Air monitoring report 2015 – Compliance with the National Environment Protection (Ambient Air Quality) Measure

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Environment report

Overview

This report presents the results of air quality monitoring in Victoria in 2015 and assesses them against the requirements of the Ambient Air Quality National Environment Protection Measure [1] (The Measure). Environment Protection Authority Victoria (EPA) EPA also produces an annual air quality summary and data tables on its website[2].

The Measure establishes:

- The requirements for air quality monitoring for carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), sulfur dioxide, particles as PM_{10}, particles as $PM_{2.5}$ and lead (pb);
- 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 Measure. Recognising that certain events can impact on air quality, the Measure specifies a maximum number of days on which it is permissible to exceed the standard.

On 25 February 2016, the Measure was varied to introduce a 25 µg/m^3 annual standard for PM_{10}, a daily standard of 25 µg/m^3 for $PM_{2.5}$ and a 8 µg/m^3 annual standard for $PM_{2.5}$. The varied Measure also removed the number of allowable exceedances for $PM_{2.5}$ and PM_{10}.

Victoria's air quality in 2015 was generally good. Monitoring showed the AAQ NEPM goals and standards were met for carbon monoxide (CO), nitrogen dioxide (NO_2), Ozone (O_3) and sulfur dioxide (SO_2). There were some exceedances for particles.

There were 10 days when particles as PM_{10} exceeded the daily standard in the Port Phillip Region at the Geelong Sth, Richmond and Footscray stations. These events are attributed to either localized and regional dust events (seven days), bushfires (two days) and authorized hazard reduction burns (one day).

There were 2 days when the $PM_{2.5}$ daily standard was exceeded at Alphington Station, these can be linked to an increase contribution of pollution from domestic wood heaters in the colder months.

Monitoring was performed in accordance with a modified form of Victoria's monitoring plan[3] , the Measure's Technical Papers and EPA's NATA accreditation and data capture was over 90%. In 2015, data capture goals were met at all stations except for carbon monoxide at Richmond, nitrogen dioxide at Brighton and Point Cook and PM_{10} at Brighton and Mooroolbark due to monitoring for these parameters ceasing at these locations during periods of the year.

Separate to this report, issue-specific stations not included in the Measure are located in Brooklyn and the Latrobe Valley. Results for these stations are reported separately on EPA Victoria's website[4].

[1] National Environment Protection Measure for Air Quality, National Environment Protection Council publication, available from https://www.legislation.gov.au

[2] EPA hourly data tables http://www.epa.vic.gov.au

[3] Ambient Air Quality NEPM Monitoring Plan Victoria, Environment Protection Authority Victoria publication 753, available from www.epa.vic.gov.au/publications

[4] Brooklyn air quality update: effectiveness of road sealing EPA Publication 1627 available from www.epa.vic.gov.au/publications

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A Monitoring Summary

Current performance monitoring stations

Victoria's air monitoring plan for the Measure was approved by the National Environment Protection Council Ministers in February 2001. Data presented in this report is produced in accordance with the monitoring plan, except where noted.

The Measure 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; these include:

- Port Phillip and Latrobe Valley regions with permanent performance monitoring stations.
- Ballarat, Bendigo, Shepparton, Warrnambool and Mildura where campaign monitoring has previously been conducted.
- Wodonga where data from New South Wales monitoring at Albury is used.

Stations at which monitoring was conducted in 2015 are shown in Figure 1 and Figure 2.

The monitoring stations, pollutants monitored and site types are summarised in Table 1. Site types are defined as generally representative upper bound for community exposure sites and population-average sites.

Description of exposed population

The exposed population represented by each monitoring station is described qualitatively by the location category column in Table 1. Further information is given in Appendix C of the monitoring plan[5].

Investigative monitoring stations

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

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 results of these reviews.

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

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

The station at Moe was closed in October 2009 when the lease was terminated due to building construction works, and a subsequent review 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 area.

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

[5] Ambient Air Quality NEPM Monitoring Plan Victoria, Environment Protection Authority Victoria publication 753, available from www.epa.vic.gov.au/publications

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	Residential / Light Industrial	G*	G*	Pop	Pop*	G*
Altona North [d]	Industrial / Residential				G	
Brighton	Residential		G	Pop*		Pop
Dandenong	Light Industrial			Pop		Pop
Footscray	Industrial / Residential		G*	G*		G*
Geelong South	Light Industrial / Residential	G*	G*	Pop*	G*	G*
Melton	Residential			G		
Mooroolbark	Residential			Pop		Pop
Point Cook	Rural / Residential		Pop*	G*		
Point Henry [c]	Industrial / Rural			Pop		
Richmond	Residential	G				G
RMIT (CBD) [a]	CBD	G*	G*		G	G*
Latrobe Valley						
Moe [b]	Residential		Pop	G	G	G
Traralgon	Residential		G*	G*	G*	G*

G Generally representative upper bound
Pop Population average
a RMIT station closed in 2006
b Moe closed in 2009, monitoring for $PM_{2.5}$ (beta attenuation started in 2015)
c Point Henry closed in 2011
d SO_2 monitoring ceased in 2015

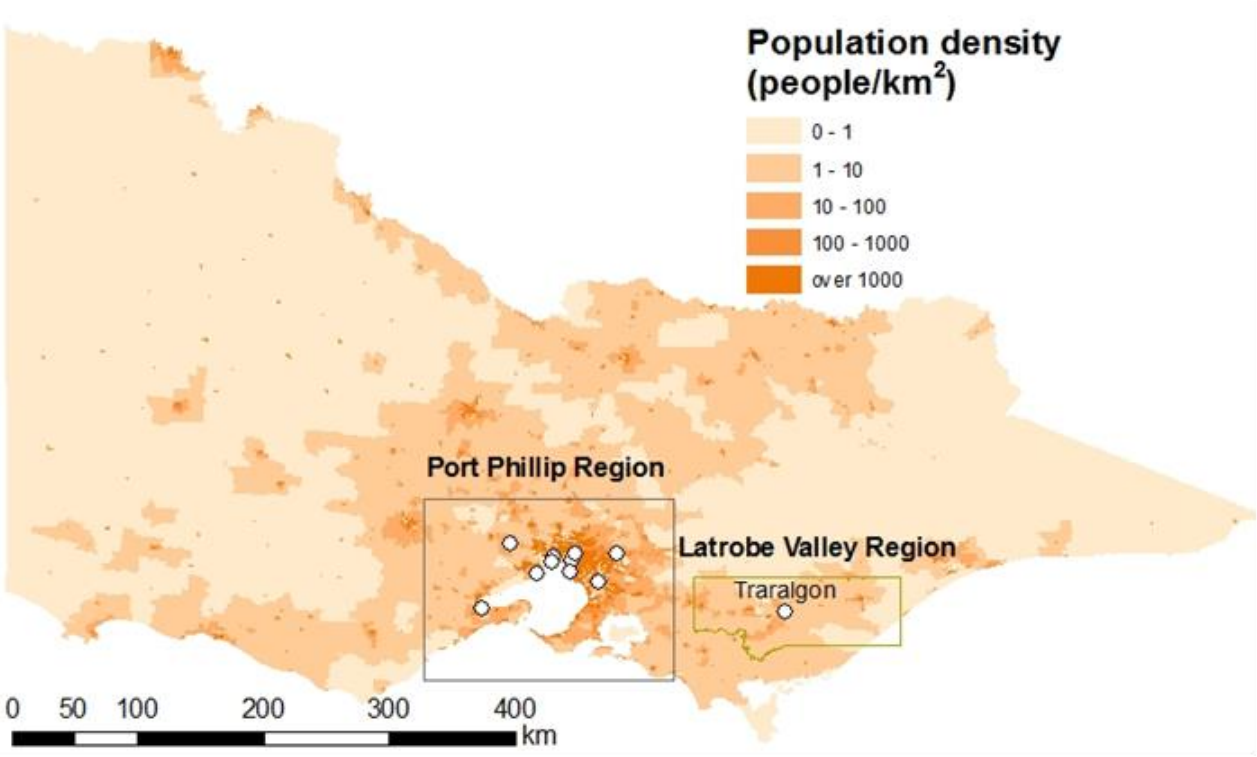

Figure 1: Defined regions and population density in Victoria

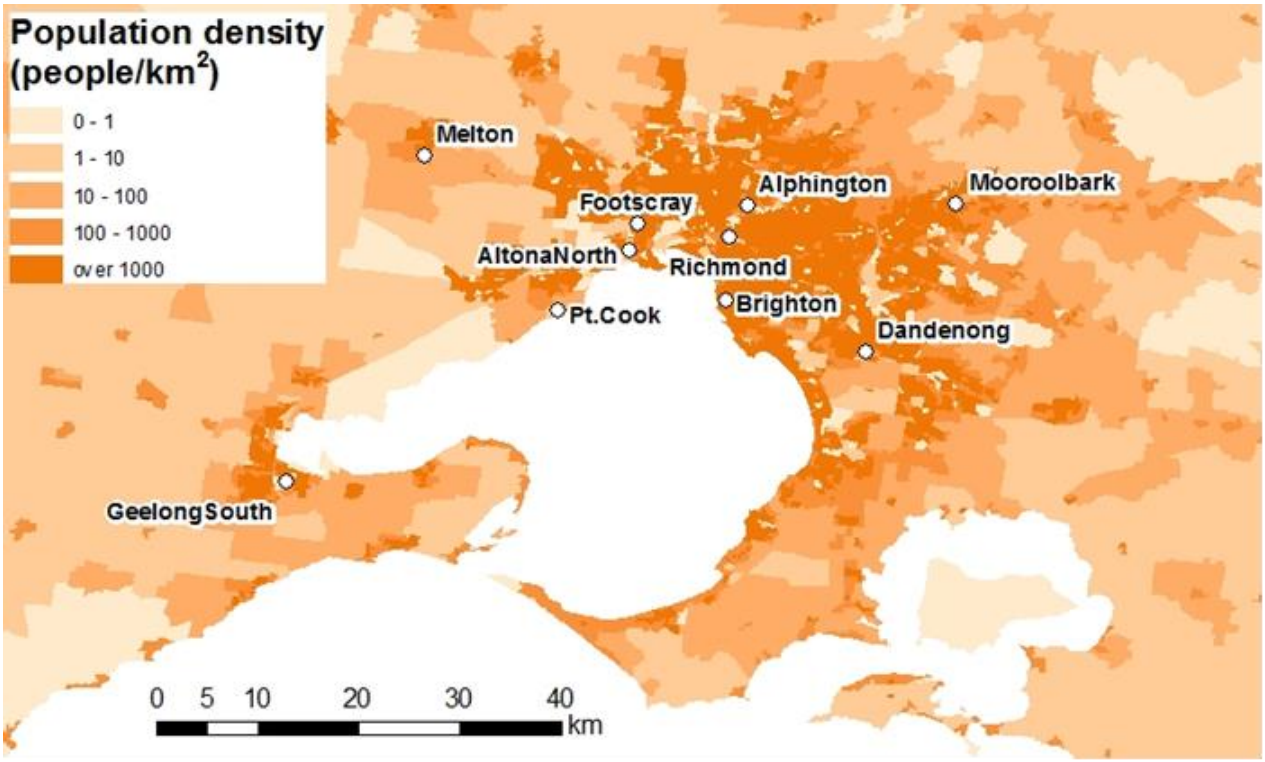

Figure 2: Monitoring stations and population density in Port Phillip region

Table 2: Summary of stations' siting compliance with AS 3580.1.1-2016

Region Station	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	Y	Y	Y	Y	N	Y	N
Altona North	Y	Y	Y	Y	Y	Y	N
Brighton	Y	Y	Y	Y	Y	Y	N
Dandenong	Y	Y	Y	Y	Y	Y	N
Footscray	Y	Y	Y	Y	Y	Y	Y
Geelong South	Y	Y	Y	Y	Y	Y	N
Melton	Y	Y	Y	Y	Y	Y	N
Mooroolbark	Y	Y	Y	Y	Y	Y	N
Point Cook	Y	Y	Y	Y	Y	Y	N
Richmond	Y	Y	Y	Y	Y	Y	N
Latrobe Valley							
Traralgon	Y	Y	Y	Y	N	Y	N
Moe	Y	Y	Y	Y	N	Y	N

Monitoring methods

Victorian monitoring is conducted in accordance with the Australian Standard as 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.

TEOM PM_{10} data included in this report has been adjusted according to the approved procedure as outlined in Technical Paper No. 10 – Collection and Reporting of TEOM PM_{10} Data[6], 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% at a temperature of 5 °C. Particle concentration units of µg /m^3 refer to volumes at 0 °C and one atmosphere of pressure.

[6] Former Standing Council on Environment and Water (incorporating the National Environment Protection Council) http://www.scew.gov.au

Table 3: Methods for monitoring pollutants in the Measure

Pollutant		Applicable Standard "Title of Standard"	Method used
Carbon monoxide	CO	Australian Standard 3580.7.1-2001 "Ambient air - Determination of carbon monoxide, direction instrument method"	Gas filter correlation/infrared
Nitrogen dioxide	NO_2	Australian Standard 3580.5.1–2011 "Ambient air — Determination of oxides of nitrogen —Direct reading instrument method"	Gas phase chemiluminescence
Photochemical oxidant (ozone)	O_3	Australia Standard 3580.6.1–2016 "Ambient air — Determination of ozone — Direct reading instrument method"	Non-dispersive ultraviolet
Sulfur dioxide	SO_2	Australian Standard 3580.4.1–2008 "Ambient air — Determination of sulfur dioxide — Direct reading instrument method"	Pulsed fluorescence
Particles	PM_{10}	Australian Standard 3580.9.8–2008 "Determination of suspended particulate matter — PM_{10} continuous direct mass method using a tapered element oscillating microbalance analyser"	Tapered element oscillating microbalance (TEOM)
	$PM_{2.5}$	Australian Standard 3580.9.10–2006 "Determination of suspended particulate matter – $PM_{2.5}$ low volume sampler – Gravimetric method"	Gravimetric reference method
		Australian Standard 3580.9.12:2013 Determination of suspended particulate matter $PM_{2.5}$beta attenuation monitors	Beta Attenuation Monitors

NATA status

All current performance monitoring stations operated by EPA are covered by its National Association of Testing Authorities (NATA) accreditation (Number 15119) with the exception of $PM_{2.5}$ using BAMs. Work is being carried out to incorporate monitoring for $PM_{2.5}$ using BAMs as part of EPA Victoria's NATA accreditation.

EPA was successfully reaccredited in 2014. Monitoring in the Latrobe Valley region was previously performed for EPA by Aurecon under its NATA accreditation (Number 4669). As of 2013, this has now been incorporated back under the EPA Applied Sciences Group.

Screening Procedure

The monitoring plan outlines how to demonstrate whether levels of pollutants are consistently below the standards. If screen procedures are satisfied, monitoring may not be required, or may be conducted at fewer locations. Screening procedures conducted in accordance with the Measure 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.

$PM_{2.5}$ monitoring

On 25 February 2016, the Measure was varied to introduce a daily standard of 25 µg /m^3 for $PM_{2.5}$ and a 8 µg /m^3 annual standard for $PM_{2.5}$. The varied Measure also removed the number of allowable exceedances for $PM_{2.5}$ and PM_{10}.

Victoria monitors $PM_{2.5}$ by the reference method specified in the Measure (on a one-day-in-three basis) at two stations (Alphington and Footscray). It also monitors $PM_{2.5}$ continuously at these two stations using BAMs.

Prior to this, Victoria also participated 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.

In 2013 Victoria trialled BAMs for $PM_{2.5}$ equivalence at Alphington. Additional monitors were installed at Footscray and Traralgon during 2014 and Geelong and Moe in 2015.

B Assessment of compliance with standards and goals

Air quality is assessed against the standards defined in the Measure and the associated goals shown in Table 4. Standards are concentrations, in parts per million (ppm) or micrograms per cubic metre (µg/m^3), against which air quality can be assessed.

The goal of the Measure is to achieve the National Environment Protection Standards as assessed in accordance with the monitoring protocol to the extent specified in Schedule 2 of the Measure. The extent is expressed as a maximum allowable number of exceedances for each standard (shown in column four of Table 4). For $PM_{2.5}$, there is an additional goal to further reduce concentrations to below a daily concentration of 20 µg /m^3 and an annual concentration of 7 µg /m^3 by 2025.

The number of allowable exceedances associated with the standards has been set to account for unusual meteorological conditions and, in the case of particles, exceptional events such as bushfires, jurisdiction authorized hazard reduction burning or continental scale windblown dust 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.

Air quality is assessed as complying with the Measure if the number of exceedances of the standard is no more than the number specified in Schedule 2 of the Measure and data availability was at least 75% 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.

Table 4: Air quality standards and goals in the Measure

Pollutant	Averaging period	Standard	Goal max. Allowable exceedances
Carbon monoxide	8 hours	9.0 ppm	1 day a year
Nitrogen dioxide	1 hour 1 year	0.12 ppm 0.03 ppm	1 day a year None allowed
Ozone	1 hour 4 hours	0.10 ppm 0.08 ppm	1 day a year 1 day a year
Sulfur dioxide	1 hour 1 day 1 year	0.20 ppm 0.08 ppm 0.02 ppm	1 day a year 1 day a year None
Particles as PM_{10}	1 day 1 year	50 µg /m^3 25 µg/m^3	None None
Particles as $PM_{2.5}$	1 day 1 year	25 µg/m^3 8 µg/m^3	None None
Lead	1 year	0.50 µg/m^3	None

C Summary of progress towards achieving the goals of the Measure

The Measure's goals for carbon monoxide, nitrogen dioxide, ozone, sulfur dioxide, PM_{10} , $PM_{2.5}$ and lead are to achieve the standards, to the extent specified by the number of times allowed to exceed the standard as shown in Table 4.

Compliance in 2015

In 2015, where there was sufficient data captured, the goals were met at all stations except for PM_{10} at Geelong South, Footscray and Richmond and for $PM_{2.5}$ at Alphington. In total, there were thirteen exceedances of the standard across ten days. All of the days when PM_{10} exceedances were recorded in the Port Phillip region were attributed to either dust, fire or urban emissions.

Measurements that did not demonstrate-compliance due to insufficient data capture are carbon monoxide at Richmond, nitrogen dioxide at Brighton and Point Cook and PM_{10} at Brighton and Mooroolbark.

Carbon monoxide levels were well within the standard at all stations. The highest reading occurred at Alphington, where carbon monoxide reached 19% of the standard.

The one hour standard for nitrogen dioxide was met at all stations during 2015 where there was sufficient data captured. The highest one hour average in the Port Phillip region, at Footscray was 38% of the standard and in the Latrobe Valley, at Traralgon, 28% of the standard.

The one hour and four hour standards for ozone were met at all stations during 2015 where there was sufficient data captured. The highest one hour average in the Port Phillip region, at Geelong South, was 79% of the standard and in the Latrobe Valley, at Traralgon, 59% of the standard.

The one hour and daily standards for sulfur dioxide were met at all stations during 2015 where there was sufficient data captured. The highest one hour average in the Port Phillip region, at Altona North, was 31% of the standard and in the Latrobe Valley, at Traralgon, 31% of the standard. The highest daily average in the Port Phillip region at Altona North, was 22.5% of the standard and in the Latrobe Valley, at Traralgon, 8% of the standard.

The highest daily average for PM_{10} in the Port Phillip region, at Geelong South was 572% of the standard. The high levels of localized dust have been attributed to an unsealed car park and high levels of vehicle movement associated with the Geelong races. The highest daily average for PM_{10} in the Latrobe Valley, at Traralgon was 90% of the standard.

The highest annual average for PM_{10} in the Port Phillip region, at Geelong South was 69.6% of the standard and in the Latrobe Valley, at Traralgon was 54% of the standard.

The highest daily average for $PM_{2.5}$ in the Port Phillip region, at Alphington was 120% of the standard. The highest annual average for $PM_{2.5}$ was recorded at Alphington and was 103% of the standard.

Trends in compliance between 2002 and 2015

An analysis of Victoria's compliance with the Measure has been performed taking into account monitoring over 2003–2015 and screening. Between 2003 and 2015, the goals and standards have been consistently met in Victoria for carbon monoxide, nitrogen dioxide, sulfur dioxide and lead.

Ozone (O_3)

For ozone, the Measure's goal was met in ten of the last thirteen years in the Port Phillip region (2004, 2005, 2008, 2009, 2010, 2011, 2012, 2013, 2014 and 2015) and in twelve of the last thirteen years in the Latrobe Valley region (2003, 2004, 2005, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014 and 2015).

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).

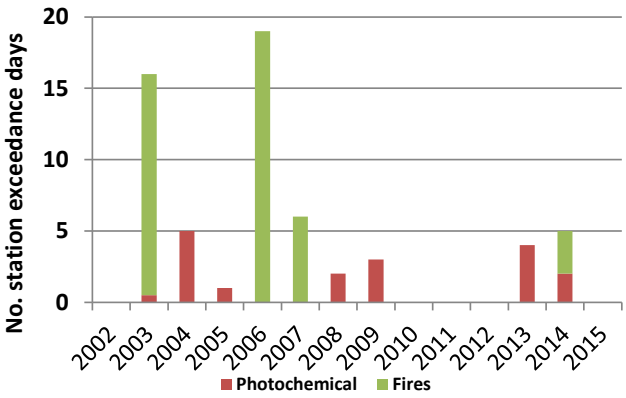

Figure 3: Inferred causes of exceedances of the ozone four-hour standard (Port Phillip region 2002-2015)

Particulate Matter less than 10 µm (PM_{10})

Exceedances at Geelong South (seven days) were due to non-continental scale (local) windblown dust, two were due to bushfires and one due to jurisdiction authorized hazard reduction burns. The bushfires and jurisdiction authorized hazard reduction burns are considered exceptional events under the Measure.

In the Port Phillip region, the particles as PM_{10} goal has only been met between 2010 and 2012. The elevated particle levels above the air quality standard were mainly attributed (see Figure 4) to fires (bushfires and planned burning), followed by windborne dust (either locally raised dust or dust storms with transport over larger distances). Urban emissions i.e. particles accumulating in stable atmospheric conditions, typically from motor vehicles or domestic wood heaters contribute to a lesser extent. The years 2003, 2006 and 2009 were particularly affected by fires, with no station in the Port Phillip region

meeting the goal. In other years, the majority of stations in the region met the goal.

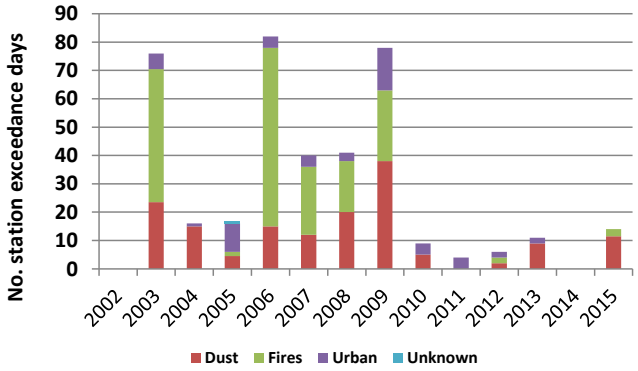

Figure 4: Inferred causes of exceedances of the PM_{10} standard (Port Phillip region 2002-2015)

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

The major cause of the elevated particle levels is attributed to fire — bushfires and planned burning — other causes are by windborne dust (either locally raised dust or dust storms with transport over larger distances).

Particulate Matter less than 2.5 µm ($PM_{2.5}$)

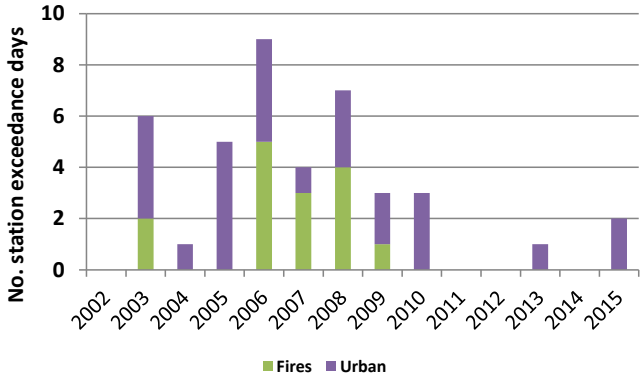

Figure 5: Inferred causes of exceedances of the $PM_{2.5}$ standard (Port Phillip region 2002-2015)

The Measure 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 Measure. $PM_{2.5}$ has been monitored at two stations (Alphington and Footscray) in the Port Phillip Control Region (PPCR) since 2002.

Where exceedances of the daily $PM_{2.5}$ standard have occurred at these stations (see Figure 5), these are attributed to urban sources, as well as bushfires and planned burns.

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D Carbon Monoxide (CO)

Analysis method for carbon monoxide

In Victoria, carbon monoxide is measured in compliance with Australian Standard 3580.7.1-2001 "Ambient air - Determination of carbon monoxide, direction instrument method". Measurements are made using an infrared gas filter correlation method.

Assessment of compliance with standards and goals of the Measure for carbon monoxide

In Victoria, carbon monoxide is assessed against an 8-hour standard of 9.0 ppm, with 1 exceedance day allowed per year.

Table 5: 2015 compliance summary for carbon monoxide in Victoria

Region	Data availability rates (% of hours)					Number of exceedances (days)	Performance against the standard and goals
Performance monitoring station	Q1	Q2	Q3	Q4	Annual		
Port Phillip							
Alphington	99.3	96.9	92.4	96.7	96.3	0	Met
Geelong South	96.7	99.4	99.0	100.0	98.8	0	Met
Richmond	79.4	ND	ND	ND	ND	ND	ND

ND: Not demonstrated

- Compliance was not demonstrated (ND) at Richmond (Q2, Q3 and Q4) due to monitoring ceasing.
- At all other stations operated during 2015, the carbon monoxide standard was not exceeded and compliance was demonstrated.

Analysis of air quality monitoring for carbon monoxide

Carbon monoxide levels were well within the standard at all stations. The highest reading occurred at Alphington, where carbon monoxide reached 19% of the standard.

Table 6: 2015 summary statistics for daily peak eight-hour carbon monoxide in Victoria

Region Performance monitoring station	Number of valid days	Highest reading (ppm)	Highest reading (date: hour)	2nd highest reading (ppm)	2nd highest reading (date:hour)
Port Phillip					
Alphington	342	1.7	June 29:03 June 20:02		
Geelong South	359	1.1	June 12:03	0.9	June 04:24 June 13:03
Richmond	71	0.5	Feb 11:10	0.4	February 20:10 January 21:08 March 10:10 January 12:08

Table 7: 2015 percentiles for daily peak eight-hour carbon monoxide in Victoria

Region	Data availability	Max	Percentiles (ppm)					
Performance monitoring station	(% of days)	(ppm)	99th	98th	95th	90th	75th	50th
Port Phillip								
Alphington	93.7	1.7	1.5	1.3	1.0	0.8	0.5	0.4
Geelong South	98.4	1.1	0.8	0.7	0.5	0.4	0.2	0.2
Richmond[a]	19.5	0.5	0.4	0.4	0.4	0.3	0.3	0.3

a: Insufficient data to calculate percentile, <75% data capture during year, values shown are excluded from trend analysis

Trends and pollutant distributions for carbon monoxide between 2002 and 2015

Results and further analysis of the monitoring data are presented in this section. Percentiles of 2015 daily peak concentrations are provided for each station and standard. In these tables, daily peak values are recorded only when at least 75% of the data for the day are valid. Data for stations with less than 15% data in the year are omitted and stations with less than 75% 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 (PPR) are plotted from 2002, when monitoring according to the Measure's protocol ensured greater continuity of stations operating each year. The values plotted are averages of the percentiles from stations having at least 75% of data in the year. Different stations and different statistics can suggest different trend behaviour; no estimates of statistical significance are presented.

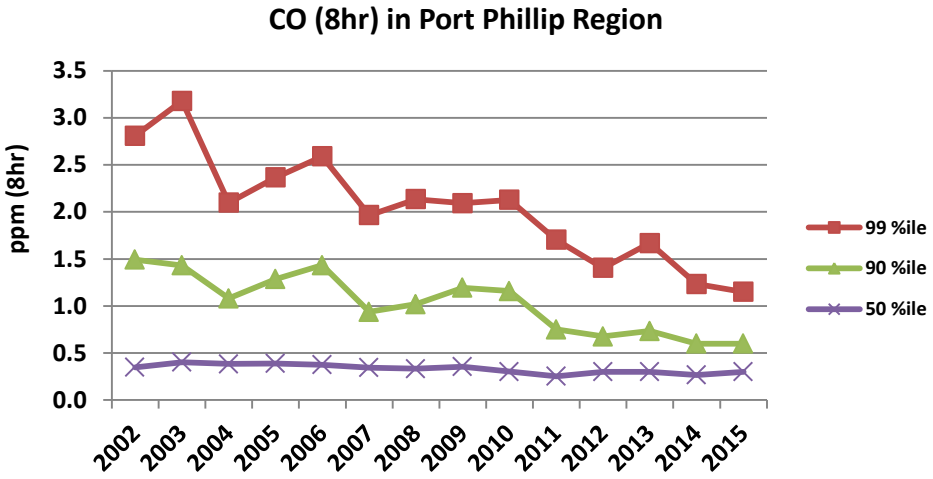

Figure 6: Percentiles of daily maximum carbon monoxide (average of Port Phillip stations 2002–2015)

In interpreting trends, it should be noted that monitoring at RMIT ceased in October 2006 and at Richmond in March 2015. This CBD station tended to record higher CO, so averages in later years may be relatively lower.

Table 8: Percentiles of daily maximum eight-hour carbon monoxide at Alphington (2002-2015)

Year	Data availability (% of days)	No. of exceedances (days)	Max (ppm)	99th (ppm)	98th (ppm)	95th (ppm)	90th (ppm)	70th (ppm)	50th (ppm)
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
2012[a]	*32.8*	*0*	*1.6*	*1.5*	*1.3*	*1.1*	*0.9*	*0.5*	*0.2*
2013	83.8	0	2.6	2.1	1.9	1.5	1.1	0.7	0.4
2014	94	0	1.7	1.4	1.2	1.0	0.8	0.6	0.4
2015	93.7	0	1.7	1.5	1.3	1.0	0.8	0.5	0.4

a: data availability between 15 and 75%, values displayed in italics

Table 9: Percentiles of daily maximum eight-hour carbon monoxide at Geelong (2002-2015)

Year	Data availability (% of days)	No. of exceedances (days)	Max (ppm)	99th (ppm)	98th (ppm)	95th (ppm)	90th (ppm)	70th (ppm)	50th (ppm)
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
2012	97.8	0	1.7	1.2	0.9	0.8	0.6	0.4	0.3
2013	97.8	0	1.5	1.2	1.0	0.6	0.4	0.3	0.2
2014	100.0	0	1.4	1.0	0.8	0.6	0.4	0.2	0.1
2015	98.4	0	1.1	0.8	0.7	0.5	0.4	0.2	0.2

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

Table 10: Percentiles of daily maximum eight-hour carbon monoxide at Richmond (2002-2015)

Year	Data availability (% of days)	No. of exceedances (days)	Max (ppm)	99th (ppm)	98th (ppm)	95th (ppm)	90th (ppm)	70th (ppm)	50th (ppm)
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
2012	97.8	0	1.7	1.2	0.9	0.8	0.6	0.4	0.3
2013	97.8	0	1.5	1.2	1.0	0.6	0.4	0.3	0.2
2014	100.0	0	1.4	1.0	0.8	0.6	0.4	0.2	0.1
2015[a]	*19.5*[a]	*0*	*0.5*	*0.4*	*0.4*	*0.4*	*0.3*	*0.3*	*0.3*

a: data availability between 15 and 75%, values displayed in italics

Table 11: Historical Percentiles of daily maximum eight-hour carbon monoxide at RMIT (2002-2006)

Year	Data availability (% of days)	No. of exceedances (days)	Max (ppm)	99th (ppm)	98th (ppm)	95th (ppm)	90th (ppm)	70th (ppm)	50th (ppm)
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

E Nitrogen Dioxide (NO_2)

Analysis method for nitrogen dioxide

In Victoria, nitrogen dioxide is measured in compliance with Australian Standard 3580.5.1–2011 "Ambient air — Determination of oxides of nitrogen —Direct reading instrument method". Measurements are made via a gas phase chemiluminescence method.

Assessment of compliance with standards and goals of the Measure for nitrogen dioxide

In Victoria, nitrogen dioxide is assessed against a 1-hour standard of 0.12 ppm, with 1 exceedance day allowed per year and a annual standard of 0.030 ppm, with no exceedances allowed.

Table 12: 2015 compliance summary for nitrogen dioxide in Victoria

Region	Data availability rates (% of hours)					Number of exceedances (days)	Annual mean (ppm)	Performance against the standard and goals	
Performance monitoring station	Q1	Q2	Q3	Q4	Annual			1 hour	Annual
Port Phillip									
Alphington	87.6	93.5	89.6	94.2	91.2	0	0.010	Met	Met
Brighton	60.8	0	0	0	15	0	0.005	ND	ND
Footscray	93.8	94.9	95.0	95.1	94.7	0	0.011	Met	Met
Geelong South	88.1	95.2	94.7	73.1	87.7	0	0.006	Met	Met
Point Cook	87.8	0	0	0	21.6	0	0.004	ND	ND
Latrobe Valley									
Traralgon	88.6	95.2	93.8	91.6	92.3	0	0.006	Met	Met

ND: Not demonstrated

- Compliance was not demonstrated (ND) at Brighton and Point Cook (Q2, Q3 and Q4) due to monitoring ceasing.
- At all other stations operated during 2015, the nitrogen dioxide standard was not exceeded and compliance was demonstrated.

Analysis of air quality monitoring for nitrogen dioxide

The one hour standard for nitrogen dioxide was met at all stations during 2015 where there was sufficient data captured. The highest one hour average in the Port Phillip region, at Footscray was 38% of the standard and in the Latrobe Valley, at Traralgon, 28% of the standard.

Table 13: 2015 summary statistics for peak one-hour nitrogen dioxide in Victoria

Region Performance monitoring station	Number of valid days	Highest reading (ppm)	Highest reading (date: hour)	2nd highest reading (ppm)	2nd highest reading (date:hour)
Port Phillip					
Alphington	341	0.043	October 09:21	0.042	April 13:20
Brighton	57	0.027	February 23:08	0.025	January 08:08
Footscray	360	0.046	June 29:19	0.042	February 21:21 April 13:19
Geelong South	332	0.038	October 15:20 July 30:07		
Point Cook	81	0.023	March 17:08	0.022	March 25:21 February 28:10
Latrobe Valley					
Traralgon	347	0.034	July 21:19	0.031	July 18:19 July 20:18

Table 14: 2015 percentiles for daily peak one-hour nitrogen dioxide in Victoria

Region	Data availability	Max	Percentiles (ppm)					
Performance monitoring station	(% of days)	(ppm)	99th	98th	95th	90th	75th	50th
Port Phillip								
Alphington	93.4	0.043	0.035	0.033	0.032	0.030	0.025	0.021
Brighton	15.6	0.027	0.026	0.025	0.023	0.019	0.016	0.011
Footscray	98.6	0.046	0.040	0.038	0.035	0.032	0.028	0.021
Geelong South	91	0.038	0.032	0.031	0.028	0.026	0.02	0.013
Point Cook	22.2	0.023	0.022	0.021	0.020	0.018	0.014	0.009
Latrobe Valley								
Traralgon	95.1	0.034	0.029	0.029	0.026	0.022	0.017	0.012

Trends and pollutant distributions for nitrogen dioxide between 2002 and 2015

Results and further analysis of the monitoring data are presented in this section. Percentiles of 2015 daily peak concentrations are provided for each station and standard. In these tables, daily peak values are recorded only when at least 75% of the data for the day are valid. Data for stations with less than 15% data in the year are omitted and stations with less than 75% 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 from 2002, when monitoring according to the Measure's protocol ensured greater continuity of stations operating each year. The values plotted are averages of the percentiles from stations having at least 75% of data in the year. Different stations and different statistics can suggest different trend behaviour; no estimates of statistical significance are presented.

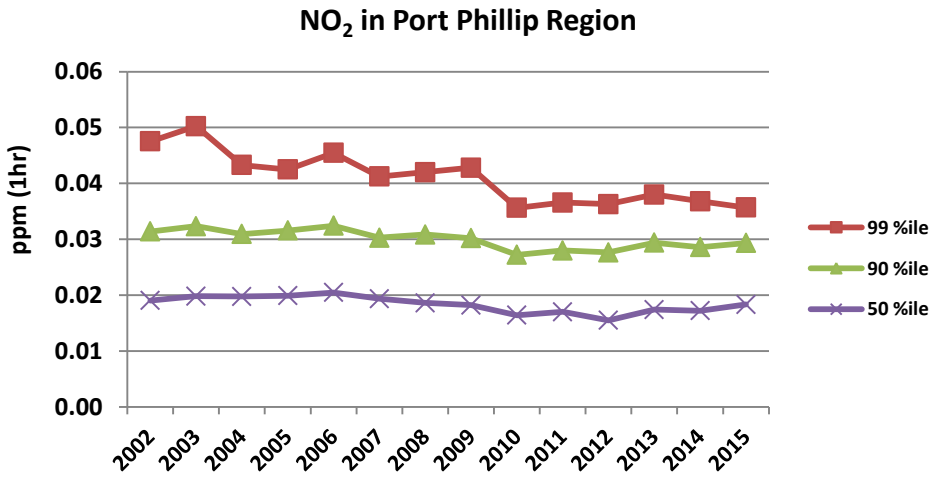

Figure 7: Percentiles of daily maximum nitrogen dioxide (average of Port Phillip stations 2002–2015)

Table 15: Percentiles of daily maximum one-hour nitrogen dioxide at Alphington (2002-2015)

Year	Data availability (% of days)	No. of exceedances (days)	Max (ppm)	99th (ppm)	98th (ppm)	95th (ppm)	90th (ppm)	70th (ppm)	50th (ppm)
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
2012[a]	*33.1*	*0*	*0.037*	*0.036*	*0.033*	*0.030*	*0.028*	*0.025*	*0.021*
2013	84.4	0	0.046	0.039	0.037	0.035	0.032	0.027	0.022
2014	90.7	0	0.064	0.039	0.037	0.032	0.030	0.026	0.020
2015	93.4	0	0.043	0.035	0.033	0.032	0.030	0.025	0.021

a: data availability between 15 and 75%, values displayed in italics

Table 16: Percentiles of daily maximum one -hour nitrogen dioxide at Brighton (2002-2015)

Year	Data availability (% of days)	No. of exceedances (days)	Max (ppm)	99th (ppm)	98th (ppm)	95th (ppm)	90th (ppm)	70th (ppm)	50th (ppm)
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
2012	98.4	0	0.041	0.035	0.034	0.031	0.029	0.024	0.017
2013	98.9	0	0.042	0.038	0.037	0.033	0.031	0.025	0.019
2014	95.9	0	0.044	0.038	0.036	0.033	0.030	0.025	0.019
2015[a]	*15.6*	*0*	*0.27*	*0.026*	*0.025*	*0.023*	*0.019*	*0.016*	*0.011*

a: data availability between 15 and 75%, values displayed in italics

Table 17: Percentiles of daily maximum one -hour nitrogen dioxide at Footscray (2002-2015)

Year	Data availability (% of days)	No. of exceedances (days)	Max (ppm)	99th (ppm)	98th (ppm)	95th (ppm)	90th (ppm)	70th (ppm)	50th (ppm)
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
2012	89.3	0	0.058	0.042	0.040	0.036	0.032	0.027	0.020
2013	83.6	0	0.051	0.045	0.040	0.037	0.035	0.028	0.022
2014	97.3	0	0.064	0.045	0.040	0.036	0.033	0.027	0.021
2015	98.6	0	0.046	0.040	0.038	0.035	0.032	0.028	0.021

Table 18: Percentiles of daily maximum one -hour nitrogen dioxide at Geelong South (2002-2015)

Year	Data availability (% of days)	No. of exceedances (days)	Max (ppm)	99th (ppm)	98th (ppm)	95th (ppm)	90th (ppm)	70th (ppm)	50th (ppm)
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
2012	94.3	0	0.041	0.032	0.031	0.028	0.026	0.020	0.014
2013	98.9	0	0.064	0.033	0.030	0.027	0.023	0.018	0.012
2014	99.5	0	0.036	0.030	0.029	0.027	0.025	0.019	0.014
2015	91.0	0	0.038	0.032	0.031	0.028	0.026	0.020	0.013

Table 19: Percentiles of daily maximum one -hour nitrogen dioxide at Point Cook (2002-2015)

Year	Data availability (% of days)	No. of exceedances (days)	Max (ppm)	99th (ppm)	98th (ppm)	95th (ppm)	90th (ppm)	70th (ppm)	50th (ppm)
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	0.019	0.012
2011	91.2	0	0.038	0.033	0.031	0.027	0.024	0.019	0.012
2012	95.9	0	0.039	0.036	0.033	0.027	0.024	0.017	0.011
2013	95.3	0	0.044	0.035	0.033	0.030	0.026	0.020	0.012
2014	98.9	0	0.044	0.032	0.031	0.028	0.025	0.020	0.012
2015[a]	*22.2*	*0*	*0.023*	*0.022*	*0.021*	*0.020*	*0.018*	*0.014*	*0.009*

a: data availability between 15 and 75%, values displayed in italics

Table 20: Historical Percentiles of daily maximum one -hour nitrogen dioxide at RMIT (2002-2006)

Year	Data availability (% of days)	No. of exceedances (days)	Max (ppm)	99th (ppm)	98th (ppm)	95th (ppm)	90th (ppm)	70th (ppm)	50th (ppm)
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

Table 21: Historical Percentiles of daily maximum one -hour nitrogen dioxide at Moe (2002-2006)

Year	Data availability (% of days)	No. of exceedances (days)	Max (ppm)	99th (ppm)	98th (ppm)	95th (ppm)	90th (ppm)	70th (ppm)	50th (ppm)
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

Table 22: Percentiles of daily maximum one -hour nitrogen dioxide at Traralgon (2002-2015)

Year	Data availability (% of days)	No. of exceedances (days)	Max (ppm)	99th (ppm)	98th (ppm)	95th (ppm)	90th (ppm)	70th (ppm)	50th (ppm)
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
2012	97.8	0	0.032	0.028	0.026	0.025	0.022	0.019	0.013
2013	94.2	0	0.034	0.030	0.028	0.025	0.022	0.019	0.013
2014	95.3	0	0.031	0.028	0.027	0.025	0.022	0.018	0.013
2015	95.1	0	0.034	0.029	0.029	0.026	0.022	0.017	0.012

F Ozone (O_3)

Analysis method for ozone

In Victoria, ozone is measured in compliance with Australia Standard 3580.6.1–2016 “Ambient air — Determination of ozone — Direct reading instrument method”. Measurements are made using a non-dispersive ultraviolet method.

Assessment of compliance with standards and goals of the Measure for ozone

In Victoria, ozone is assessed against a one-hour standard of 0.10 ppm and a four-hour standard of 0.08 ppm, with one exceedance day allowed per year.

Table 23: 2015 compliance summary for ozone in Victoria

Region	Data availability rates (% of hours)					Number of exceedances (days) Annual mean (ppm)		Performance against the standard and goals	
Performance monitoring station	Q1	Q2	Q3	Q4	Annual	1 hour	4 hour	1 hour	4 hour
Port Phillip									
Alphington	88.5	95.5	95.1	71.6	87.6	0	0	Met	Met
Brighton	95.3	95.8	95.7	94.4	95.3	0	0	Met	Met
Dandenong	92.1	95.4	95.2	95.1	94.5	0	0	Met	Met
Footscray	95.4	94.9	95.0	95.2	95.1	0	0	Met	Met
Geelong South	95.3	95.6	95.1	95.6	95.4	0	0	Met	Met
Melton	95.8	95.4	95.0	95.3	95.4	0	0	Met	Met
Mooroolbark	92.5	95.5	95.4	95.2	94.6	0	0	Met	Met
Point Cook	94.1	95.5	94.1	94.8	94.6	0	0	Met	Met
Latrobe Valley									
Traralgon	89.4	95.7	95.3	95.1	93.9	0	0	Met	Met

ND: Not demonstrated

Analysis of air quality monitoring for ozone

The one hour and four hour standards for ozone was met at all stations during 2015 when there was sufficient data captured in the Port Phillip region and at Traralgon in the Latrobe Valley. The highest one-hour average in the Port Phillip region, at Geelong South, was 79% of the standard and in the Latrobe Valley, at Traralgon, 59% of the standard.

Table 24: 2015 summary statistics for daily peak one-hour ozone in Victoria

The Measure’s standards: 0.10 ppm (one-hour average)

The Measure’s goal: standards exceeded on no more than one day per year

Region Performance monitoring station	Number of valid days	Highest reading (ppm)	Highest reading (date: hour)	2nd highest reading (ppm)	2nd highest reading (date:hour)
Port Phillip					
Alphington	332	0.061	February 06:18	0.060	December 30:14
Brighton	363	0.067	March 31:16	0.065	December 17:18
Dandenong	360	0.071	February 06:16	0.062	December 31:18 December 24:15
Footscray	363	0.064	March 31:17	0.062	January 21:18
Geelong South	364	0.079	January 22:15	0.067	February 21:14
Melton	363	0.072	December 18:13	0.070	February 15:17
Mooroolbark	212	0.068	December 05:14	0.066	December 30:17
Point Cook	359	0.076	March 31:16	0.071	January 22:15 February 21:15
Latrobe Valley					
Traralgon	356	0.059	February 22:15	0.058	December 31:11

Table 25: 2015 summary statistics for daily peak four-hour ozone in Victoria

The Measure's standards: 0.08 ppm (four-hour average)

The Measure's goal: standards exceeded on no more than one day per year

Region Performance monitoring station	Number of valid days	Highest reading (ppm)	Highest reading (date: hour)	2nd highest reading (ppm)	2nd highest reading (date:hour)
Port Phillip					
Alphington	332	0.059	December 30:16	0.056	February 15:18
Brighton	363	0.060	December 17:19	0.059	February 15:18
Dandenong	360	0.064	February 06:18	0.060	December 24:17
Footscray	363	0.055	December 24:19	0.054	December 17:20
Geelong South	364	0.061	December 17:16 February 21:17		
Melton	363	0.070	December 18:14	0.063	December 30:17
Mooroolbark	212	0.065	December 30:18	0.061	January 06:17
Point Cook	359	0.062	February 21:17	0.060	December 31:22 January 21:16 December 17:18 November 09:17 December 24:16
Latrobe Valley					
Traralgon	356	0.053	December 31:19	0.050	December 18:20

Table 26: 2015 percentiles for daily peak one-hour ozone in Victoria

Region	Data availability	Max	Percentiles (ppm)					
Performance monitoring station	**(% of days)**	**(ppm)**	**99th**	**98th**	**95th**	**90th**	**75th**	**50th**
Port Phillip								
Alphington	91.0	0.061	0.055	0.053	0.048	0.042	0.032	0.025
Brighton	99.5	0.067	0.061	0.058	0.046	0.041	0.030	0.025
Dandenong	98.6	0.071	0.060	0.057	0.050	0.041	0.031	0.026
Footscray	99.5	0.064	0.058	0.054	0.046	0.040	0.031	0.025
Geelong South	99.7	0.079	0.062	0.054	0.044	0.038	0.030	0.026
Melton	99.5	0.072	0.066	0.057	0.048	0.042	0.033	0.028
Mooroolbark	58.1	0.065	0.055	0.051	0.046	0.039	0.028	0.024
Point Cook	98.4	0.076	0.066	0.064	0.047	0.042	0.032	0.028
Latrobe Valley								
Traralgon	97.5	0.059	0.053	0.049	0.041	0.035	0.028	0.023

Table 27: 2015 percentiles for daily peak four-hour ozone in Victoria

Region	Data availability	Max	Percentiles (ppm)					
Performance monitoring station	**(% of days)**	**(ppm)**	**99th**	**98th**	**95th**	**90th**	**75th**	**50th**
Port Phillip								
Alphington	91.0	0.059	0.052	0.048	0.044	0.040	0.029	0.024
Brighton	99.5	0.060	0.056	0.053	0.044	0.038	0.029	0.024
Dandenong	98.6	0.064	0.058	0.054	0.046	0.039	0.029	0.025
Footscray	99.5	0.055	0.051	0.049	0.043	0.037	0.029	0.024
Geelong South	99.7	0.061	0.056	0.050	0.042	0.035	0.029	0.025
Melton	99.5	0.070	0.059	0.050	0.045	0.040	0.032	0.027
Mooroolbark	58.1	0.061	0.049	0.047	0.042	0.035	0.027	0.023
Point Cook	98.4	0.062	0.060	0.057	0.046	0.040	0.031	0.027
Latrobe Valley								
Traralgon	97.5	0.053	0.047	0.045	0.036	0.033	0.026	0.022

Trends and pollutant distributions for ozone between 2002 and 2015

Results and further analysis of the monitoring data are presented in this section. Percentiles of 2015 daily peak concentrations are provided for each station and standard. In these tables, daily peak values are recorded only when at least 75% of the data for the day are valid. Data for stations with less than 15%of valid data in the year are omitted and stations with less than 75% of valid data are shown in italics. Exceedances are in bold. The percentiles for eight-hour carbon monoxide and four-hour ozone are from running averages, including those that overlap from one day to the next.

Percentiles of the daily peak concentrations in Port Phillip Region is plotted from 2002, when monitoring according to the Measure's protocol ensured greater continuity of stations operating each year. The values plotted are averages of the percentiles from stations having at least 75% of valid data in the year. Different stations and different statistics can suggest different trend behaviour; no estimates of statistical significance are presented.

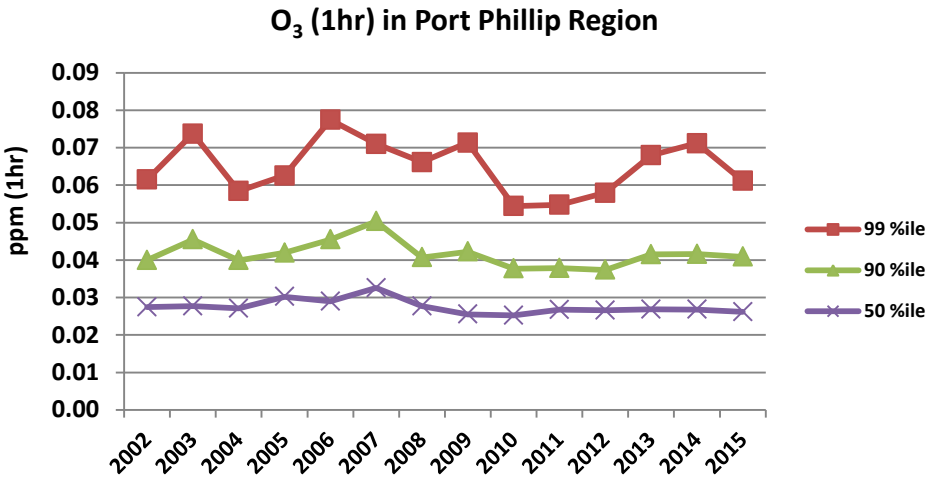

Figure 8: Percentiles of daily maximum one-hour ozone (average of Port Phillip stations 2002–2015)

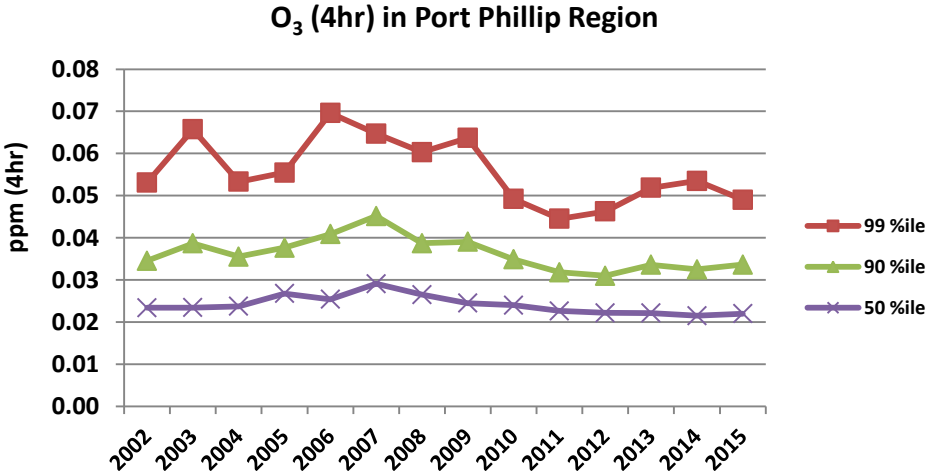

Figure 9: Percentiles of daily maximum four-hour ozone (average of Port Phillip stations 2002–2015)

One-hour ozone trends

Table 28: Percentiles of daily maximum one-hour ozone at Alphington (2002-2015)

Year	Data availability (% of days)	No. of exceedances (days)	Max (ppm)	99th (ppm)	98th (ppm)	95th (ppm)	90th (ppm)	70th (ppm)	50th (ppm)
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
2012[a]	*33.1*	*0*	*0.057*	*0.055*	*0.051*	*0.042*	*0.033*	*0.026*	*0.023*
2013	85.2	0	0.097	0.062	0.059	0.044	0.038	0.030	0.025
2014	97.0	1	0.131	0.076	0.065	0.052	0.043	0.031	0.026
2015	91.0	0	0.061	0.055	0.053	0.048	0.042	0.032	0.025

a: data availability between 15 and 75%, values displayed in italics

Table 29: Percentiles of daily maximum one-hour ozone at Brighton (2002-2015)

Year	Data availability (% of days)	No. of exceedances (days)	Max (ppm)	99th (ppm)	98th (ppm)	95th (ppm)	90th (ppm)	70th (ppm)	50th (ppm)
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
2012	99.2	0	0.069	0.055	0.050	0.044	0.038	0.030	0.026
2013	99.2	0	0.078	0.066	0.060	0.052	0.042	0.031	0.026
2014[a]	*68.5*	*1*	*0.091*	*0.087*	*0.078*	*0.056*	*0.047*	*0.033*	*0.026*
2015	99.5	0	0.067	0.061	0.058	0.046	0.041	0.030	0.025

a: data availability between 15 and 75%, values displayed in italics

Table 30: Percentiles of daily maximum one-hour ozone at Dandenong (2002-2015)

Year	Data availability (% of days)	No. of exceedances (days)	Max (ppm)	99th (ppm)	98th (ppm)	95th (ppm)	90th (ppm)	70th (ppm)	50th (ppm)
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
2012	98.6	0	0.068	0.060	0.051	0.042	0.038	0.029	0.026
2013[a]	*72.6*	*0*	*0.094*	*0.066*	*0.064*	*0.056*	*0.044*	*0.031*	*0.025*
2014[a]	*72.1*	*0*	*0.083*	*0.078*	*0.075*	*0.057*	*0.048*	*0.033*	*0.025*
2015	98.6	0	0.071	0.060	0.057	0.050	0.041	0.031	0.026

a: data availability between 15 and 75%, values displayed in italics

Table 31: Percentiles of daily maximum one-hour ozone at Footscray (2002-2015)

Year	Data availability (% of days)	No. of exceedances (days)	Max (ppm)	99th (ppm)	98th (ppm)	95th (ppm)	90th (ppm)	70th (ppm)	50th (ppm)
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
2012	81.1	0	0.057	0.053	0.044	0.042	0.036	0.030	0.026
2013[a]	*74.8*	*0*	*0.083*	*0.060*	*0.055*	*0.042*	*0.037*	*0.029*	*0.025*
2014	99.5	0	0.100	0.077	0.063	0.050	0.042	0.031	0.026
2015	99.5	0	0.064	0.058	0.054	0.046	0.040	0.031	0.025

a: data availability between 15 and 75%, values displayed in italics

Table 32: Percentiles of daily maximum one-hour ozone at Geelong South (2002-2015)

Year	Data availability (% of days)	No. of exceedances (days)	Max (ppm)	99th (ppm)	98th (ppm)	95th (ppm)	90th (ppm)	70th (ppm)	50th (ppm)
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
2012	98.9	0	0.079	0.059	0.053	0.039	0.034	0.029	0.026
2013	99.2	0	0.079	0.066	0.058	0.046	0.036	0.029	0.026
2014	98.1	0	0.077	0.058	0.053	0.045	0.038	0.030	0.026
2015	99.7	0	0.079	0.062	0.054	0.044	0.038	0.030	0.026

Table 33: Percentiles of daily maximum one-hour ozone at Melton (2002-2015)

Year	Data availability (% of days)	No. of exceedances (days)	Max (ppm)	99th (ppm)	98th (ppm)	95th (ppm)	90th (ppm)	70th (ppm)	50th (ppm)
2002[a]	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
2012	95.9	0	0.068	0.060	0.050	0.044	0.037	0.031	0.027
2013	98.6	0	0.086	0.071	0.066	0.054	0.045	0.033	0.029
2014	96.2	0	0.088	0.070	0.066	0.051	0.042	0.034	0.028
2015	99.5	0	0.072	0.066	0.057	0.048	0.042	0.033	0.028

a: Less than 15% data capture, percentiles not displayed

Table 34: Percentiles of daily maximum one-hour ozone at Mooroolbark (2002-2015)

Year	Data availability (% of days)	No. of exceedances (days)	Max (ppm)	99th (ppm)	98th (ppm)	95th (ppm)	90th (ppm)	70th (ppm)	50th (ppm)
2002[a]	*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
2012	99.5	0	0.077	0.057	0.055	0.048	0.039	0.031	0.027
2013	98.6	0	0.088	0.068	0.064	0.054	0.046	0.033	0.027
2014	69.6	0	0.099	0.081	0.076	0.055	0.050	0.035	0.026
2015[a]	*58.1*	*0*	*0.065*	*0.055*	*0.051*	*0.046*	*0.039*	*0.028*	*0.024*

a: data availability between 15 and 75%, values displayed in italics

Table 35: Percentiles of daily maximum one-hour ozone at Point Cook (2002-2015)

Year	Data availability (% of days)	No. of exceedances (days)	Max (ppm)	99th (ppm)	98th (ppm)	95th (ppm)	90th (ppm)	70th (ppm)	50th (ppm)
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
2012	97.5	0	0.092	0.061	0.058	0.046	0.039	0.032	0.028
2013	97.0	0	0.089	0.075	0.068	0.052	0.042	0.032	0.028
2014	98.9	0	0.093	0.075	0.067	0.054	0.043	0.032	0.028
2015	98.4	0	0.076	0.066	0.064	0.047	0.042	0.032	0.028

Table 36: Percentiles of daily maximum one-hour ozone at Traralgon (2002-2015)

Year	Data availability (% of days)	No. of exceedances (days)	Max (ppm)	99th (ppm)	98th (ppm)	95th (ppm)	90th (ppm)	70th (ppm)	50th (ppm)
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
2012	99.7	0	0.054	0.047	0.043	0.036	0.033	0.028	0.024
2013	97.3	0	0.092	0.059	0.054	0.044	0.039	0.029	0.024
2014	97.0	0	0.077	0.066	0.056	0.045	0.037	0.028	0.024
2015	97.5	0	0.059	0.053	0.049	0.041	0.035	0.028	0.023

Four-hour ozone trends

Table 37: Percentiles of daily maximum four-hour ozone at Alphington (2002-2015)

Year	Data availability (% of days)	No. of exceedances (days)	Max (ppm)	99th (ppm)	98th (ppm)	95th (ppm)	90th (ppm)	70th (ppm)	50th (ppm)
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
2012a	*33.1*	*0*	*0.054*	*0.048*	*0.048*	*0.038*	*0.032*	*0.025*	*0.022*
2013	84.9	1	0.082	0.057	0.054	0.041	0.036	0.029	0.024
2014	96.7	1	0.114	0.066	0.055	0.048	0.039	0.030	0.025
2015	91.0	0	0.059	0.052	0.048	0.044	0.040	0.029	0.024

a: data availability between 15 and 75%, values displayed in italics

Table 38: Percentiles of daily maximum four -hour ozone at Brighton (2002-2015)

Year	Data availability (% of days)	No. of exceedances (days)	Max (ppm)	99th (ppm)	98th (ppm)	95th (ppm)	90th (ppm)	70th (ppm)	50th (ppm)
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
2012	99.2	0	0.065	0.052	0.048	0.041	0.037	0.029	0.025
2013	99.2	0	0.067	0.057	0.055	0.049	0.040	0.030	0.025
2014	68.5	1	0.084	0.078	0.071	0.053	0.044	0.031	0.024
2015	99.5	0	0.060	0.056	0.053	0.044	0.038	0.029	0.024

Table 39: Percentiles of daily maximum four -hour ozone at Dandenong (2002-2015)

Year	Data availability (% of days)	No. of exceedances (days)	Max (ppm)	99th (ppm)	98th (ppm)	95th (ppm)	90th (ppm)	70th (ppm)	50th (ppm)
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
2012	98.6	0	0.066	0.052	0.048	0.040	0.036	0.028	0.024
2013[a]	*72.6*	*1*	*0.083*	*0.062*	*0.058*	*0.053*	*0.040*	*0.029*	*0.024*
2014[a]	*72.1*	*0*	*0.078*	*0.071*	*0.068*	*0.053*	*0.046*	*0.031*	*0.024*
2015	98.6	0	0.064	0.058	0.054	0.046	0.039	0.029	0.025

a: data availability between 15 and 75%, values displayed in italics

Table 40: Percentiles of daily maximum four -hour ozone at Footscray (2002-2015)

Year	Data availability (% of days)	No. of exceedances (days)	Max (ppm)	99th (ppm)	98th (ppm)	95th (ppm)	90th (ppm)	70th (ppm)	50th (ppm)
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
2012	81.1	0	0.052	0.048	0.043	0.038	0.034	0.029	0.025
2013[a]	*74.8*	*0*	*0.065*	*0.054*	*0.051*	*0.041*	*0.033*	*0.028*	*0.024*
2014	99.5	1	0.082	0.069	0.056	0.046	0.039	0.030	0.025
2015	99.5	0	0.055	0.051	0.049	0.043	0.037	0.029	0.024

a: data availability between 15 and 75%, values displayed in italics

Table 41: Percentiles of daily maximum four -hour ozone at Geelong South (2002-2015)

Year	Data availability (% of days)	No. of exceedances (days)	Max (ppm)	99th (ppm)	98th (ppm)	95th (ppm)	90th (ppm)	70th (ppm)	50th (ppm)
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
2012	98.9	0	0.070	0.053	0.049	0.037	0.032	0.028	0.025
2013	99.2	0	0.065	0.060	0.054	0.044	0.035	0.029	0.025
2014	98.4	0	0.075	0.053	0.049	0.042	0.036	0.029	0.025
2015	99.7	0	0.061	0.056	0.050	0.042	0.035	0.029	0.025

Table 42: Percentiles of daily maximum four -hour ozone at Melton (2002-2015)

Year	Data availability (% of days)	No. of exceedances (days)	Max (ppm)	99th (ppm)	98th (ppm)	95th (ppm)	90th (ppm)	70th (ppm)	50th (ppm)
2002[a]	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
2012	95.9	0	0.061	0.052	0.046	0.040	0.035	0.030	0.027
2013	98.6	1	0.081	0.062	0.060	0.049	0.042	0.032	0.028
2014	96.2	0	0.078	0.063	0.057	0.049	0.041	0.033	0.027
2015	99.5	0	0.070	0.059	0.050	0.045	0.040	0.032	0.027

a: data availability is less than 15%, percentile values not shown

Table 43: Percentiles of daily maximum four -hour ozone at Mooroolbark (2002-2015)

Year	Data availability (% of days)	No. of exceedances (days)	Max (ppm)	99th (ppm)	98th (ppm)	95th (ppm)	90th (ppm)	70th (ppm)	50th (ppm)
2002[a]	*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
2012	99.5	0	0.069	0.055	0.050	0.043	0.036	0.030	0.026
2013	98.4	1	0.083	0.062	0.058	0.049	0.043	0.032	0.026
2014	69.6	1	0.081	0.074	0.068	0.050	0.045	0.034	0.025
2015	58.1	0	0.061	0.049	0.047	0.042	0.035	0.027	0.023

a: data availability between 15 and 75%, values displayed in italics

Table 44: Percentiles of daily maximum four -hour ozone at Point Cook (2002-2015)

Year	Data availability (% of days)	No. of exceedances (days)	Max (ppm)	99th (ppm)	98th (ppm)	95th (ppm)	90th (ppm)	70th (ppm)	50th (ppm)
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
2012	97.5	0	0.073	0.058	0.051	0.043	0.037	0.031	0.027
2013	97.0	0	0.079	0.065	0.059	0.050	0.039	0.031	0.027
2014	99.2	0	0.080	0.070	0.061	0.050	0.040	0.031	0.027
2015	98.4	0	0.062	0.060	0.057	0.046	0.040	0.031	0.027

Table 45: Percentiles of daily maximum four -hour ozone at Traralgon (2002-2015)

Year	Data availability (% of days)	No. of exceedances (days)	Max (ppm)	99th (ppm)	98th (ppm)	95th (ppm)	90th (ppm)	70th (ppm)	50th (ppm)
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
2012	99.7	0	0.053	0.041	0.039	0.033	0.030	0.026	0.022
2013	97.3	1	0.086	0.054	0.05	0.04	0.035	0.027	0.022
2014	97.5	0	0.062	0.059	0.053	0.042	0.035	0.026	0.023
2015	97.5	0	0.053	0.047	0.045	0.036	0.033	0.026	0.022

G Sulfur dioxide (SO_2)

Analysis method for sulfur dioxide

In Victoria, sulfur dioxide is measured in compliance with Australian Standard 3580.4.1–2008 “Ambient air — Determination of sulfur dioxide — Direct reading instrument method”. Measurements are made using a pulsed fluorescence method.

Assessment of compliance with standards and goals of the Measure for sulfur dioxide

In Victoria, sulfur dioxide is assessed against a 1-hour standard of 0.200 ppm and a daily standard of 0.080 ppm, with 1 exceedance day allowed per year.

Table 46: 2015 compliance summary for sulphur dioxide in Victoria

Region	Date availability rates (% of hours)					Exceedances (days)		Annual mean (ppm)	Performance against the standards and goal		
Performance monitoring station	Q1	Q2	Q3	Q4	Annual	1 hour	24 hour		1 hour	24 hour	1 year
Port Phillip											
Alphington	87.8	72.9	89.6	94.1	86.1	0	0	0.001	Met	Met	Met
Altona North	94.9	95.1	95.0	94.4	94.8	0	0	0.002	Met	Met	Met
Geelong South	92.4	95.2	95.1	95.5	94.6	0	0	<0.001	Met	Met	Met
Latrobe Valley											
Traralgon	88.5	95.7	93.8	95.1	93.3	0	0	0.001	Met	Met	Met

- At all other stations operating during 2015, the sulfur dioxide standards were not exceeded and compliance was demonstrated. Annual mean values were close to the limits of detection.

Table 47: 2015 summary statistics for daily peak one hour sulfur dioxide in Victoria

The Measure’s standard: 0.20 ppm (one-hour average)
The Measure’s goal: standard exceeded on no more than one day per year

Region Performance monitoring station	Number of valid days	Highest (ppm)	Highest (date:hour)	2nd highest (ppm)	2nd highest (date:hour)
Port Phillip					
Alphington	316	0.012	April 06:01	0.009	April 03:13 January 31:07 April 05:24
Altona North	361	0.062	July 27:24	0.055	December 11:19
Geelong South	365	0.026	April 27:19	0.022	March 06:20
Latrobe Valley					
Traralgon	352	0.061	December 29:12	0.037	December 28:15

Table 48: 2015 summary statistics for daily sulfur dioxide in Victoria

The Measure’s standard: 0.08 ppm (24-hour average)
The Measure’s goal: standard exceeded on no more than one day per year

Region Performance monitoring station	Number of valid days	Highest (ppm)	Highest (date)	2nd highest (ppm)	2nd highest (date)
Port Phillip					
Alphington	316	0.003	April 26	0.002	October 08 June 29 January 31 December 06 February 01 August 27 March 25 December 05 March 28 April 05 June 01
Altona North	361	0.018	November 26	0.014	December 11 July 13
Geelong South	360	0.003	April 27 June 02 May 14 February 11 June 29 August 18		

Region Performance monitoring station	Number of valid days	Highest (ppm)	Highest (date)	2nd highest (ppm)	2nd highest (date)
Latrobe Valley					
Traralgon	352	0.007	December 29	0.005	August 31 October 30 May 07 December 28

- 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 average in the Port Phillip region, at Altona North, was 31% of the standard and in the Latrobe Valley, at Traralgon, 31% of the standard. The highest 24-hour average in the Port Phillip region, at Altona North, was 23% of the standard and in the Latrobe Valley, at Traralgon, 9% of the standard. Annual averages at all stations (see Table 46) are close to the limit of detection.

Table 49: 2015 percentiles of daily peak one-hour sulfur dioxide concentrations in Victoria
The Measure's standard: 0.20 ppm (one-hour average)
The Measure's 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	86.6	0.012	0.009	0.007	0.006	0.004	0.003	0.001
Altona North	98.9	0.062	0.041	0.039	0.031	0.025	0.011	0.004
Geelong South	98.6	0.026	0.017	0.014	0.010	0.006	0.003	0.001
Latrobe Valley								
Traralgon	96.4	0.061	0.023	0.020	0.013	0.010	0.006	0.003

Table 50: 2015 percentiles of daily sulfur dioxide concentrations in Victoria
The Measure's standard: 0.08 ppm (24-hour average)
The Measure's 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	86.6	0.003	0.002	0.002	0.001	0.001	0.001	0.000
Altona North	98.4	0.018	0.012	0.010	0.005	0.003	0.002	0.001
Geelong South	98.6	0.003	0.003	0.002	0.002	0.001	0.001	0.000
Latrobe Valley								
Traralgon	96.4	0.007	0.005	0.003	0.003	0.002	0.001	0.001

Trends and pollutant distributions for sulfur dioxide between 2002 and 2015

Results and further analysis of the monitoring data are presented in this section. Percentiles of 2015 daily peak concentrations are provided for each station and standard. In these tables, daily peak values are recorded only when at least 75% of the data for the day are valid. Data for stations with less than 15% of valid data in the year are omitted and stations with less than 75% of valid 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 from 2002, when monitoring according to the Measure's protocol ensured greater continuity of stations operating each year. The values plotted are averages of the percentiles from stations having at least 75% of data in the year. Different stations and different statistics can suggest different trend behaviour; no estimates of statistical significance are presented.

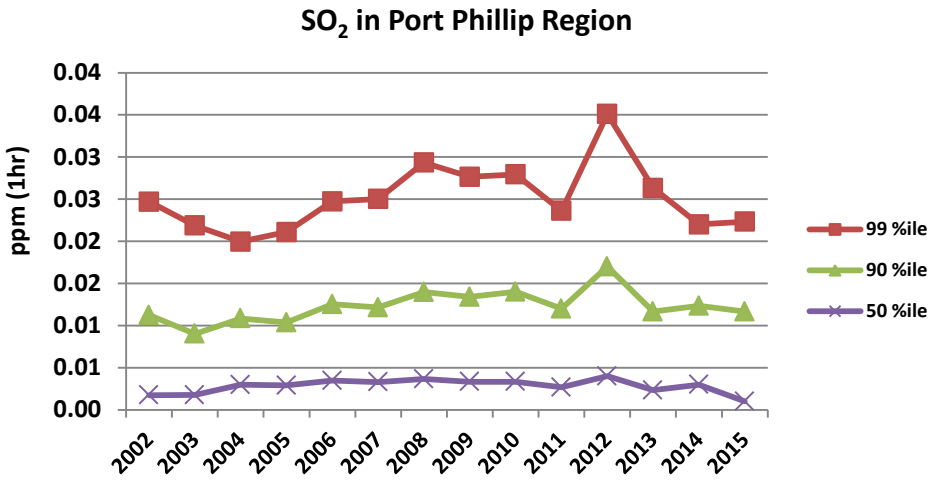

Figure 10: Percentiles of daily maximum one-hour sulphur dioxide (average of Port Phillip stations 2002–2015)

Table 51: Percentiles of daily maximum one hour sulfur dioxide at Alphington (2002-2015)

Year	Data availability (% of days)	No. of exceedances (days)	Max (ppm)	99th (ppm)	98th (ppm)	95th (ppm)	90th (ppm)	70th (ppm)	50th (ppm)
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
2012[a]	*33.1*	*0*	*0.014*	*0.011*	*0.009*	*0.006*	*0.004*	*0.003*	*0.002*
2013	79.7	0	0.035	0.010	0.007	0.005	0.004	0.003	0.001
2014	90.1	0	0.011	0.010	0.009	0.007	0.005	0.003	0.002
2015	86.6	0	0.012	0.009	0.007	0.006	0.004	0.003	0.001

a: data availability between 15 and 75%, values displayed in italics

Table 52: Percentiles of daily maximum one hour sulfur dioxide at Altona (2002-2015)

Year	Data availability (% of days)	No. of exceedances (days)	Max (ppm)	99th (ppm)	98th (ppm)	95th (ppm)	90th (ppm)	70th (ppm)	50th (ppm)
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	0.061	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
2012	96.2	0	0.066	0.043	0.033	0.026	0.021	0.012	0.005
2013	97.0	0	0.052	0.042	0.036	0.025	0.019	0.008	0.004
2014	99.7	0	0.041	0.033	0.031	0.027	0.023	0.012	0.005
2015	98.4	0	0.062	0.041	0.039	0.031	0.025	0.011	0.004

Table 53: Percentiles of daily maximum one hour sulfur dioxide at Geelong (2002-2015)

Year	Data availability (% of days)	No. of exceedances (days)	Max (ppm)	99th (ppm)	98th (ppm)	95th (ppm)	90th (ppm)	70th (ppm)	50th (ppm)
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
2012	97.8	0	0.060	0.027	0.021	0.015	0.013	0.007	0.003
2013	97.3	0	0.029	0.027	0.023	0.015	0.012	0.006	0.002
2014	87.4	0	0.029	0.023	0.017	0.012	0.009	0.005	0.002
2015	98.6	0	0.026	0.017	0.014	0.010	0.006	0.003	0.001

Table 54: Percentiles of daily maximum one hour sulfur dioxide at Traralgon (2002-2015)

Year	Data availability (% of days)	No. of exceedances (days)	Max (ppm)	99th (ppm)	98th (ppm)	95th (ppm)	90th (ppm)	70th (ppm)	50th (ppm)
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
2012	99.7	0	0.101	0.023	0.017	0.013	0.010	0.005	0.003
2013	92.1	0	0.070	0.028	0.025	0.014	0.009	0.005	0.003
2014	85.8	0	0.044	0.036	0.029	0.015	0.009	0.006	0.003
2015	96.4	0	0.061	0.023	0.020	0.013	0.010	0.006	0.003

Table 55: Percentiles of daily sulfur dioxide at Alphington (2002-2015)

Year	Data availability (% of days)	No. of exceedances (days)	Max (ppm)	99th (ppm)	98th (ppm)	95th (ppm)	90th (ppm)	70th (ppm)	50th (ppm)
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
2012	33.1	0	0.003	0.003	0.002	0.002	0.001	0.001	0.000
2013	79.7	0	0.003	0.002	0.002	0.001	0.001	0.001	0.000
2014	89.9	0	0.004	0.003	0.002	0.002	0.001	0.001	0.000
2015	86.6	0	0.003	0.002	0.002	0.001	0.001	0.001	0.000

Table 56: Percentiles of daily sulfur dioxide at Altona (2002-2015)

Year	Data availability (% of days)	No. of exceedances (days)	Max (ppm)	99th (ppm)	98th (ppm)	95th (ppm)	90th (ppm)	70th (ppm)	50th (ppm)
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
2012	96.2	0	0.018	0.010	0.008	0.005	0.004	0.002	0.001
2013	97.0	0	0.009	0.007	0.006	0.005	0.003	0.002	0.001
2014	99.5	0	0.011	0.009	0.007	0.006	0.004	0.002	0.001
2015	98.4	0	0.018	0.012	0.010	0.005	0.003	0.002	0.001

Table 57: Percentiles of daily sulfur dioxide at Geelong (2002-2015)

Year	Data availability (% of days)	No. of exceedances (days)	Max (ppm)	99th (ppm)	98th (ppm)	95th (ppm)	90th (ppm)	70th (ppm)	50th (ppm)
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
2012	97.8	0	0.006	0.004	0.004	0.003	0.002	0.001	0.001
2013	97.3	0	0.005	0.003	0.003	0.003	0.002	0.001	0.000
2014	87.1	0	0.005	0.004	0.003	0.002	0.001	0.001	0.000
2015	98.6	0	0.003	0.003	0.002	0.002	0.001	0.001	0.000

Table 58: Percentiles of daily sulfur dioxide at Traralgon (2002-2015)

Year	Data availability (% of days)	No. of exceedances (days)	Max (ppm)	99th (ppm)	98th (ppm)	95th (ppm)	90th (ppm)	70th (ppm)	50th (ppm)
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
2012	99.7	0	0.015	0.005	0.004	0.004	0.003	0.002	0.002
2013	92.1	0	0.007	0.005	0.004	0.003	0.002	0.001	0.001
2014	85.8	0	0.010	0.005	0.004	0.003	0.002	0.001	0.001
2015	96.4	0	0.007	0.005	0.003	0.003	0.002	0.001	0.001

H Particulate Matter less than 10 µm (PM_{10})

Analysis method for PM_{10}

In Victoria, PM_{10} is measured in compliance with Australian Standard 3580.9.8–2008 "Determination of suspended particulate matter — PM_{10} continuous direct mass method using a tapered element oscillating microbalance analyser".

Assessment of compliance with standards and goals of the Measure for PM_{10}

In Victoria, PM_{10} is assessed against a daily standard of 50 µg/m^3, with 5 exceedance days allowed per year. PM_{10} is also assessed against an annual standard of 25 µg/m^3.

Table 59: 2015 compliance summary for daily PM_{10} in Victoria

Region	Data availability rates (% of hours)					Number of exceedances (days)	Annual average[a] (µg/m^3)	Performance against the standard and goals
Performance monitoring station	Q1	Q2	Q3	Q4	Annual			
Port Phillip								
Alphington	90.0	97.8	87.0	97.8	93.2	0[c]	15.8	Met
Brighton	68.9	0.0	0.0	0.0	17.0	0		ND
Dandenong	96.7	79.1	64.1	40.2	69.9	0	18.1	ND
Footscray	100.0	96.7	93.5	97.8	97.0	**3**[a]	16.8	Not Met
Geelong South	97.8	87.9	35.9	97.8	79.7	**10**[b]	19.9	Not Met
Mooroolbark	63.3	0.0	0.0	0.0	15.6	0		ND
Richmond	100.0	95.6	95.7	93.5	96.2	**1**	16	Not Met
Latrobe Valley								
Traralgon	62.2	95.6	92.4	87.0	84.4	0	13.5	Met

ND: Not demonstrated
a: 2 of the 3 days are considered exceptional event days and are not included in the assessment of performance against the standard and goals
b: 3 of the 10 days are considered exceptional event days and are not included in the assessment of performance against the standard and goals
c: A daily concentration of 108 µg/m3 was recorded on 25 November 2015, however as only 12 valid hours were collected on this day, it has been excluded from the count of exceedances days.

Table 60: 2015 summary statistics for daily PM_{10} in Victoria

Region Performance monitoring station	Number of valid days	Highest reading (µg/m^3)	Highest reading (date: hour)	2nd highest reading (µg/m^3)	2nd highest reading (date:hour)
Port Phillip					
Alphington	339	47.5	January 03	33.5	June 29
Brighton	62	47.6	January 03	23.9	January 06
Dandenong	255	47.8	October 06	38.2	February 09
Footscray	354	71.8	November 25	38.6	March 31
Geelong South	291	286.1	November 15	64.4	October 15
Mooroolbark	57	39.5	January 03	28.3	January 05
Richmond	351	52.4	November 25	33.7	February 11
Latrobe Valley					
Traralgon	308	45	March 31	29.3	October 05

The highest daily average for PM_{10} in the Port Phillip region, at Geelong South was 572% of the standard. The high levels of localized dust have been attributed to an unsealed carpark and high levels of vehicle movement associated with the Geelong races. The highest daily average for PM_{10} in the Latrobe Valley, at Traralgon was 90% of the standard.

The highest annual average for PM_{10} in the Port Phillip region, at Geelong South was 69.6% of the standard and in the Latrobe Valley, at Traralgon, 54% of the standard.

Table 61: 2015 PM_{10} exceedances

Date	Port Phillip [b]							Latrobe Valley	Inferred cause[a]
	Alphington	Brighton	Dandenong	Footscray	Geelong South	Mooroolbark	Richmond	Traralgon	
January 03	47.5	47.6	42.5	47.7	**57.8**	39.5	46.6		Bushfire and dust [c]
March 15			17.7	19.2	**83.6**		17.3	14.8	Localised dust
April 01	43.9		42.5	**52.8**	**54.5**		39.8	45.0	Planned burns and General dust [c]
October 06	40.1		47.8	**51.0**	**91.7**		36.1	29.3	Bushfire [c]
October 15	24.4		19.4	20.2	**64.4**			20.9	Localised dust
October 16	25.1		28.4	28.6	**64.0**			26.3	Localised dust
November 15	14.0			12.5	**286.1**		13.4	7.4	Localised dust
November 25	*108.0*[d]			**71.8**	**112.6**		**52.4**	29.7	General dust
November 30	23.1			27.1	**68.5**		20.1	11.3	General dust
December 19	29.6			32.7	**51.4**		25.9	19.9	General dust

a: Possible inferred causes include windborne crustal dust, often from distant sources (dust), smoke from bushfires, planned burning or agricultural burning and particles accumulating in stable atmospheric conditions, typically from motor vehicles or domestic wood heaters (urban).
b: Exceedances are highlighted in red, concentrations of other stations are included to show the distribution across the network
c: Considered to be an exceptional event as per the definition of exceptional event in the Measure.
d: Recorded on a day with less than 75% data capture, 12 valid hours were captured on this day, excluded from exceedances count.

Table 62: 2015 percentiles for daily PM_{10} concentrations in Victoria

Region / Performance monitoring station	Data availability	Max (µg/m3)	Percentiles					
			99th	98th	95th	90th	75th	50th
Port Phillip								
Alphington	92.9	47.5	35.5	32.2	27.4	24.4	19.9	15.3
Brighton	17.0	47.6	37.9	31.1	27.7	23.8	21.1	17.2
Dandenong	69.9	47.8	41.9	38.1	32.9	26.5	22.6	17.5
Footscray	97.0	71.8	44.7	35.7	32.5	28.8	21.9	16.4
Geelong South	79.7	286.1	84.4	64.1	45.5	32.4	23.8	16.6
Mooroolbark	15.6	39.5	37.5	35.5	31.8	27.2	22.0	17.5
Richmond	96.2	52.4	35.7	32.8	27.7	24.9	20.8	16.4
Latrobe Valley								
Traralgon	84.4	45.0	29.7	29.0	26.2	21.9	17.2	13.9

Trends and pollutant distributions for PM_{10} between 2002 and 2015

Results and further analysis of the monitoring data are presented in this section. Percentiles of 2015 daily peak concentrations are provided for each station and standard. In these tables, daily peak values are formed only when at least 75% of the data for the day are valid. Data for stations with less than 15% data in the year are omitted and stations with less than 75% 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 from 2002, when monitoring according to the Measure's protocol ensured greater continuity of stations operating each year. The values plotted are averages of the percentiles from stations having at least 75% of data in the year. Different stations and different statistics can suggest different trend behaviour; no estimates of statistical significance are presented.

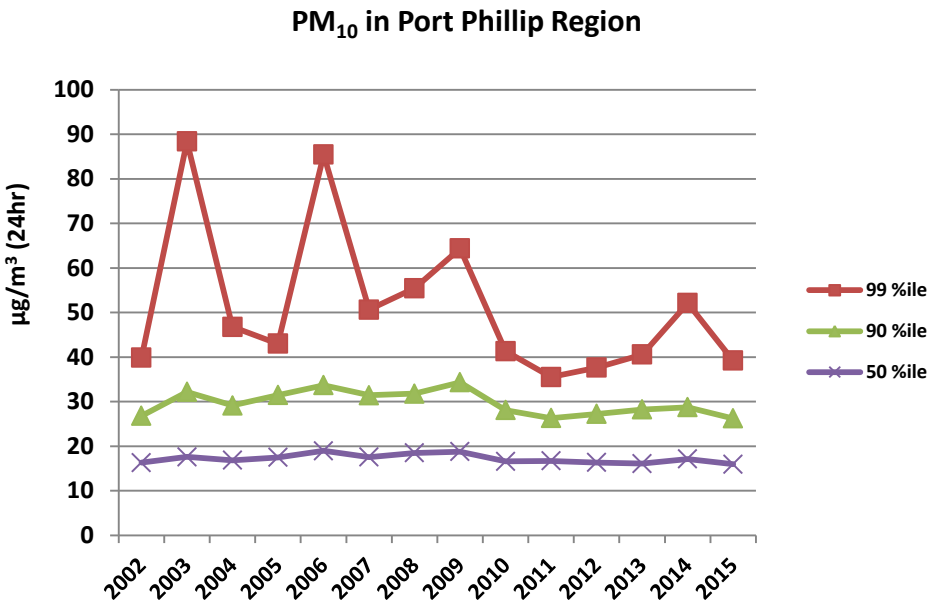

Figure 11: Percentiles of daily PM_{10} (average of Port Phillip stations 2002–2015)

Table 63: Percentiles of daily PM_{10} at Alphington (2002-2015)

Year	Data availability (% of days)	No. of exceedances (days)	Max (ppm)	99th (ppm)	98th (ppm)	95th (ppm)	90th (ppm)	70th (ppm)	50th (ppm)
2002	97.5	1	66.2	35.9	34.5	30.4	27.9	22.4	17.2
2003[a]	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[a]	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[a]	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
2012	97.8	0	40.7	30.8	29.5	26.3	23.7	19.4	15.1
2013	98.9	0	44.3	35.5	32.7	29.2	25.1	19.9	15.1
2014	96.2	4	64.5	45.9	33.4	30.7	24.6	20.4	16.3
2015	92.9	0	*108.0[b]*	38.4	33.3	27.5	24.7	20.0	15.3

a: Compliance with 24 hour PM10 not met, values displayed in bold
b: Recorded on a day with less than 25% data capture, not included in count of exceedances days

Table 64: Percentiles of daily PM_{10} at Brighton (2002-2015)

Year	Data availability (% of days)	No. of exceedances (days)	Max (ppm)	99th (ppm)	98th (ppm)	95th (ppm)	90th (ppm)	70th (ppm)	50th (ppm)
2002	97.3	1	69.1	34.7	31.1	28.2	24.8	19.6	14.7
2003[b]	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[b]	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[b]	99.5	**6**	132.4	57.1	48.5	35.7	29.1	22.8	17.1
2010[a]	*17.0*	*0*	*47.6*	*37.9*	*31.1*	*27.7*	*23.8*	*21.1*	*17.2*
2011	98.6	0	41.9	30.0	28.9	26.2	24.4	19.8	15.5
2012	98.6	0	45.8	31.8	30.7	27.5	24.8	20.1	15.5
2013	97.8	0	36.3	33.3	31.0	28.4	24.7	20.0	15.2
2014	97.3	2	58.1	38.1	36.1	29.6	25.6	20.1	16.0
2015a	*17.0*	*0*	*47.6*	*37.9*	*31.1*	*27.7*	*23.8*	*21.1*	*17.2*

a: data availability between 15 and 75%, values displayed in italics.
b: Compliance with 24 hour PM_{10} not met, values displayed in **bold**

Table 65: Percentiles of daily PM_{10} at Dandenong (2002-2015)

Year	Data availability (% of days)	No. of exceedances (days)	Max (ppm)	99th (ppm)	98th (ppm)	95th (ppm)	90th (ppm)	70th (ppm)	50th (ppm)
2002	87.4	3	84.8	45.6	37.6	31.5	26.5	21.0	15.8
2003[b]	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[b]	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[b]	99.2	**8**	88.6	61.3	52.8	39.4	33.2	25.4	19.1
2009[b]	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
2012	98.6	0	49.8	39.7	35.4	30.8	27.8	22.1	16.9
2013	93.4	1	52.9	38.1	36.6	33.7	30.2	23.6	17.3
2014	99.2	4	68.6	53.0	40.8	35.1	29.3	23.0	17.9
2015	*69.9*	*0*	47.8	41.9	38.1	32.9	26.5	22.6	17.5

a: data availability between 15 and 75%, values displayed in italics
b: Compliance with 24 hour PM_{10} not met, values displayed in **bold**

Table 66: Percentiles of daily PM_{10} at Footscray (2002-2015)

Year	Data availability (% of days)	No. of exceedances (days)	Max (ppm)	99th (ppm)	98th (ppm)	95th (ppm)	90th (ppm)	70th (ppm)	50th (ppm)
2002	98.4	2	79.1	42.9	38.7	32.2	28.3	22.1	17.5
2003[a]	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[a]	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[a]	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
2012	98.9	3	57.7	45.1	38.7	33.7	28.6	23.6	17.1
2013	97.3	2	50.5	43.0	38.9	34.4	28.8	22.5	16.6
2014[a]	98.6	**6**	79.2	63.0	42.2	36.5	30.6	23.0	18.0
2015[a]	97.0	**3**	71.8	44.7	35.7	32.5	28.8	21.9	16.4

b: Compliance with 24 hour PM_{10} not met, values displayed in **bold**

Table 67: Percentiles of daily PM_{10} at Geelong (2002-2015)

Year	Data availability (% of days)	No. of exceedances (days)	Max (ppm)	99th (ppm)	98th (ppm)	95th (ppm)	90th (ppm)	70th (ppm)	50th (ppm)
2002[ab]	*32.1*	***6***	*81.1*	*73.2*	*56.8*	*49.5*	*35.8*	*27.4*	*20.1*
2003[b]	94.0	**10**	148.7	80.2	57.7	45.3	35.3	25.6	18.4
2004[b]	91.8	**11**	149.0	62.5	53.5	44.0	34.3	26.1	18.3
2005[b]	96.2	**7**	83.0	55.2	49.3	40.6	33.7	26.6	18.5
2006[b]	91.0	**17**	116.4	98.0	72.2	49.1	38.0	26.9	19.6
2007[b]	98.9	**14**	129.1	65.2	59.9	43.4	32.8	26.5	19.1
2008[b]	99.7	**6**	168.7	66.6	48.8	39.4	35.4	26.4	18.9
2009[b]	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
2012	98.1	1	53.8	42.7	38.7	34.9	29.8	23.6	16.9
2013[b]	99.5	**8**	107.6	60.7	52.4	40.6	33.3	24.8	16.5
2014[b]	99.5	**8**	75.8	58.8	51.7	43.3	33.8	24.3	17.7
2015[b]	79.7	**10**	286.1	84.4	64.1	45.5	32.4	23.8	16.6

a: data availability between 15 and 75%, values displayed in *italics*
b: Compliance with 24 hour PM_{10} not met, values displayed in **bold**

Table 68: Percentiles of daily PM_{10} at Mooroolbark (2002-2015)

Year	Data availability (% of days)	No. of exceedances (days)	Max (ppm)	99th (ppm)	98th (ppm)	95th (ppm)	90th (ppm)	70th (ppm)	50th (ppm)
2002[ab]	*57*	*1*	*66.7*	*44.9*	*44.3*	*39.7*	*33.2*	*27.0*	*19.9*
2003[b]	91.8	**13**	322.2	118.1	91.3	45.6	37.4	26.8	19.1
2004[b]	94.8	1	63.9	46.0	42.8	34.7	30.1	23.9	17.3
2005[b]	99.5	**9**	57.6	53.7	52.1	43.1	36.1	27.4	19.3
2006[b]	97.3	**17**	219.9	135.9	69.6	46.1	39.2	29.1	21.3
2007[b]	100.0	**11**	136.1	63.0	51.7	43.0	37.3	27.4	19.4
2008[b]	97.8	**10**	99.9	60.6	54.7	44.5	37.8	27.7	21.1
2009[b]	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
2012	99.2	2	53.9	40.8	38.2	34.0	31.2	23.7	17.6
2013	98.4	0	42.6	39.7	37.9	34.9	30.4	23.6	16.4
2014	98.4	4	109.3	55.4	40.9	34.1	30.1	23.2	17.5
2015a	*15.6*	*0*	39.5	37.5	35.5	31.8	27.2	22.0	17.5

a: data availability between 15 and 75%, values displayed in *italics*
b: Compliance with 24 hour PM_{10} not met, values displayed in **bold**

Table 69: Percentiles of daily PM_{10} at Richmond (2002-2015)

Year	Data availability (% of days)	No. of exceedances (days)	Max (ppm)	99th (ppm)	98th (ppm)	95th (ppm)	90th (ppm)	70th (ppm)	50th (ppm)
2002	92.6	1	70.0	40.3	34.7	29.2	26.5	21.2	16.5
2003[a]	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[a]	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[a]	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
2012	96.2	0	47.4	32.7	29.2	26.7	24.7	20.5	15.6
2013	98.1	0	41.5	33.8	32.4	28.3	25.2	20.8	15.6
2014	97.5	4	63.4	50.7	37.6	33.1	27.3	20.9	16.7
2015[a]	96.2	**1**	52.4	35.7	32.8	27.7	24.9	20.8	16.4

a: Compliance with 24 hour PM_{10} not met, values displayed in **bold**

Table 70: Percentiles of daily PM_{10} at Traralgon (2002-2015)

Year	Data availability (% of days)	No. of exceedances (days)	Max (ppm)	99th (ppm)	98th (ppm)	95th (ppm)	90th (ppm)	70th (ppm)	50th (ppm)
2002	15.3	0	37.1	33.2	30.0	28.8	26.4	23.5	18.7
2003[a]	**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[a]	**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
2012	97.8	0	35.0	29.4	27.6	24.4	21.4	18.1	14.5
2013	92.9	4	104.8	48.7	36	27.6	22.9	17.8	13.4
2014	97.5	3	84.9	47.1	41.3	32.2	26	19.9	15.3
2015	84.4	0	45.0	29.7	29.0	26.2	21.9	17.2	13.9

a: Compliance with 24 hour PM_{10} not met, values displayed in **bold**

Air monitoring report 2015 – Compliance with the National Environment Protection (Ambient Air Quality) Measure

I Particulate Matter less than 2.5 µm ($PM_{2.5}$)

Analysis method for $PM_{2.5}$

In Victoria, $PM_{2.5}$ is measured in compliance with Australian Standard S3580.9.10–2006 "Determination of suspended particulate matter – $PM_{2.5}$ low volume sampler – Gravimetric method" and with Australian Standard 3580.9.12:2013 Determination of suspended particulate matter $PM_{2.5}$ beta attenuation monitors. As of June 2016, monitoring for $PM_{2.5}$ using BAMs has not been incorporated in EPA Victoria's NATA accreditation yet. Work is being undertaken to incorporate it into EPA Victoria's accreditation in the future.

Assessment of compliance with standards and goals of the Measure for $PM_{2.5}$

In Victoria, $PM_{2.5}$ is assessed against a 1-day standard of 25 µg/m^3 and an annual standard of 8 µg/m^3

Partisol Method (manual sample once every three days)

Table 71: 2015 compliance summary for daily $PM_{2.5}$ in Victoria (Partisol)

Region	Data availability rates (% of hours)					Number of exceedances (days)	Annual average (µ/m^3)
Performance monitoring station	Q1	Q2	Q3	Q4	Annual		
Port Phillip							
Alphington	100.0	100.0	100.0	100.0	100.0	0	6.9
Footscray	100.0	100.0	100.0	100.0	100.0	0	6.4

Data availability rates are based on a 1-day-in-3 sampling regime
No exceedances were recorded using the Partisol method running once every three days.

Table 72: 2015 summary statistics for daily $PM_{2.5}$ in Victoria (Partisol)

Region Performance monitoring station	Number of valid days	Highest (µg/m3)	Highest (date)
Port Phillip			
Alphington	121	20.7	June 15
Footscray	121	20.8	June 12

Data availability rates are based on a 1-day-in-3 sampling regime

Table 73: 2015 percentiles for daily $PM_{2.5}$ concentrations in Victoria (Partisol)

Region	Data availability	Max (µg/m3)	Percentiles					
Performance monitoring station			99th	98th	95th	90th	75th	50th
Port Phillip								
Alphington	100.0	20.7	19.3	18.2	13.4	10.6	7.9	5.8
Footscray	100.0	20.8	19.0	14.0	12.3	10.5	7.8	5.5

Data availability rates are based on a 1-day-in-3 sampling regime

Continuous Equivalence Methods

Victoria monitors $PM_{2.5}$ by the reference method specified in the Measure (on a one-day-in-three basis) at two stations (Alphington and Footscray). It also monitors $PM_{2.5}$ continuously at these two stations using BAM.

Table 74: 2015 compliance summary for daily $PM_{2.5}$ in Victoria (BAM)

Region	Data availability rates (% of hours)					Number of exceedances (days)	Annual average (µ/m^3)
Performance monitoring station	Q1	Q2	Q3	Q4	Annual		
Port Phillip							
Alphington	56.7	95.6	69.6	95.7	79.5	**2**	**8.3**
Footscray	22.2	79.1	97.8	93.5	73.4	0	7.5

Table 75: 2015 summary statistics for daily $PM_{2.5}$ in Victoria (BAM)

Region Performance monitoring station	Number of valid days	Highest (µg/m3)	Highest (date)
Port Phillip			
Alphington	290	30.0	June 20
Footscray	268	23.3	June 15

The TEOM Equivalence Program ceased at Alphington and Footscray in 2012. The TEOMs were replaced by BAMS during 2014.

The highest daily average for $PM_{2.5}$ in the Port Phillip region, at Alphington was 120% of the standard. The highest annual average for $PM_{2.5}$ was recorded at Alphington and was 103% of the standard.

Table 76: 2015 $PM_{2.5}$ exceedances

Date	Port Phillip Region		Inferred cause
	Alphington (µ/m³)	Footscray (µ/m³)	
June 20	**30**	8.2	Urban
July 19	**29.1**	17.3	Urban

Table 77: 2015 percentiles for daily $PM_{2.5}$ concentrations in Victoria (BAM)

Region	Data availability	Max (µg/m3)	Percentiles					
Performance monitoring station			99th	98th	95th	90th	75th	50th
Port Phillip								
Alphington	79.5	30.0	24.5	23.3	19.2	13.3	10.0	7.3
Footscray	73.4	23.3	19.3	16.4	13.4	11.6	9.0	6.8

Trends and pollutant distributions for $PM_{2.5}$ between 2002 and 2015

Results and further analysis of the monitoring data are presented in this section. Percentiles of 2015 daily peak concentrations are provided for each station and standard. In these tables, daily peak values are recorded only when at least 75% of the data for the day are valid. Data for stations with less than 15% of valid data in the year are omitted and stations with less than 75% of valid 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 from 2002, when monitoring according to the Measure's protocol ensured greater continuity of stations operating each year. The values plotted are averages of the percentiles from stations having at least 75% of data in the year. Different stations and different statistics can suggest different trend behavior; no estimates of statistical significance are presented.

Partisol Method (manual sample once every three days)

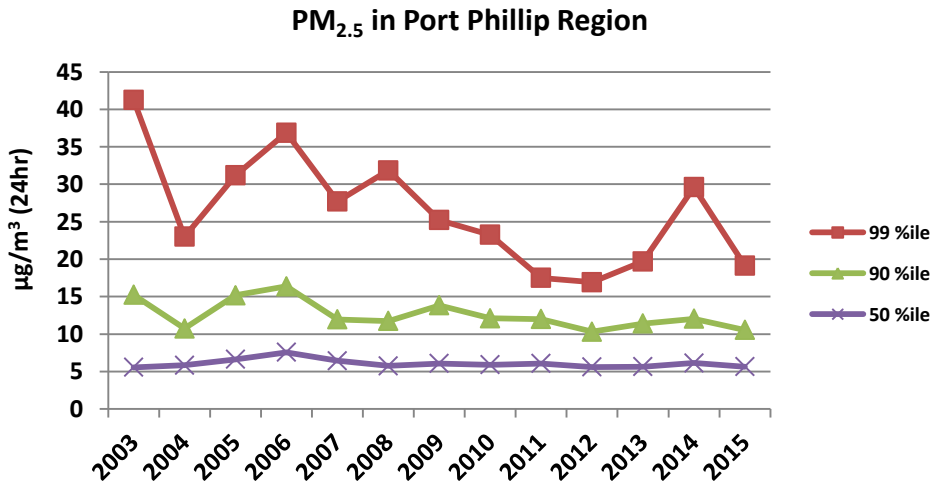

Figure 12: Percentiles of daily $PM_{2.5}$ (average of Port Phillip stations 2003–2015)

Table 78: Percentiles of daily $PM_{2.5}$ at Alphington (2002-2015) Partisol

Year	Data availability (% of days)	No. of exceedances (days)	Max (ppm)	99th (ppm)	98th (ppm)	95th (ppm)	90th (ppm)	70th (ppm)	50th (ppm)
2002[a]	*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
2012	98.4	0	19.0	17.6	15.2	13.8	10.6	7.8	5.7
2013	97.5	1	26.4	22.8	17.2	14.4	12.0	8.6	5.8
2014	97.5	5	40.6	32.4	23.8	16.5	12.7	8.7	6.4
2015	100	0	20.7	19.3	18.2	13.4	10.6	7.9	5.8

a: data availability between 15 and 75%, values displayed in italics

Table 79: Percentiles of daily $PM_{2.5}$ at Footscray (2002-2015) Partisol

Year	Data availability (% of days)	No. of exceedances (days)	Max (ppm)	99th (ppm)	98th (ppm)	95th (ppm)	90th (ppm)	70th (ppm)	50th (ppm)
2002[a]	*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
2012	100.0	0	23.1	16.2	14.9	11.2	10.0	7.2	5.5
2013	100.0	0	17.1	16.6	15.5	12	10.8	7.7	5.5
2014	100.0	2	39.1	26.8	21.9	17.4	11.4	7.9	5.9
2015	100.0	0	20.8	19.0	14.0	12.3	10.5	7.8	5.5

a: data availability between 15 and 75%, values displayed in italics

Equivalence Methods (continuous)

Victoria monitors $PM_{2.5}$ by the reference method specified in the Measure (on a one-day-in-three basis) at two stations (Alphington and Footscray). It also monitors $PM_{2.5}$ continuously at these two stations using BAM. Prior to this, Victoria also participated in the $PM_{2.5}$ Equivalence Program, with TEOM monitors located at Alphington and Footscray.

Table 80: Percentiles of daily $PM_{2.5}$ at Alphington (2002-2015) (Equivalence Methods)

Year	Data availability (% of days)	No. of exceedances (days)	Max (ppm)	99th (ppm)	98th (ppm)	95th (ppm)	90th (ppm)	70th (ppm)	50th (ppm)
2002[a]	95.6	N/A	16.2	13.9	12.6	11.5	9.6	6.5	4.6
2003[a]	94.2	N/A	59.5	39.2	29.9	17.9	13.7	8.3	5.6
2004[a]	94.8	N/A	21.7	15.6	12.3	10.1	7.8	6.1	4.3
2005[a]	93.4	N/A	24.8	17.9	16.2	14.0	11.2	6.9	4.3
2006[a]	87.7	N/A	112.6	50.5	28.7	14.9	11.2	7.6	4.7
2007[a]	100.0	N/A	59.4	21.7	17.9	14.3	12.0	7.5	5.0
2008[a]	99.5	N/A	44.2	25.6	19.0	12.8	9.9	6.8	4.7
2009[a]	98.4	N/A	32.7	22.4	21.3	14.8	11.7	7.3	4.7
2010[a]	98.1	N/A	17.3	16.1	14.4	11.1	9.4	6.2	4.1
2011[a]	89.9	N/A	20.2	14.8	13.7	11.6	8.9	6.1	4.2
2012[a]	91.5	N/A	21.1	13.5	12.3	9.9	8.2	5.6	3.6
2013[ac]	*29.0*	*N/A*	*17.4*	*12.7*	*12.1*	*11.6*	*9.2*	*6.6*	*4.2*
2014[b]	91.8	N/A	44.8	31.5	22.1	15.8	13.8	9.8	7.2
2015[b]	79.5	2	30.0	24.5	23.3	19.2	13.3	10.0	7.3

a: Measured using a TEOM
b: Measured using a BAM
c: data availability between 15 and 75%, values displayed in italics

Table 81: Percentiles of daily $PM_{2.5}$ at Footrscray (2002-2015) (Equivalence Methods)

Year	Data availability (% of days)	No. of exceedances (days)	Max (ppm)	99th (ppm)	98th (ppm)	95th (ppm)	90th (ppm)	70th (ppm)	50th (ppm)
2002[a]	65.5	N/A	24.7	21.5	19.7	16.0	13.8	10.9	8.8
2003[a]	10.1	N/A	14.0	13.9	13.7	12.8	10.9	8.4	5.3
2004[a]	88.5	N/A	23.8	14.1	12.5	9.9	8.2	5.8	3.8
2005[a]	99.7	N/A	20.3	14.3	13.0	10.8	9.0	5.9	3.9
2006[a]	91.8	N/A	95.7	44.0	23.2	15.6	11.3	6.8	4.3
2007[a]	99.5	N/A	42.9	18.9	16.0	12.0	10.4	6.3	4.2
2008[a]	99.7	N/A	34.5	23.2	16.6	11.6	9.2	6.6	4.5
2009[a]	99.5	N/A	32.9	23.3	19.4	13.8	10.8	7.3	4.2
2010[a]	98.9	N/A	22.9	15.7	12.5	10.3	8.4	5.7	3.7
2011[a]	99.2	N/A	15.7	12.6	11.9	10.2	8.3	6.1	4.0
2012[a]	97.3	N/A	26.3	14.8	13.1	10.4	8.0	5.5	3.7
2013[ac]	*29.6*	*N/A*	*17.6*	*15*	*14.5*	*11.5*	*9.7*	*6.4*	*4.4*
2014[bc]	*25.2*	*N/A*	*18.1*	*13.7*	*13.1*	*11.8*	*10.1*	*8.1*	*6.5*
2015[b]	73.4	0	23.3	19.3	16.4	13.4	11.6	9.0	6.8

a: Measured using a TEOM
b: Measured using a BAM
c: data availability between 15 and 75%, values displayed in italics

J Lead (Pb)

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

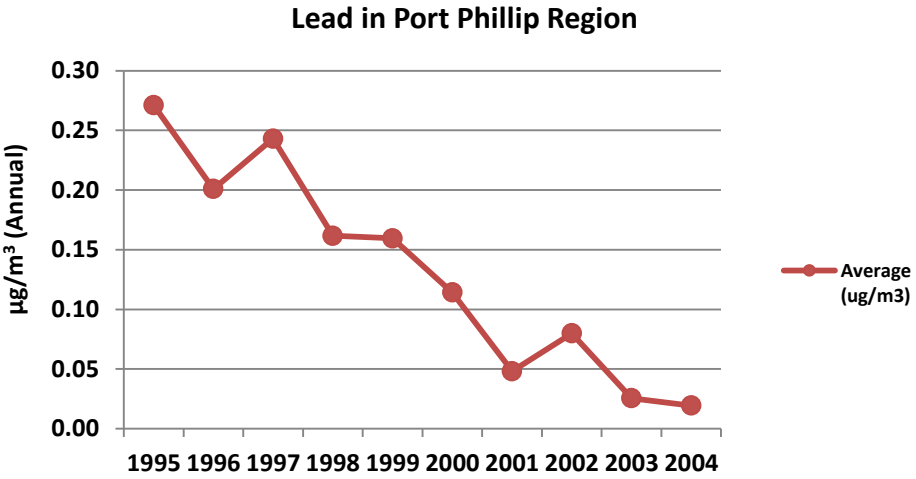

Figure 13: Historical annual averages for Lead (Collingwood 1995-2004)

Table 82: Historical annual averages for Lead (Collingwood 1995-2004)

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