
| 2007 | 99.2 | 1 | **0.082** | 0.058 | 0.056 | 0.047 | 0.037 | 0.029 | 0.026 |
| 2008 | 100.0 | 0 | 0.053 | 0.050 | 0.042 | 0.036 | 0.030 | 0.025 | 0.022 |
| 2009 | 95.6 | 0 | 0.074 | 0.047 | 0.045 | 0.037 | 0.031 | 0.026 | 0.022 |
| 2010 | 100.0 | 0 | 0.047 | 0.043 | 0.040 | 0.036 | 0.031 | 0.026 | 0.022 |
| 2011 | 100.0 | 0 | 0.044 | 0.037 | 0.036 | 0.033 | 0.030 | 0.026 | 0.021 |

Exceedances shown in bold. Years with data availability below 75 per cent shown in italics.

### Sulfur dioxide

## Table 62: 2011 percentiles of daily peak one-hour sulfur dioxide concentrations in Victoria

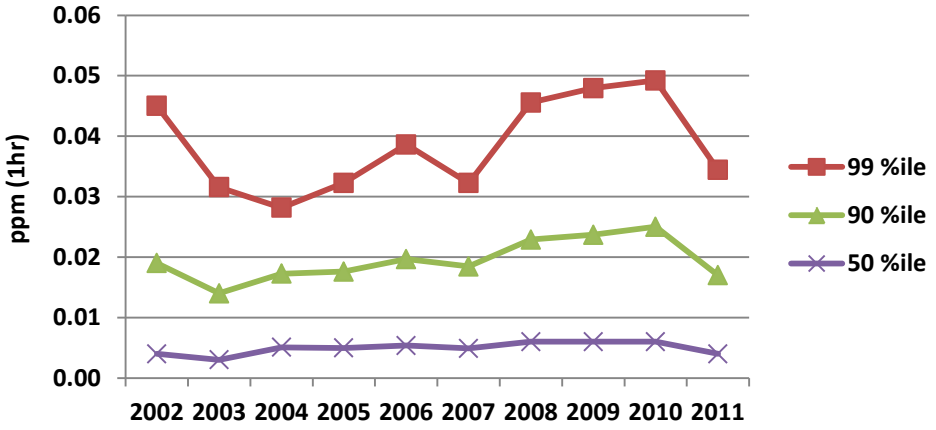
AAQ NEPM standard: 0.20 ppm (one-hour average)
AAQ NEPM goal: standard exceeded on no more than one day per year

| Region | Data availability | Max | Percentiles (ppm) | | | | | |
|---|---|---|---|---|---|---|---|---|
| Performance monitoring station | (% of days) | (ppm) | 99th | 98th | 95th | 90th | 75th | 50th |
| Port Phillip | | | | | | | | |
| Alphington | 94.2 | 0.011 | 0.007 | 0.006 | 0.004 | 0.004 | 0.002 | 0.001 |
| Altona North | 98.4 | 0.047 | 0.034 | 0.030 | 0.023 | 0.017 | 0.008 | 0.004 |
| Geelong South | 97.5 | 0.033 | 0.029 | 0.027 | 0.017 | 0.015 | 0.008 | 0.003 |
| Latrobe Valley | | | | | | | | |
| Traralgon | 99.5 | 0.038 | 0.019 | 0.016 | 0.013 | 0.009 | 0.006 | 0.003 |

## Table 63: 2011 percentiles of daily sulfur dioxide concentrations in Victoria

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

| Region | Data availability | Max | Percentiles (ppm) | | | | | |
|---|---|---|---|---|---|---|---|---|
| Performance monitoring station | (% of days) | (ppm) | 99th | 98th | 95th | 90th | 75th | 50th |
| Port Phillip | | | | | | | | |
| Alphington | 94.2 | 0.003 | 0.002 | 0.002 | 0.001 | 0.001 | 0.001 | 0.000 |
| Altona North | 98.4 | 0.012 | 0.009 | 0.007 | 0.005 | 0.003 | 0.002 | 0.001 |
| Geelong South | 97.5 | 0.005 | 0.004 | 0.004 | 0.004 | 0.003 | 0.002 | 0.001 |
| Latrobe Valley | | | | | | | | |
| Traralgon | 99.5 | 0.005 | 0.004 | 0.004 | 0.003 | 0.003 | 0.002 | 0.001 |




## Figure 10: Percentiles of daily maximum one-hour sulfur dioxide (Altona North 2002-2011)

As there are few $SO_2$ stations, and some changes from year to year, only data from Altona North is presented. This station consistently records the highest readings in the Port Phillip region.

## Table 64: Percentiles of daily maximum one-hour sulfur dioxide at Alphington (1995–2011)

AAQ NEPM standard: 0.20 ppm (one-hour average)
AAQ NEPM goal: standard exceeded on no more than one day per year

| Year | Data availability | No. of exceedances | Max | Percentiles (ppm) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (% of days) | (days) | (ppm) | 99th | 98th | 95th | 90th | 75th | 50th |
| *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 | 0.021 | 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 |
| 2005 | 94.5 | 0 | 0.011 | 0.008 | 0.007 | 0.005 | 0.004 | 0.002 | 0.001 |
| 2006 | 90.7 | 0 | 0.013 | 0.011 | 0.009 | 0.008 | 0.006 | 0.004 | 0.002 |
| 2007 | 99.5 | 0 | 0.022 | 0.010 | 0.008 | 0.006 | 0.005 | 0.004 | 0.002 |
| 2008 | 98.4 | 0 | 0.014 | 0.010 | 0.009 | 0.006 | 0.005 | 0.003 | 0.002 |
| 2009 | 97.5 | 0 | 0.012 | 0.009 | 0.008 | 0.006 | 0.005 | 0.002 | 0.001 |
| 2010 | 95.6 | 0 | 0.008 | 0.007 | 0.007 | 0.005 | 0.004 | 0.002 | 0.001 |
| 2011 | 94.2 | 0 | 0.011 | 0.007 | 0.006 | 0.004 | 0.004 | 0.002 | 0.001 |

Years with data availability below 75 per cent shown in italics.

## Table 65: Percentiles of daily maximum one-hour sulfur dioxide at Altona North (1995–2011)

AAQ NEPM standard: 0.20 ppm (one-hour average)
AAQ NEPM goal: standard exceeded on no more than one day per year

| Year | Data availability | No. of exceedances | Max | Percentiles (ppm) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (% of days) | (days) | (ppm) | 99th | 98th | 95th | 90th | 75th | 50th |
| 1995 | 97.5 | 0 | 0.039 | 0.023 | 0.022 | 0.018 | 0.015 | 0.008 | 0.004 |
| 1996 | 87.7 | 0 | 0.041 | 0.025 | 0.021 | 0.017 | 0.012 | 0.008 | 0.005 |
| 1997 | 96.4 | 0 | 0.069 | 0.054 | 0.048 | 0.031 | 0.022 | 0.009 | 0.004 |
| 1998 | 92.9 | 0 | 0.125 | 0.080 | 0.073 | 0.051 | 0.035 | 0.017 | 0.007 |
| 1999 | 96.2 | 0 | 0.059 | 0.044 | 0.039 | 0.032 | 0.024 | 0.012 | 0.005 |
| 2000 | 92.3 | 0 | 0.068 | 0.049 | 0.044 | 0.031 | 0.024 | 0.010 | 0.003 |
| 2001 | 95.6 | 0 | 0.073 | 0.053 | 0.043 | 0.035 | 0.026 | 0.012 | 0.004 |
| 2002 | 97.3 | 0 | 0.122 | 0.045 | 0.037 | 0.024 | 0.019 | 0.010 | 0.004 |
| 2003 | 94.8 | 0 | 0.036 | 0.032 | 0.027 | 0.020 | 0.014 | 0.007 | 0.003 |
| 2004 | 97.5 | 0 | 0.044 | 0.028 | 0.026 | 0.021 | 0.017 | 0.010 | 0.005 |
| 2005 | 96.2 | 0 | 0.044 | 0.032 | 0.028 | 0.021 | 0.018 | 0.009 | 0.005 |
| 2006 | 92.3 | 0 | 0.053 | 0.039 | 0.031 | 0.024 | 0.020 | 0.011 | 0.005 |
| 2007 | 97.3 | 0 | 0.039 | 0.032 | 0.029 | 0.023 | 0.018 | 0.010 | 0.005 |
| 2008 | 98.9 | 0 | 0.059 | 0.046 | 0.038 | 0.029 | 0.023 | 0.011 | 0.006 |
| 2009 | 97.0 | 0 | 0.068[a] | 0.048 | 0.040 | 0.031 | 0.024 | 0.012 | 0.006 |
| 2010 | 92.1 | 0 | 0.068 | 0.049 | 0.040 | 0.032 | 0.025 | 0.012 | 0.006 |
| 2011 | 98.4 | 0 | 0.047 | 0.034 | 0.030 | 0.023 | 0.017 | 0.008 | 0.004 |

a Recorded on a day with less than 75 per cent of valid one-hour averages.

## Table 66: Percentiles of daily maximum one-hour sulfur dioxide at Geelong South (1995–2011)

AAQ NEPM standard: 0.20 ppm (one-hour average)
AAQ NEPM goal: standard exceeded on no more than one day per year

| Year | Data availability | No. of exceedances | Max | Percentiles (ppm) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (% of days) | (days) | (ppm) | 99th | 98th | 95th | 90th | 75th | 50th |
| 1995 | 88.2 | 0 | 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* | *0.0* | | | | | | | | |
| *1998* | *68.8* | *0* | *0.038* | *0.023* | *0.021* | *0.016* | *0.012* | *0.008* | *0.003* |
| 1999 | 94.0 | 0 | 0.032 | 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 |
| 2005 | 96.4 | 0 | 0.054 | 0.029 | 0.022 | 0.017 | 0.012 | 0.008 | 0.003 |
| 2006 | 93.2 | 0 | 0.036 | 0.029 | 0.026 | 0.017 | 0.013 | 0.007 | 0.003 |
| 2007 | 98.9 | 0 | 0.083 | 0.033 | 0.027 | 0.017 | 0.013 | 0.008 | 0.003 |
| 2008 | 96.7 | 0 | 0.050 | 0.032 | 0.024 | 0.016 | 0.014 | 0.007 | 0.003 |
| 2009 | 98.9 | 0 | 0.037 | 0.026 | 0.024 | 0.017 | 0.012 | 0.007 | 0.003 |
| 2010 | 92.6 | 0 | 0.052 | 0.028 | 0.025 | 0.019 | 0.013 | 0.007 | 0.003 |
| 2011 | 97.5 | 0 | 0.033 | 0.029 | 0.027 | 0.017 | 0.015 | 0.008 | 0.003 |

Years with data availability below 75 per cent shown in italics.

## Table 67: Percentiles of daily maximum one-hour sulfur dioxide at RMIT (CBD) (1995–2006)

AAQ NEPM standard: 0.20 ppm (one-hour average)
AAQ NEPM goal: standard exceeded on no more than one day per year

| Year | Data availability | No. of exceedances | Max | Percentiles (ppm) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (% of days) | (days) | (ppm) | 99th | 98th | 95th | 90th | 75th | 50th |
| *1995* | *2.7* | | | | | | | | |
| 1996 | 82.8 | 0 | 0.016 | 0.014 | 0.013 | 0.009 | 0.007 | 0.004 | 0.001 |
| 1997 | 97.8 | 0 | 0.029 | 0.025 | 0.018 | 0.014 | 0.011 | 0.007 | 0.004 |
| 1998 | 92.6 | 0 | 0.038 | 0.020 | 0.016 | 0.013 | 0.010 | 0.007 | 0.003 |
| 1999 | 98.6 | 0 | 0.020 | 0.013 | 0.012 | 0.010 | 0.008 | 0.005 | 0.002 |
| 2000 | 96.7 | 0 | 0.017 | 0.014 | 0.013 | 0.010 | 0.007 | 0.004 | 0.002 |
| 2001 | 94.2 | 0 | 0.018 | 0.015 | 0.013 | 0.012 | 0.009 | 0.006 | 0.002 |
| 2002 | 94.2 | 0 | 0.024 | 0.017 | 0.013 | 0.012 | 0.010 | 0.006 | 0.002 |
| 2003 | 99.2 | 0 | 0.035 | 0.017 | 0.013 | 0.010 | 0.008 | 0.005 | 0.002 |
| 2004 | 98.4 | 0 | 0.023 | 0.017 | 0.015 | 0.011 | 0.009 | 0.006 | 0.003 |
| 2005 | 98.9 | 0 | 0.017 | 0.015 | 0.012 | 0.010 | 0.008 | 0.005 | 0.003 |
| 2006 | 76.2 | 0 | 0.034 | 0.020 | 0.017 | 0.014 | 0.011 | 0.007 | 0.003 |

Years with data availability below 75 per cent shown in italics.

## Table 68: Percentiles of daily maximum one-hour sulfur dioxide at Moe (1995–2009)

AAQ NEPM standard: 0.20 ppm (one-hour average)
AAQ NEPM goal: standard exceeded on no more than one day per year

| Year | Data availability | No. of exceedances | Max | Percentiles (ppm) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (% of days) | (days) | (ppm) | 99th | 98th | 95th | 90th | 75th | 50th |
| 1995 | 97.8 | 0 | 0.025 | 0.021 | 0.017 | 0.011 | 0.008 | 0.004 | 0.002 |
| 1996 | 98.9 | 0 | 0.033 | 0.019 | 0.015 | 0.012 | 0.008 | 0.004 | 0.002 |
| 1997 | 92.3 | 0 | 0.047 | 0.024 | 0.018 | 0.014 | 0.010 | 0.005 | 0.002 |
| 1998 | 94.8 | 0 | 0.032 | 0.023 | 0.021 | 0.013 | 0.009 | 0.005 | 0.002 |
| 1999 | 94.0 | 0 | 0.030 | 0.020 | 0.017 | 0.015 | 0.011 | 0.006 | 0.002 |
| 2000 | 98.4 | 0 | 0.039 | 0.032 | 0.025 | 0.017 | 0.013 | 0.007 | 0.004 |
| 2001 | 98.4 | 0 | 0.034 | 0.026 | 0.022 | 0.016 | 0.012 | 0.007 | 0.003 |
| 2002 | 97.5 | 0 | 0.046 | 0.022 | 0.020 | 0.014 | 0.010 | 0.005 | 0.003 |
| 2003 | 99.2 | 0 | 0.030 | 0.026 | 0.024 | 0.019 | 0.013 | 0.006 | 0.003 |
| 2004 | 99.7 | 0 | 0.048 | 0.024 | 0.021 | 0.016 | 0.009 | 0.004 | 0.001 |
| 2005 | 100.0 | 0 | 0.047 | 0.029 | 0.026 | 0.017 | 0.012 | 0.006 | 0.002 |
| 2006 | 88.5 | 0 | 0.046 | 0.028 | 0.024 | 0.017 | 0.012 | 0.005 | 0.002 |
| 2007 | 98.9 | 0 | 0.066 | 0.032 | 0.019 | 0.015 | 0.011 | 0.007 | 0.003 |
| 2008 | 99.2 | 0 | 0.033 | 0.025 | 0.023 | 0.016 | 0.012 | 0.006 | 0.002 |
| 2009 | 81.6 | 0 | 0.054 | 0.026 | 0.021 | 0.016 | 0.011 | 0.005 | 0.003 |

## Table 69: Percentiles of daily maximum one-hour sulfur dioxide at Traralgon (1995–2011)

AAQ NEPM standard: 0.20 ppm (one-hour average)
AAQ NEPM goal: standard exceeded on no more than one day per year

| Year | Data availability | No. of exceedances | Max | Percentiles (ppm) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (% of days) | (days) | (ppm) | 99th | 98th | 95th | 90th | 75th | 50th |
| 1995 | 88.5 | 0 | 0.049 | 0.021 | 0.020 | 0.015 | 0.011 | 0.007 | 0.004 |
| 1996 | 85.8 | 0 | 0.032 | 0.017 | 0.014 | 0.011 | 0.008 | 0.006 | 0.003 |
| *1997* | *67.1* | *0* | *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 | 96.7 | 0 | 0.062 | 0.032 | 0.022 | 0.016 | 0.012 | 0.008 | 0.005 |
| 2003 | 97.5 | 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 |
| 2005 | 91.5 | 0 | 0.061 | 0.044 | 0.034 | 0.022 | 0.015 | 0.009 | 0.005 |
| 2006 | 97.5 | 0 | 0.095 | 0.037 | 0.033 | 0.022 | 0.017 | 0.010 | 0.006 |
| 2007 | 96.2 | 0 | 0.092 | 0.041 | 0.029 | 0.022 | 0.016 | 0.011 | 0.006 |
| 2008 | 97.8 | 0 | 0.170 | 0.042 | 0.032 | 0.018 | 0.013 | 0.009 | 0.005 |
| 2009 | 99.5 | 0 | 0.110 | 0.040 | 0.030 | 0.019 | 0.013 | 0.008 | 0.004 |
| 2010 | 100.0 | 0 | 0.049 | 0.028 | 0.021 | 0.012 | 0.009 | 0.006 | 0.003 |
| 2011 | 99.5 | 0 | 0.038 | 0.019 | 0.016 | 0.013 | 0.009 | 0.006 | 0.003 |

Years with data availability below 75 per cent shown in italics.

## Table 70: Percentiles of daily average sulfur dioxide at Alphington (1995–2011)

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

| Year | Data availability | No. of exceedances | Max | Percentiles (ppm) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (% of days) | (days) | (ppm) | 99th | 98th | 95th | 90th | 75th | 50th |
| *1995* | *71.5* | *0* | *0.002* | *0.001* | *0.000* | *0.000* | *0.000* | *-0.001* | *-0.001* |
| 1996 | 97.0 | 0 | 0.003 | 0.002 | 0.002 | 0.002 | 0.001 | 0.001 | 0.000 |
| 1997 | 94.2 | 0 | 0.003 | 0.002 | 0.002 | 0.001 | 0.001 | 0.001 | 0.000 |
| 1998 | 97.0 | 0 | 0.003 | 0.002 | 0.002 | 0.002 | 0.001 | 0.001 | 0.000 |
| 1999 | 97.8 | 0 | 0.001 | 0.001 | 0.001 | 0.001 | 0.000 | 0.000 | -0.001 |
| 2000 | 97.8 | 0 | 0.002 | 0.001 | 0.001 | 0.000 | 0.000 | 0.000 | -0.001 |
| 2001 | 93.4 | 0 | 0.002 | 0.001 | 0.001 | 0.000 | 0.000 | 0.000 | -0.001 |
| 2002 | 98.4 | 0 | 0.002 | 0.001 | 0.001 | 0.000 | 0.000 | 0.000 | -0.001 |
| 2003 | 96.7 | 0 | 0.002 | 0.002 | 0.001 | 0.001 | 0.001 | 0.000 | 0.000 |
| 2004 | 99.7 | 0 | 0.003 | 0.002 | 0.002 | 0.001 | 0.001 | 0.001 | 0.000 |
| 2005 | 94.5 | 0 | 0.002 | 0.002 | 0.002 | 0.001 | 0.001 | 0.001 | 0.000 |
| 2006 | 90.7 | 0 | 0.004 | 0.003 | 0.003 | 0.002 | 0.002 | 0.001 | 0.001 |
| 2007 | 99.5 | 0 | 0.004 | 0.003 | 0.003 | 0.002 | 0.002 | 0.001 | 0.001 |
| 2008 | 98.4 | 0 | 0.005 | 0.003 | 0.002 | 0.002 | 0.002 | 0.001 | 0.001 |
| 2009 | 97.5 | 0 | 0.003 | 0.002 | 0.002 | 0.002 | 0.001 | 0.000 | -0.001 |
| 2010 | 95.6 | 0 | 0.004 | 0.002 | 0.001 | 0.001 | 0.001 | 0.000 | -0.001 |
| 2011 | 94.2 | 0 | 0.003 | 0.002 | 0.002 | 0.001 | 0.001 | 0.001 | 0.000 |

Years with data availability below 75 per cent shown in italics.

## Table 71: Percentiles of daily average sulfur dioxide at Altona North (1995–2011)

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

| Year | Data availability | No. of exceedances | Max | Percentiles (ppm) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (% of days) | (days) | (ppm) | 99th | 98th | 95th | 90th | 75th | 50th |
| 1995 | 97.5 | 0 | 0.007 | 0.005 | 0.005 | 0.003 | 0.002 | 0.001 | 0.000 |
| 1996 | 87.7 | 0 | 0.018 | 0.008 | 0.005 | 0.004 | 0.004 | 0.002 | 0.001 |
| 1997 | 96.4 | 0 | 0.011 | 0.010 | 0.008 | 0.005 | 0.003 | 0.001 | 0.000 |
| 1998 | 92.9 | 0 | 0.021 | 0.017 | 0.014 | 0.010 | 0.005 | 0.003 | 0.001 |
| 1999 | 96.2 | 0 | 0.016 | 0.009 | 0.006 | 0.005 | 0.003 | 0.001 | 0.000 |
| 2000 | 92.3 | 0 | 0.010 | 0.008 | 0.006 | 0.004 | 0.003 | 0.001 | 0.000 |
| 2001 | 95.6 | 0 | 0.033 | 0.013 | 0.011 | 0.006 | 0.004 | 0.001 | 0.000 |
| 2002 | 97.3 | 0 | 0.019 | 0.008 | 0.008 | 0.005 | 0.003 | 0.001 | 0.001 |
| 2003 | 94.8 | 0 | 0.009 | 0.007 | 0.005 | 0.003 | 0.002 | 0.001 | 0.000 |
| 2004 | 97.5 | 0 | 0.013 | 0.008 | 0.006 | 0.005 | 0.003 | 0.002 | 0.001 |
| 2005 | 96.2 | 0 | 0.010 | 0.007 | 0.006 | 0.004 | 0.003 | 0.002 | 0.001 |
| 2006 | 92.3 | 0 | 0.019 | 0.009 | 0.006 | 0.004 | 0.003 | 0.002 | 0.001 |
| 2007 | 97.3 | 0 | 0.013 | 0.008 | 0.006 | 0.004 | 0.003 | 0.002 | 0.001 |
| 2008 | 98.9 | 0 | 0.015 | 0.009 | 0.007 | 0.006 | 0.004 | 0.002 | 0.001 |
| 2009 | 97.0 | 0 | 0.034 | 0.011 | 0.009 | 0.006 | 0.005 | 0.003 | 0.001 |
| 2010 | 92.1 | 0 | 0.026 | 0.012 | 0.009 | 0.006 | 0.004 | 0.003 | 0.001 |
| 2011 | 98.4 | 0 | 0.012 | 0.009 | 0.007 | 0.005 | 0.003 | 0.002 | 0.001 |

## Table 72: Percentiles of daily average sulfur dioxide at Geelong South (1995–2011)

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

| Year | Data availability | No. of exceedances | Max | Percentiles (ppm) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (% of days) | (days) | (ppm) | 99th | 98th | 95th | 90th | 75th | 50th |
| 1995 | 98.4 | 0 | 0.004 | 0.003 | 0.003 | 0.002 | 0.001 | 0.000 | -0.001 |
| 1996 | 76.8 | 0 | 0.005 | 0.004 | 0.003 | 0.002 | 0.001 | 0.000 | -0.001 |
| *1997* | *0.0* | | | | | | | | |
| *1998* | *68.8* | *0* | *0.006* | *0.004* | *0.004* | *0.003* | *0.002* | *0.001* | *0.001* |
| 1999 | 94.0 | 0 | 0.005 | 0.003 | 0.003 | 0.002 | 0.002 | 0.001 | 0.000 |
| 2000 | 88.2 | 0 | 0.006 | 0.003 | 0.002 | 0.002 | 0.001 | 0.001 | 0.000 |
| *2001* | *50.7* | *0* | *0.006* | *0.005* | *0.003* | *0.002* | *0.001* | *0.000* | *-0.001* |
| 2002 | 84.9 | 0 | 0.004 | 0.002 | 0.002 | 0.001 | 0.001 | 0.000 | -0.001 |
| 2003 | 96.2 | 0 | 0.004 | 0.003 | 0.002 | 0.002 | 0.001 | 0.000 | -0.001 |
| 2004 | 90.7 | 0 | 0.006 | 0.004 | 0.003 | 0.002 | 0.002 | 0.001 | 0.000 |
| 2005 | 96.4 | 0 | 0.008 | 0.005 | 0.004 | 0.003 | 0.002 | 0.001 | 0.001 |
| 2006 | 93.2 | 0 | 0.005 | 0.005 | 0.004 | 0.003 | 0.002 | 0.001 | 0.001 |
| 2007 | 98.9 | 0 | 0.009 | 0.004 | 0.003 | 0.003 | 0.002 | 0.001 | 0.001 |
| 2008 | 96.7 | 0 | 0.007 | 0.004 | 0.004 | 0.003 | 0.002 | 0.001 | 0.001 |
| 2009 | 98.9 | 0 | 0.006 | 0.004 | 0.003 | 0.003 | 0.002 | 0.001 | 0.001 |
| 2010 | 92.6 | 0 | 0.007 | 0.004 | 0.004 | 0.003 | 0.002 | 0.001 | 0.001 |
| 2011 | 97.5 | 0 | 0.005 | 0.004 | 0.004 | 0.004 | 0.003 | 0.002 | 0.001 |

Years with data availability below 75 per cent shown in italics.

## Table 73: Percentiles of daily average sulfur dioxide at RMIT (CBD) (1995–2006)

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

| Year | Data availability | No. of exceedances | Max | Percentiles (ppm) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (% of days) | (days) | (ppm) | 99th | 98th | 95th | 90th | 75th | 50th |
| *1995* | *2.7* | | | | | | | | |
| 1996 | 82.8 | 0 | 0.003 | 0.003 | 0.002 | 0.002 | 0.001 | 0.000 | -0.001 |
| 1997 | 97.8 | 0 | 0.006 | 0.006 | 0.005 | 0.004 | 0.003 | 0.002 | 0.001 |
| 1998 | 92.6 | 0 | 0.007 | 0.005 | 0.004 | 0.003 | 0.002 | 0.001 | 0.000 |
| 1999 | 98.6 | 0 | 0.005 | 0.003 | 0.003 | 0.002 | 0.002 | 0.001 | 0.000 |
| 2000 | 96.7 | 0 | 0.006 | 0.004 | 0.003 | 0.002 | 0.002 | 0.001 | 0.000 |
| 2001 | 94.2 | 0 | 0.004 | 0.004 | 0.003 | 0.002 | 0.002 | 0.000 | 0.000 |
| 2002 | 94.2 | 0 | 0.005 | 0.004 | 0.003 | 0.003 | 0.002 | 0.001 | 0.000 |
| 2003 | 99.2 | 0 | 0.006 | 0.005 | 0.004 | 0.003 | 0.002 | 0.001 | 0.001 |
| 2004 | 98.4 | 0 | 0.007 | 0.004 | 0.004 | 0.003 | 0.003 | 0.002 | 0.001 |
| 2005 | 98.9 | 0 | 0.005 | 0.004 | 0.003 | 0.003 | 0.002 | 0.001 | 0.001 |
| 2006 | 76.2 | 0 | 0.008 | 0.005 | 0.004 | 0.003 | 0.003 | 0.002 | 0.001 |

Years with data availability below 75 per cent shown in italics.

## Table 74: Percentiles of daily average sulfur dioxide at Moe (1995–2009)

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

| Year | Data availability | No. of exceedances | Max | Percentiles (ppm) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (% of days) | (days) | (ppm) | 99th | 98th | 95th | 90th | 75th | 50th |
| 1995 | 97.8 | 0 | 0.007 | 0.005 | 0.004 | 0.004 | 0.003 | 0.002 | 0.001 |
| 1996 | 98.9 | 0 | 0.008 | 0.005 | 0.004 | 0.003 | 0.003 | 0.002 | 0.001 |
| 1997 | 92.3 | 0 | 0.010 | 0.007 | 0.006 | 0.004 | 0.003 | 0.002 | 0.001 |
| 1998 | 94.8 | 0 | 0.007 | 0.005 | 0.005 | 0.004 | 0.003 | 0.001 | 0.000 |
| 1999 | 94.0 | 0 | 0.008 | 0.005 | 0.005 | 0.004 | 0.003 | 0.002 | 0.001 |
| 2000 | 98.4 | 0 | 0.012 | 0.008 | 0.007 | 0.006 | 0.005 | 0.003 | 0.002 |
| 2001 | 98.4 | 0 | 0.009 | 0.006 | 0.006 | 0.005 | 0.004 | 0.003 | 0.001 |
| 2002 | 97.5 | 0 | 0.010 | 0.007 | 0.006 | 0.004 | 0.004 | 0.002 | 0.001 |
| 2003 | 99.2 | 0 | 0.009 | 0.007 | 0.007 | 0.005 | 0.004 | 0.002 | 0.001 |
| 2004 | 99.7 | 0 | 0.006 | 0.005 | 0.004 | 0.003 | 0.002 | 0.001 | 0.000 |
| 2005 | 100.0 | 0 | 0.009 | 0.006 | 0.004 | 0.004 | 0.003 | 0.002 | 0.001 |
| 2006 | 88.5 | 0 | 0.009 | 0.007 | 0.005 | 0.004 | 0.003 | 0.002 | 0.001 |
| 2007 | 98.4 | 0 | 0.010 | 0.006 | 0.005 | 0.004 | 0.003 | 0.002 | 0.001 |
| 2008 | 99.2 | 0 | 0.007 | 0.006 | 0.005 | 0.004 | 0.003 | 0.002 | 0.001 |
| 2009 | 81.6 | 0 | 0.011 | 0.005 | 0.005 | 0.004 | 0.003 | 0.002 | 0.002 |

## Table 75: Percentiles of daily average sulfur dioxide at Traralgon (1995–2011)

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

| Year | Data availability | No. of exceedances | Max | Percentiles (ppm) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (% of days) | (days) | (ppm) | 99th | 98th | 95th | 90th | 75th | 50th |
| 1995 | 88.5 | 0 | 0.005 | 0.004 | 0.004 | 0.003 | 0.003 | 0.002 | 0.001 |
| 1996 | 85.8 | 0 | 0.008 | 0.004 | 0.003 | 0.003 | 0.002 | 0.002 | 0.001 |
| *1997* | *67.1* | *0* | *0.028* | *0.008* | *0.006* | *0.004* | *0.003* | *0.002* | *0.001* |
| 1998 | 84.1 | 0 | 0.009 | 0.007 | 0.007 | 0.005 | 0.005 | 0.004 | 0.002 |
| 1999 | 80.3 | 0 | 0.006 | 0.005 | 0.004 | 0.004 | 0.003 | 0.003 | 0.001 |
| 2000 | 90.4 | 0 | 0.013 | 0.007 | 0.005 | 0.004 | 0.003 | 0.002 | 0.001 |
| 2001 | 98.6 | 0 | 0.008 | 0.006 | 0.005 | 0.004 | 0.003 | 0.002 | 0.002 |
| 2002 | 96.7 | 0 | 0.009 | 0.008 | 0.005 | 0.004 | 0.004 | 0.003 | 0.002 |
| 2003 | 97.5 | 0 | 0.008 | 0.006 | 0.005 | 0.005 | 0.004 | 0.002 | 0.001 |
| 2004 | 98.4 | 0 | 0.010 | 0.007 | 0.006 | 0.004 | 0.003 | 0.002 | 0.001 |
| 2005 | 91.5 | 0 | 0.012 | 0.007 | 0.005 | 0.004 | 0.003 | 0.002 | 0.001 |
| 2006 | 97.5 | 0 | 0.023 | 0.007 | 0.006 | 0.005 | 0.004 | 0.003 | 0.002 |
| 2007 | 95.6 | 0 | 0.011 | 0.009 | 0.008 | 0.006 | 0.005 | 0.003 | 0.002 |
| 2008 | 97.8 | 0 | 0.026 | 0.008 | 0.007 | 0.005 | 0.004 | 0.003 | 0.002 |
| 2009 | 99.5 | 0 | 0.013 | 0.008 | 0.006 | 0.005 | 0.004 | 0.003 | 0.002 |
| 2010 | 100.0 | 0 | 0.007 | 0.005 | 0.004 | 0.003 | 0.003 | 0.002 | 0.001 |
| 2011 | 99.5 | 0 | 0.005 | 0.004 | 0.004 | 0.003 | 0.003 | 0.002 | 0.001 |

Years with data availability below 75 per cent shown in italics.

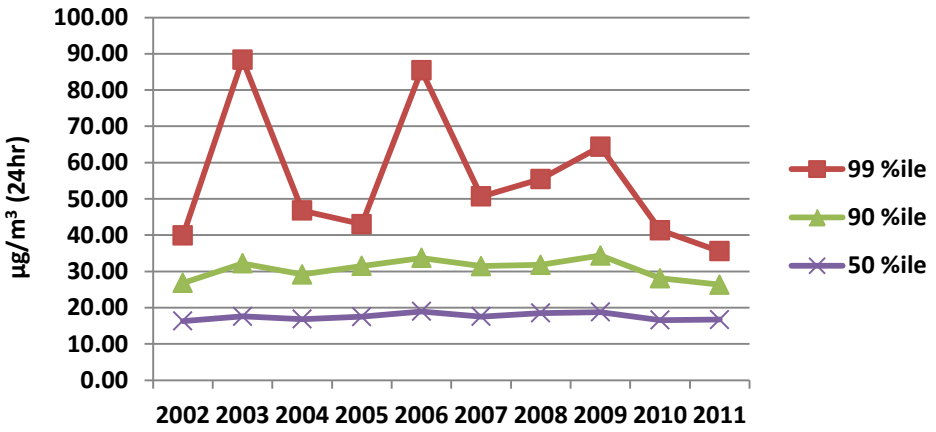
### Particles as $PM_{10}$

## Table 76: 2011 percentiles of daily $PM_{10}$ concentrations in Victoria

AAQ NEPM standard: 50 μg/m³ (24-hour average)
AAQ NEPM goal: standard exceeded on no more than five days per year

| Region | Data availability | Max | Percentiles (μg/m³) | | | | | |
|---|---|---|---|---|---|---|---|---|
| Performance monitoring station | (% of days) | (μg/m³) | 99th | 98th | 95th | 90th | 75th | 50th |
| Port Phillip | | | | | | | | |
| Alphington | 97.0 | **50.3** | 31.7 | 31.1 | 26.3 | 23.6 | 19.5 | 15.6 |
| Brighton | 98.6 | 41.9 | 30.0 | 28.7 | 26.4 | 24.4 | 19.9 | 15.5 |
| Dandenong | 99.5 | 43.5 | 34.5 | 30.7 | 28.9 | 26.6 | 21.5 | 17.4 |
| Footscray | 98.9 | 49.6 | 36.6 | 34.4 | 30.4 | 27.9 | 23.0 | 17.9 |
| Geelong South | 98.9 | **57.4** | 46.2 | 43.8 | 35.1 | 29.4 | 23.2 | 17.7 |
| Mooroolbark | 99.2 | **50.1** | 36.2 | 35.6 | 31.7 | 27.4 | 21.7 | 17.0 |
| Richmond | 92.3 | 42.4 | 33.7 | 32.2 | 28.0 | 24.9 | 20.2 | 15.8 |
| Latrobe Valley | | | | | | | | |
| Traralgon | 99.5 | 41.8 | 31.6 | 30.1 | 26.0 | 21.7 | 18.2 | 15.0 |

Exceedances shown in bold.




## Figure 11: Percentiles of daily $PM_{10}$ (average of Port Phillip stations 2002-2011)

In interpreting trends, it should be noted that $PM_{10}$ monitoring commenced at Geelong and Mooroolbark during 2002 (<75% data capture this year) and these stations, which tend to record higher $PM_{10}$, are not included in the average for 2002.

## Table 77: Percentiles of 24-hour $PM_{10}$ at Alphington (1995–2011)

AAQ NEPM standard: 50 μg/m³ (24-hour average)
AAQ NEPM goal: standard exceeded on no more than five days per year

| Year | Data availability | No. of exceedances | Max | Percentiles (μg/m³) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (% of days) | (days) | (μg/m³) | 99th | 98th | 95th | 90th | 75th | 50th |
| *1995* | *63.0* | *0* | *43.3* | *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 |
| 2005 | 92.6 | 0 | 46.6 | 40.7 | 36.8 | 34.5 | 31.4 | 23.3 | 17.0 |
| 2006 | 87.1 | 8 | **154.7** | **82.5** | **58.4** | 40.0 | 31.3 | 23.9 | 18.4 |
| 2007 | 100.0 | 2 | **83.1** | 43.5 | 40.4 | 35.2 | 30.8 | 22.8 | 17.6 |
| 2008 | 99.5 | 3 | **71.1** | 45.2 | 40.0 | 34.8 | 29.1 | 23.5 | 17.8 |
| 2009 | 98.1 | 7 | **140.8** | **58.9** | 49.6 | 39.8 | 31.5 | 25.3 | 18.5 |
| 2010 | 97.8 | 0 | 47.7 | 37.7 | 35.2 | 31.3 | 27.6 | 22.9 | 17.7 |
| 2011 | 97.0 | 1 | **50.3** | 31.7 | 31.1 | 26.3 | 23.6 | 19.5 | 15.6 |

Years with data availability below 75 per cent shown in italics. Exceedances shown in bold.

## Table 78: Percentiles of 24-hour $PM_{10}$ at Brighton (1996–2011)

AAQ NEPM standard: 50 μg/m³ (24-hour average)
AAQ NEPM goal: standard exceeded on no more than five days per year

| Year | Data availability | No. of exceedances | Max | Percentiles (μg/m³) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (% of days) | (days) | (μg/m³) | 99th | 98th | 95th | 90th | 75th | 50th |
| *1996* | *5.5* | | | | | | | | |
| *1997* | *47.4* | *1* | ***54.8*** | *43.9* | *36.9* | *32.9* | *30.2* | *22.4* | *17.7* |
| 1998 | 85.2 | 0 | 49.0 | 44.7 | 40.3 | 34.0 | 29.0 | 21.4 | 16.4 |
| 1999 | 99.5 | 0 | 49.0 | 32.0 | 31.0 | 26.0 | 23.9 | 19.3 | 15.7 |
| 2000 | 94.0 | 2 | **52.6** | 45.0 | 32.5 | 26.4 | 23.4 | 17.9 | 13.8 |
| 2001 | 95.6 | 1 | **70.8** | 33.4 | 30.9 | 26.5 | 24.3 | 19.4 | 13.9 |
| 2002 | 97.3 | 1 | **69.1** | 34.7 | 31.1 | 28.2 | 24.8 | 19.6 | 14.7 |
| 2003 | 88.8 | 8 | **182.3** | **89.3** | **67.8** | 35.9 | 30.5 | 21.5 | 15.8 |
| 2004 | 89.3 | 0 | 44.9 | 40.5 | 36.6 | 30.4 | 26.4 | 20.9 | 15.9 |
| 2005 | 84.1 | 0 | 41.5 | 33.8 | 32.7 | 28.0 | 25.8 | 19.7 | 14.4 |
| 2006 | 89.9 | 6 | **109.1** | **78.0** | 46.2 | 36.7 | 25.9 | 19.8 | 13.8 |
| 2007 | 99.7 | 1 | **78.4** | 35.9 | 32.7 | 29.4 | 24.1 | 18.1 | 13.7 |
| 2008 | 100.0 | 5 | **65.3** | **52.5** | 43.8 | 33.4 | 26.7 | 21.8 | 16.1 |
| 2009 | 99.5 | 6 | **132.4** | **57.1** | 48.5 | 35.7 | 29.1 | 22.8 | 17.1 |
| 2010 | 91.5 | 0 | 41.0 | 35.8 | 33.3 | 28.2 | 25.7 | 20.1 | 15.4 |
| 2011 | 98.6 | 0 | 41.9 | 30.0 | 28.7 | 26.4 | 24.4 | 19.9 | 15.5 |

Years with data availability below 75 per cent shown in italics. Exceedances shown in bold.

## Table 79: Percentiles of 24-hour $PM_{10}$ at Dandenong (1998–2011)

AAQ NEPM standard: 50 μg/m³ (24-hour average)
AAQ NEPM goal: standard exceeded on no more than five days per year

| Year | Data availability | No. of exceedances | Max | Percentiles (μg/m³) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (% of days) | (days) | (μg/m³) | 99th | 98th | 95th | 90th | 75th | 50th |
| *1998* | *69.6* | *1* | ***50.4*** | *42.8* | *41.1* | *35.1* | *30.3* | *23.5* | *17.4* |
| *1999* | *65.2* | *1* | ***52.3*** | *40.9* | *37.0* | *32.1* | *27.3* | *22.4* | *17.1* |
| *2000* | *73.8* | *1* | ***74.5*** | *43.8* | *39.8* | *32.3* | *29.3* | *22.5* | *15.3* |
| *2001* | *14.5* | | | | | | | | |
| 2002 | 87.4 | 3 | **84.8** | 45.6 | 37.6 | 31.5 | 26.5 | 21.0 | 15.8 |
| 2003 | 93.4 | 8 | **295.1** | **92.3** | **52.4** | 39.0 | 30.9 | 23.4 | 17.6 |
| 2004 | 92.3 | 1 | **50.1** | 44.5 | 42.1 | 35.7 | 30.8 | 23.4 | 16.7 |
| 2005 | 90.1 | 0 | 43.7 | 40.5 | 37.5 | 34.0 | 31.5 | 24.8 | 17.4 |
| 2006 | 100.0 | 12 | **149.2** | **90.9** | **71.3** | 47.5 | 38.2 | 30.0 | 22.8 |
| 2007 | 100.0 | 5 | **84.6** | **52.3** | 47.3 | 39.4 | 35.0 | 27.4 | 19.1 |
| 2008 | 99.2 | 8 | **88.6** | **61.3** | **52.8** | 39.4 | 33.2 | 25.4 | 19.1 |
| 2009 | 94.2 | 12 | **199.7** | **63.7** | **54.8** | 43.3 | 36.8 | 26.0 | 18.7 |
| 2010 | 98.6 | 0 | 43.7 | 38.6 | 36.0 | 31.8 | 27.4 | 21.8 | 15.8 |
| 2011 | 99.5 | 0 | 43.5 | 34.5 | 30.7 | 28.9 | 26.6 | 21.5 | 17.4 |

Years with data availability below 75 per cent shown in italics. Exceedances shown in bold.

## Table 80: Percentiles of 24-hour $PM_{10}$ at Footscray (1996–2011)

AAQ NEPM standard: 50 μg/m³ (24-hour average)
AAQ NEPM goal: standard exceeded on no more than five days per year

| Year | Data availability | No. of exceedances | Max | Percentiles (μg/m³) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (% of days) | (days) | (μg/m³) | 99th | 98th | 95th | 90th | 75th | 50th |
| *1996* | *13.1* | | | | | | | | |
| 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 |
| 2005 | 96.4 | 0 | 48.9 | 44.7 | 41.3 | 37.4 | 35.0 | 26.0 | 18.9 |
| 2006 | 90.1 | 11 | **124.5** | **77.0** | **55.9** | 41.0 | 35.5 | 25.8 | 19.5 |
| 2007 | 99.5 | 4 | **65.9** | 49.8 | 42.2 | 38.6 | 32.2 | 24.4 | 17.8 |
| 2008 | 100.0 | 4 | **89.3** | 48.6 | 46.0 | 42.0 | 33.1 | 25.8 | 19.2 |
| 2009 | 98.9 | 13 | **166.5** | **67.9** | **58.5** | 43.5 | 34.8 | 27.0 | 18.7 |
| 2010 | 99.2 | 4 | **74.8** | **50.8** | 41.3 | 35.4 | 29.3 | 23.2 | 17.4 |
| 2011 | 98.9 | 0 | 49.6 | 36.6 | 34.4 | 30.4 | 27.9 | 23.0 | 17.9 |

Years with data availability below 75 per cent shown in italics. Exceedances shown in bold.

## Table 81: Percentiles of 24-hour $PM_{10}$ at Geelong South (2002–11)

AAQ NEPM standard: 50 μg/m³ (24-hour average)
AAQ NEPM goal: standard exceeded on no more than five days per year

| Year | Data availability | No. of exceedances | Max | Percentiles (μg/m³) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (% of days) | (days) | (μg/m³) | 99th | 98th | 95th | 90th | 75th | 50th |
| *2002* | *32.1* | *6* | *81.1* | *73.2* | *56.8* | *49.5* | *35.8* | *27.4* | *20.1* |
| 2003 | 94.0 | 10 | **148.7** | **80.2** | **57.7** | 45.3 | 35.3 | 25.6 | 18.4 |
| 2004 | 91.8 | 11 | **149.0** | **62.5** | **53.5** | 44.0 | 34.3 | 26.1 | 18.3 |
| 2005 | 96.2 | 7 | **83.0** | **55.2** | 49.3 | 40.6 | 33.7 | 26.6 | 18.5 |
| 2006 | 91.0 | 17 | **116.4** | **98.0** | **72.2** | 49.1 | 38.0 | 26.9 | 19.6 |
| 2007 | 98.9 | 14 | **129.1** | **65.2** | **59.9** | 43.4 | 32.8 | 26.5 | 19.1 |
| 2008 | 99.7 | 6 | **168.7** | **66.6** | 48.8 | 39.4 | 35.4 | 26.4 | 18.9 |
| 2009 | 85.2 | 12 | **154.6** | **65.4** | **57.3** | 46.2 | 36.6 | 27.8 | 20.1 |
| 2010 | 99.5 | 1 | **50.4** | 44.6 | 42.3 | 34.0 | 29.6 | 22.2 | 16.5 |
| 2011 | 98.9 | 2 | **57.4** | 46.2 | 43.8 | 35.1 | 29.4 | 23.2 | 17.7 |

Years with data availability below 75 per cent shown in italics. Exceedances shown in bold.

## Table 82: Percentiles of 24-hour $PM_{10}$ at Mooroolbark (2002–11)

AAQ NEPM standard: 50 μg/m³ (24-hour average)
AAQ NEPM goal: standard exceeded on no more than five days per year

| Year | Data availability | No. of exceedances | Max | Percentiles (μg/m³) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (% of days) | (days) | (μg/m³) | 99th | 98th | 95th | 90th | 75th | 50th |
| *2002* | *57.0* | *1* | *66.7* | *44.9* | *44.3* | *39.7* | *33.2* | *27.0* | *19.9* |
| 2003 | 91.8 | 13 | **322.2** | **118.1** | **91.3** | 45.6 | 37.4 | 26.8 | 19.1 |
| 2004 | 94.8 | 1 | **63.9** | 46.0 | 42.8 | 34.7 | 30.1 | 23.9 | 17.3 |
| 2005 | 99.5 | 9 | **57.6** | **53.7** | **52.1** | 43.1 | 36.1 | 27.4 | 19.3 |
| 2006 | 97.3 | 17 | **219.9** | **135.9** | **69.6** | 46.1 | 39.2 | 29.1 | 21.3 |
| 2007 | 100.0 | 11 | **136.1** | **63.0** | **51.7** | 43.0 | 37.3 | 27.4 | 19.4 |
| 2008 | 97.8 | 10 | **99.9** | **60.6** | **54.7** | 44.5 | 37.8 | 27.7 | 21.1 |
| 2009 | 98.1 | 20 | **214.1** | **82.3** | **67.5** | **50.7** | 41.6 | 28.6 | 20.7 |
| 2010 | 94.0 | 3 | **53.8** | 48.1 | 43.9 | 36.5 | 32.3 | 25.6 | 17.6 |
| 2011 | 99.2 | 1 | **50.1** | 36.2 | 35.6 | 31.7 | 27.4 | 21.7 | 17.0 |

Years with data availability below 75 per cent shown in italics. Exceedances shown in bold.

## Table 83: Percentiles of 24-hour $PM_{10}$ at Richmond (2002–11)

AAQ NEPM standard: 50 μg/m³ (24-hour average)
AAQ NEPM goal: standard exceeded on no more than five days per year

| Year | Data availability | No. of exceedances | Max | Percentiles (μg/m³) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (% of days) | (days) | (μg/m³) | 99th | 98th | 95th | 90th | 75th | 50th |
| 2002 | 92.6 | 1 | **70.0** | 40.3 | 34.7 | 29.2 | 26.5 | 21.2 | 16.5 |
| 2003 | 92.3 | 6 | **274.9** | **73.8** | 48.2 | 33.2 | 29.1 | 21.6 | 16.5 |
| 2004 | 100.0 | 0 | 43.9 | 40.6 | 35.7 | 30.0 | 26.0 | 20.7 | 15.9 |
| 2005 | 96.2 | 1 | **54.9** | 39.0 | 37.0 | 32.0 | 28.9 | 22.5 | 17.1 |
| 2006 | 97.5 | 9 | **140.0** | **78.6** | **53.5** | 37.9 | 31.4 | 24.3 | 18.4 |
| 2007 | 94.0 | 3 | **78.7** | 44.8 | 36.6 | 32.5 | 27.9 | 21.0 | 16.3 |
| 2008 | 97.5 | 5 | **73.5** | **53.2** | 44.3 | 34.0 | 27.2 | 22.4 | 17.4 |
| 2009 | 95.3 | 8 | **121.2** | **55.2** | **50.3** | 36.7 | 30.0 | 23.5 | 17.8 |
| 2010 | 97.3 | 0 | 46.6 | 33.7 | 30.9 | 27.6 | 24.8 | 20.3 | 15.8 |
| 2011 | 92.3 | 0 | 42.4 | 33.7 | 32.2 | 28.0 | 24.9 | 20.2 | 15.8 |

Exceedances shown in bold.

## Table 84: Percentiles of 24-hour $PM_{10}$ at RMIT (CBD) (2002–06)

AAQ NEPM standard: 50 μg/m³ (24-hour average)
AAQ NEPM goal: standard exceeded on no more than five days per year

| Year | Data availability | No. of exceedances | Max | Percentiles (μg/m³) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (% of days) | (days) | (μg/m³) | 99th | 98th | 95th | 90th | 75th | 50th |
| *2002* | *23.3* | *2* | *82.9* | *66.3* | *51.5* | *37.6* | *33.3* | *27.2* | *21.1* |
| 2003 | 96.7 | 11 | **279.4** | **83.5** | **58.3** | 38.8 | 31.3 | 23.9 | 18.7 |
| 2004 | 94.5 | 2 | **79.8** | 46.7 | 41.8 | 32.3 | 28.9 | 23.5 | 18.2 |
| 2005 | 98.4 | 0 | 41.7 | 36.5 | 35.2 | 33.2 | 29.4 | 22.8 | 17.4 |
| 2006 | 78.1 | 1 | **53.0** | 42.6 | 41.4 | 36.0 | 30.0 | 23.6 | 18.0 |

Years with data availability below 75 per cent shown in italics. Exceedances shown in bold.

## Table 85: Percentiles of 24-hour $PM_{10}$ at Moe (2002–09)

AAQ NEPM standard: 50 μg/m³ (24-hour average)
AAQ NEPM goal: standard exceeded on no more than five days per year

| Year | Data availability | No. of exceedances | Max | Percentiles (μg/m³) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (% of days) | (days) | (μg/m³) | 99th | 98th | 95th | 90th | 75th | 50th |
| *2002* | *14.8* | | | | | | | | |
| 2003 | 98.1 | 11 | **288.8** | **81.2** | **56.2** | 37.7 | 31.0 | 21.2 | 14.7 |
| 2004 | 90.2 | 1 | **56.3** | 41.2 | 37.6 | 31.8 | 27.8 | 20.0 | 14.5 |
| 2005 | 99.7 | 0 | 36.9 | 33.4 | 32.6 | 28.5 | 24.7 | 19.8 | 14.2 |
| 2006 | 87.9 | 15 | **254.0** | **135.3** | **85.2** | 42.3 | 28.7 | 21.6 | 16.0 |
| 2007 | 90.7 | 13 | **137.2** | **71.0** | **56.3** | 43.5 | 35.1 | 25.6 | 18.6 |
| 2008 | 98.9 | 6 | **90.9** | **61.9** | 46.5 | 36.3 | 27.8 | 20.8 | 15.8 |
| 2009 | 81.6 | 7 | **169.6** | **55.2** | **51.8** | 37.6 | 30.0 | 21.6 | 16.3 |

Years with data availability below 75 per cent shown in italics. Exceedances shown in bold.

## Table 86: Percentiles of 24-hour $PM_{10}$ at Traralgon (2002–11)

AAQ NEPM standard: 50 μg/m³ (24-hour average)
AAQ NEPM goal: standard exceeded on no more than five days per year

| Year | Data availability | No. of exceedances | Max | Percentiles (μg/m³) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (% of days) | (days) | (μg/m³) | 99th | 98th | 95th | 90th | 75th | 50th |
| *2002* | *15.3* | *0* | *37.1* | *33.2* | *30.0* | *28.8* | *26.4* | *23.5* | *18.7* |
| 2003 | 98.1 | 7 | **237.8** | **59.3** | 47.5 | 37.2 | 27.3 | 21.6 | 16.8 |
| 2004 | 99.7 | 0 | 44.5 | 34.2 | 31.8 | 29.8 | 25.9 | 20.6 | 15.9 |
| 2005 | 90.1 | 0 | 44.9 | 41.0 | 36.8 | 31.5 | 26.3 | 20.8 | 16.2 |
| 2006 | 99.2 | 9 | **193.5** | **82.7** | **50.5** | 32.9 | 27.4 | 22.1 | 17.5 |
| 2007 | 96.4 | 5 | **151.2** | **52.0** | 40.8 | 32.3 | 27.0 | 21.7 | 17.0 |
| 2008 | 100.0 | 2 | **64.9** | 42.1 | 39.2 | 33.2 | 27.9 | 22.4 | 17.6 |
| 2009 | 100.0 | 5 | **125.7** | **51.0** | 40.4 | 35.3 | 29.2 | 23.5 | 17.9 |
| 2010 | 100.0 | 3 | **77.6** | 39.5 | 33.4 | 28.1 | 24.4 | 19.4 | 15.6 |
| 2011 | 99.5 | 0 | 41.8 | 31.6 | 30.1 | 26.0 | 21.7 | 18.2 | 15.0 |

Years with data availability below 75 per cent shown in italics. Exceedances shown in bold.

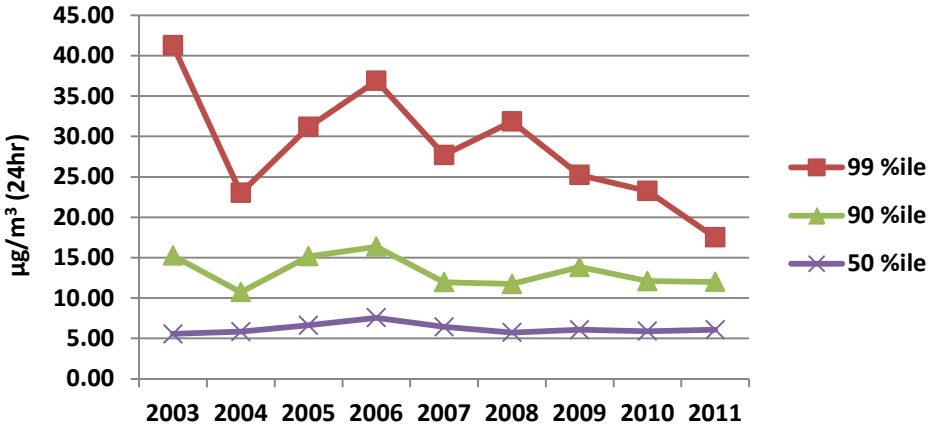
### Particles as $PM_{2.5}$

## Table 87: 2011 percentiles of daily $PM_{2.5}$ concentrations in Victoria

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

| Region | Data availability | Max | Percentiles (μg/m³) | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Performance monitoring station** | **(% of days)** | **(μg/m³)** | **99th** | **98th** | **95th** | **90th** | **75th** | **50th** |
| Port Phillip | | | | | | | | |
| Alphington | 95.9 | 21.2 | 18.4 | 17.4 | 15.7 | 12.7 | 8.9 | 6.3 |
| Footscray | 100.0 | 18.1 | 16.6 | 15.3 | 14.0 | 11.3 | 8.3 | 5.9 |

Monitoring by reference method (one-day-in-three). Exceedances shown in bold.




## Figure 12: Percentiles of daily $PM_{2.5}$ (average of Port Phillip stations 2003–10)

## Table 88: Percentiles of daily $PM_{2.5}$ at Alphington (2002–11)

AAQ NEPM standard: 25 μg/m³ (24-hour average)
AAQ NEPM goal: standard exceeded on no more than five days per year

| Year | Data availability | No. of exceedances | Max | Percentiles (ppm) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | **(% of days)** | **(days)** | **(μg/m³)** | **99th** | **98th** | **95th** | **90th** | **75th** | **50th** |
| *2002* | *33.6* | *0* | *19.3* | *17.9* | *16.6* | *11.6* | *11.0* | *8.7* | *6.0* |
| 2003 | 91.8 | 5 | **41.0** | **39.0** | **34.2** | 19.2 | 15.5 | 9.1 | 6.0 |
| 2004 | 94.3 | 1 | **27.4** | 24.2 | 19.4 | 13.0 | 11.3 | 8.6 | 6.0 |
| 2005 | 94.3 | 3 | **38.3** | **31.2** | **27.0** | 19.5 | 16.8 | 9.3 | 7.2 |
| 2006 | 86.9 | 6 | **56.4** | **36.9** | **31.0** | **25.4** | 16.4 | 10.7 | 7.6 |
| 2007 | 95.1 | 3 | **36.0** | **30.7** | 24.7 | 17.1 | 12.6 | 8.9 | 6.5 |
| 2008 | 100.0 | 4 | **46.7** | **34.5** | **32.2** | 15.8 | 11.6 | 8.6 | 6.0 |
| 2009 | 100.0 | 2 | **27.0** | **26.4** | 24.1 | 21.2 | 15.0 | 9.1 | 6.6 |
| 2010 | 100.0 | 3 | **27.0** | **26.3** | 22.9 | 15.8 | 12.5 | 8.7 | 6.1 |
| 2011 | 95.9 | 0 | 21.2 | 18.4 | 17.4 | 15.7 | 12.7 | 8.9 | 6.3 |

Monitoring by reference method (one-day-in-three). Years with data availability below 75 per cent shown in italics. Exceedances shown in bold.

## Table 89: Percentiles of daily $PM_{2.5}$ at Footscray (2002–11)

AAQ NEPM standard: 25 μg/m³ (24-hour average)
AAQ NEPM goal: standard exceeded on no more than five days per year

| Year | Data availability | No. of exceedances | Max | Percentiles (ppm) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (% of days) | (days) | (μg/m³) | 99th | 98th | 95th | 90th | 75th | 50th |
| *2002* | *22.1* | *0* | *10.2* | *10.2* | *10.1* | *9.6* | *8.3* | *7.2* | *4.2* |
| 2003 | 80.3 | 3 | **55.7** | **43.5** | **29.2** | 22.5 | 15.0 | 8.4 | 5.1 |
| 2004 | 89.3 | 0 | 22.3 | 21.8 | 19.7 | 13.9 | 10.2 | 7.5 | 5.7 |
| 2005 | 81.1 | 2 | **32.8** | **31.2** | 21.3 | 16.8 | 13.5 | 9.0 | 6.1 |
| *2006* | *65.6* | *2* | ***36.7*** | ***31.4*** | *22.5* | *16.6* | *14.3* | *9.4* | *6.1* |
| 2007 | 95.1 | 1 | **33.1** | 24.7 | 22.4 | 17.0 | 11.3 | 8.5 | 6.4 |
| 2008 | 92.6 | 3 | **30.5** | **29.2** | 23.9 | 13.9 | 11.9 | 7.9 | 5.5 |
| 2009 | 92.6 | 1 | **26.9** | 24.1 | 19.4 | 15.7 | 12.7 | 9.4 | 5.6 |
| 2010 | 95.9 | 0 | 24.5 | 20.2 | 18.7 | 14.1 | 11.7 | 8.5 | 5.7 |
| 2011 | 100.0 | 0 | 18.1 | 16.6 | 15.3 | 14.0 | 11.3 | 8.3 | 5.9 |

Monitoring by reference method (one-day-in-three). Years with data availability below 75 per cent shown in italics. Exceedances shown in bold.

Monitoring for the $PM_{2.5}$ Equivalence Program was conducted using TEOM instruments. Results are presented in Tables 90 to 92.

## Table 90: $PM_{2.5}$ Equivalence Program 2011 TEOM monitoring – Daily concentrations in Victoria

| Region | Data availability | Max | Percentiles (μg/m³) | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Performance monitoring station** | **(% of days)** | **(μg/m³)** | **99th** | **98th** | **95th** | **90th** | **75th** | **50th** |
| Port Phillip | | | | | | | | |
| Alphington | 89.9 | 20.2 | 14.8 | 13.7 | 11.6 | 8.9 | 6.1 | 4.2 |
| Footscray | 99.2 | 15.7 | 12.6 | 11.9 | 10.2 | 8.3 | 6.1 | 4.0 |

## Table 91: Percentiles of daily TEOM $PM_{2.5}$ (Equivalence Program) at Alphington (2003–11)

| Year | Data availability | Max | Percentiles (μg/m³) | | | | | |
|---|---|---|---|---|---|---|---|---|
| | (% of days) | (μg/m³) | 99th | 98th | 95th | 90th | 75th | 50th |
| 2003 | 94.2 | **59.5** | **39.2** | **29.9** | 17.9 | 13.7 | 8.3 | 5.6 |
| 2004 | 94.8 | 21.7 | 15.6 | 12.3 | 10.1 | 7.8 | 6.1 | 4.3 |
| 2005 | 93.4 | 24.8 | 17.9 | 16.2 | 14.0 | 11.2 | 6.9 | 4.3 |
| 2006 | 87.7 | **112.6** | **50.5** | **28.7** | 14.9 | 11.2 | 7.6 | 4.7 |
| 2007 | 100.0 | **59.4** | 21.7 | 17.9 | 14.3 | 12.0 | 7.5 | 5.0 |
| 2008 | 99.5 | **44.2** | **25.6** | 19.0 | 12.8 | 9.9 | 6.8 | 4.7 |
| 2009 | 98.4 | **32.7** | 22.4 | 21.3 | 14.8 | 11.7 | 7.3 | 4.7 |
| 2010 | 98.1 | 17.3 | 16.1 | 14.4 | 11.1 | 9.4 | 6.2 | 4.1 |
| 2011 | 89.9 | 20.2 | 14.8 | 13.7 | 11.6 | 8.9 | 6.1 | 4.2 |

## Table 92: Percentiles of daily TEOM $PM_{2.5}$ (Equivalence Program) at Footscray (2003–11)

| Year | Data availability | Max | Percentiles (μg/m³) | | | | | |
|---|---|---|---|---|---|---|---|---|
| | (% of days) | (μg/m³) | 99th | 98th | 95th | 90th | 75th | 50th |
| *2003* | *10.1* | | | | | | | |
| 2004 | 88.5 | 23.8 | 14.1 | 12.5 | 9.9 | 8.2 | 5.8 | 3.8 |
| 2005 | 99.7 | 20.3 | 14.3 | 13.0 | 10.8 | 9.0 | 5.9 | 3.9 |
| 2006 | 91.8 | **95.7** | **44.0** | 23.2 | 15.6 | 11.3 | 6.8 | 4.3 |
| 2007 | 99.5 | **42.9** | 18.9 | 16.0 | 12.0 | 10.4 | 6.3 | 4.2 |
| 2008 | 99.7 | **34.5** | 23.2 | 16.6 | 11.6 | 9.2 | 6.6 | 4.5 |
| 2009 | 99.5 | **32.9** | 23.3 | 19.4 | 13.8 | 10.8 | 7.3 | 4.2 |
| 2010 | 98.9 | 22.9 | 15.7 | 12.5 | 10.3 | 8.4 | 5.7 | 3.7 |
| 2011 | 99.2 | 15.7 | 12.6 | 11.9 | 10.2 | 8.3 | 6.1 | 4.0 |

Years with data availability below 75 per cent shown in italics.

**Lead**

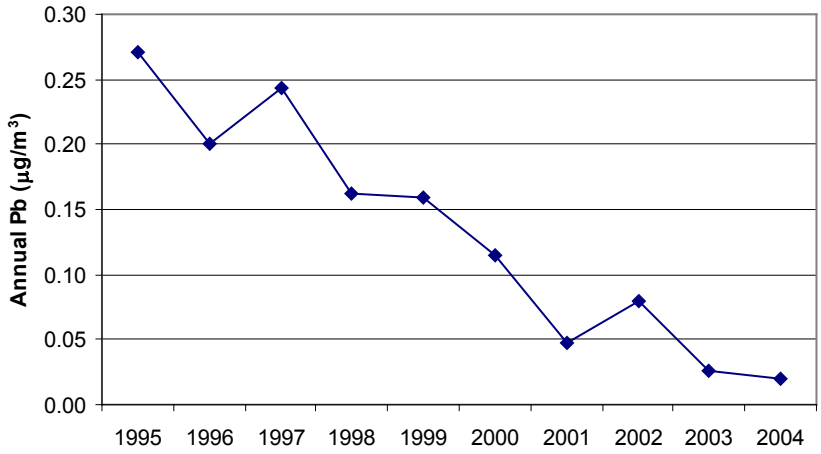



Figure 13: Annual average lead (Collingwood 1995–2004)

## Table 93: Annual average lead (Collingwood 1995–2004)

AAQ NEPM standard: 0.50 µg/m³ (one-year average)

| Year | Data availability (% of days) | Annual Average (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 | 91.8 | 0.02 |