

AIR MONITORING REPORT 1999

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OVERVIEW

The Environment Protection Authority's monitoring program recorded over two million air quality measurements in 1999, from 13 sites. It found:

- Victoria's air is generally clean. In an international context Melbourne's air quality is relatively good.
- Carbon monoxide, nitrogen dioxide, sulfur dioxide and lead levels were below the environmental quality objectives set in the *State Environment Protection Policy (SEPP) (Ambient Air Quality)*.
- Ozone and visibility-reducing particles still cause concern within Victoria, although limits were exceeded on few occasions. In 1999, there were no breaches of 1-hour and 4-hour ozone objectives, with only the 8-hour standard being breached. Ninety-three per cent of data for visibility-reducing particles were below the SEPP limit.
- The incidence of elevated levels of pollutants is significantly dependent on weather conditions.

EPA is continuing to work to improve air quality, notably with the development of the draft Air Quality Improvement Plan.

AIR QUALITY IN DETAIL

Background

Objectives are set in the *State Environment Protection Policy (Ambient Air Quality)* for six common pollutants: carbon monoxide, ozone, nitrogen dioxide, sulfur dioxide, lead and visibility-reducing particles. These objectives are consistent with the National Environment Protection Measure (NEPM) and the data for 1999 have been assessed against the air SEPP.

EPA routinely monitors air quality in two priority regions, the Melbourne-Geelong Airshed (Port Phillip Region) and the Latrobe Valley Airshed.

The long term air quality trend report, *Ambient Air Quality in the Port Phillip Control Region 1979–1993: Compliance and Observed Trends* (EPA Publication 468), published in 1995, shows that since the late 1970s Victoria's air has improved. Air quality did not always meet the SEPP goals for the 8-hour ozone and the 1-hour visibility objectives. These problems are now less frequent and improvements are a direct consequence of controls placed on industry, motor vehicles and backyard burning.

The two predominant types of pollution are summer and winter smog.

Summer smog

Summer smog is made up of chemicals called oxidants, the main one being ozone. Ozone is formed from complex reactions of pollutants such as hydrocarbons and oxides of nitrogen, with strong sunlight. Due to Melbourne's location, when light winds and temperature inversions in the morning are followed by afternoon sea breezes, high ozone levels can occur.

The three policy objectives applicable in 1999 for ozone cover 1-hour, 4-hour and 8-hour exposures. Peaks that are greater than the environment quality objective are referred to as exceedances. The objective for the 1-hour and 4-hour standard was met during 1999 in the Melbourne-Geelong Airshed, and in the Latrobe Valley Airshed. The 8-hour objective was also met in the Latrobe Valley Airshed.

However, there were 18 exceedances of the 8-hour ozone in Melbourne-Geelong Airshed. The highest monthly 8-hour averages for the year in graph 1 show that the monthly averages are well below the environmental quality objectives (see EPA website for more details).

The greatest single contributor to ozone formation is the motor vehicle, notably emission from cold engines during short trips in the average motor car.

Winter smog

Winter smog generally occurs when there is a build up of fine particles from man-made sources in the atmosphere.

These particles are trapped in the atmosphere under still weather conditions, mainly during autumn and winter. EPA takes a number of different measures of these particles. One method measures visibility, which is expressed as an Airborne Particulate Index (API).

The Airborne Particulate Index is related to Local Visual Distance by a simple ratio. It has been shown that this method provides a reasonable agreement with very fine particles.

The SEPP objective for visibility states concentrations should not reduce visibility to below 20 km (equivalent to 2.35 API units) on more than three days in any year. The highest monthly 1-hour readings for the Melbourne-Geelong Airshed compared to the SEPP objectives are shown in graph 3. The monthly averages were well below the objective. However, there were 26 exceedances measured in the Melbourne-Geelong Airshed and 24 in the Latrobe Valley Airshed. A yearly distribution of the Melbourne-Geelong Airshed exceedances is shown in graph 4, which indicates most occur during autumn and winter.

According to a recent inventory of pollution sources within the Melbourne-Geelong Airshed, the greatest contributor to elevated particle levels is from domestic solid fuel heaters without emission reducing technology (eg. old wood heaters) and open fires. Limiting the use of these heating methods will help reduce future pollution events, especially on Smog Alert or still weather days. A list of all the smog events can be found on the EPA website.

EPA also measures particles less than 10 μm (PM_{10}) (about one 10th the width of a human hair).

The goal specifies there should be no more than five yearly exceedances of the maximum daily average of $50 \mu\text{g}/\text{m}^3$. The 1999 monitoring data were within the SEPP limits. Table 1 gives a summary of EPA's monitoring data, relative to those limits. A frequency plot of all monitoring data points is shown in graph 5. All the exceedances shown occurred on one day – 15 July 1999 – when smoke from a bushfire near Portland was carried over Melbourne.

It can be seen that most daily averages are within the range 10 to $30 \mu\text{g}/\text{m}^3$. Details of the year's data can be found on EPA's website.

Other pollutants

There are objectives for the other common pollutants stated within the SEPP. These pollutants are carbon monoxide, nitrogen dioxide, sulfur dioxide and lead. All were within SEPP objectives. Detailed tables and graphs are published on EPA's website.

In addition to monitoring the six common pollutants, EPA also measures nitrous oxide, oxides of nitrogen and non-methane hydrocarbons to develop further understanding of the sources of air pollutants and their behaviour in the airshed. Details of these measurements are also available on EPA's website.

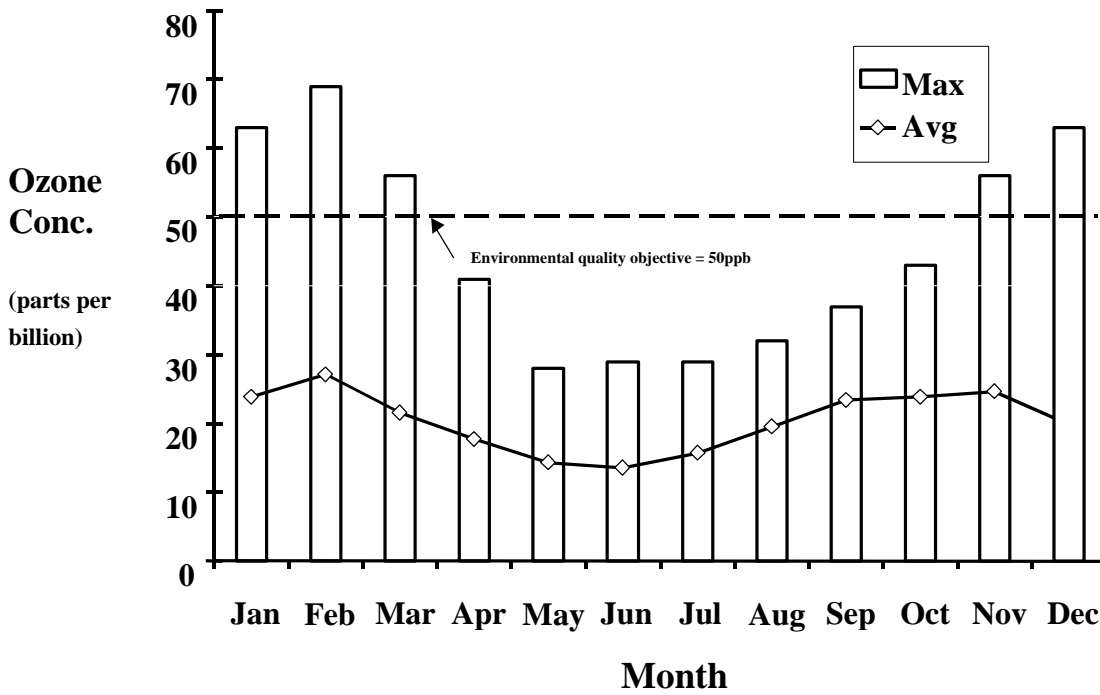
OTHER HIGHLIGHTS

- Particle monitoring using new technology was further extended so that five sites around Melbourne are now

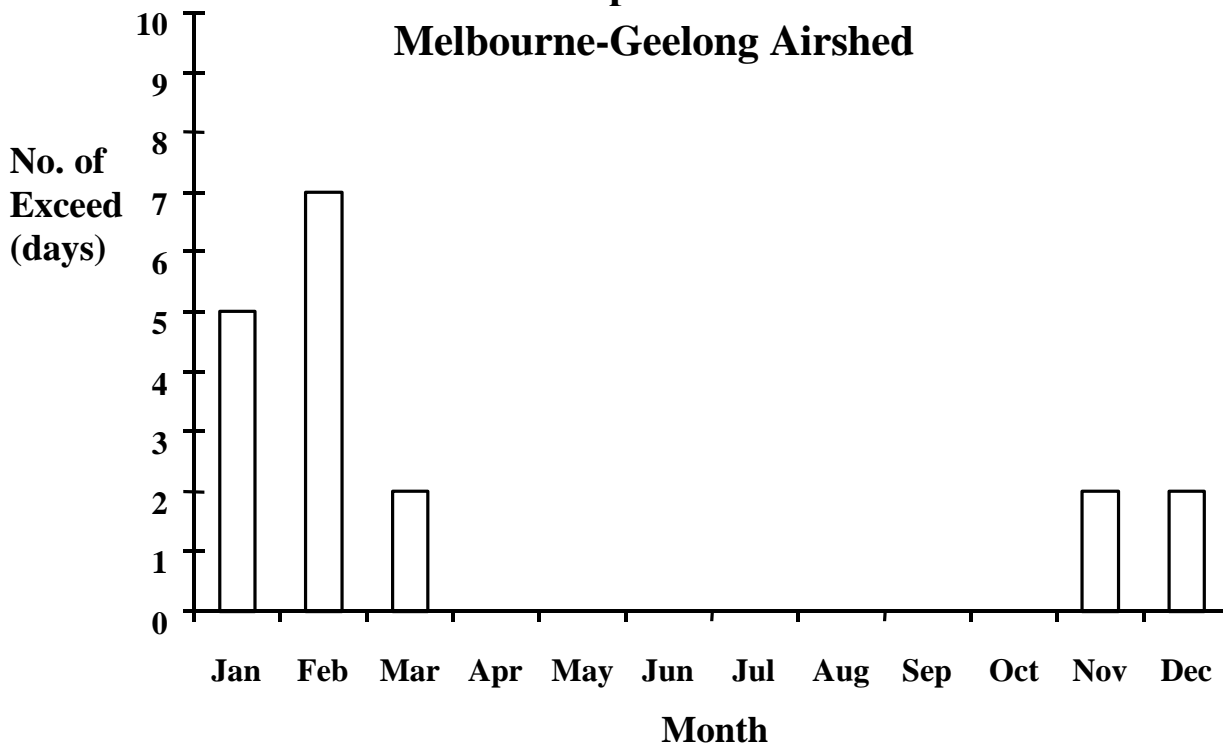
covered. These instruments (TEOM) measure particles continuously, and are dedicated to sample a particular particle size. The particle sizes measured were PM_{10} and $\text{PM}_{2.5}$.

- Windows version of AUSTRAJ, which uses to track the movement of pollutants released in the atmosphere by prevailing winds, was introduced for EPA use. This tool has subsequently played a significant role in helping EPA respond to complaints from the community by making it simpler to track down the potential origins of air pollution.
- Day-to-day air quality was reported as an air quality index which was developed to report pollutants as one number regardless of pollution type. This is reported on EPA's website, and in *The Age* and *Herald Sun*.
- EPA opened more of its air monitoring network to the community with the Community Access to Air Monitoring (CAAM) pilot project. This is a world first and involves the community helping to run air monitoring sites. The objective of the project is to raise community awareness of air quality issues, and provide an opportunity for the community to engage EPA in a two-way exchange on air quality issues.
- EPA Victoria was the first State to submit a draft NEPM monitoring plan to the National Peer Review Committee for consideration. This plan is being finalised.

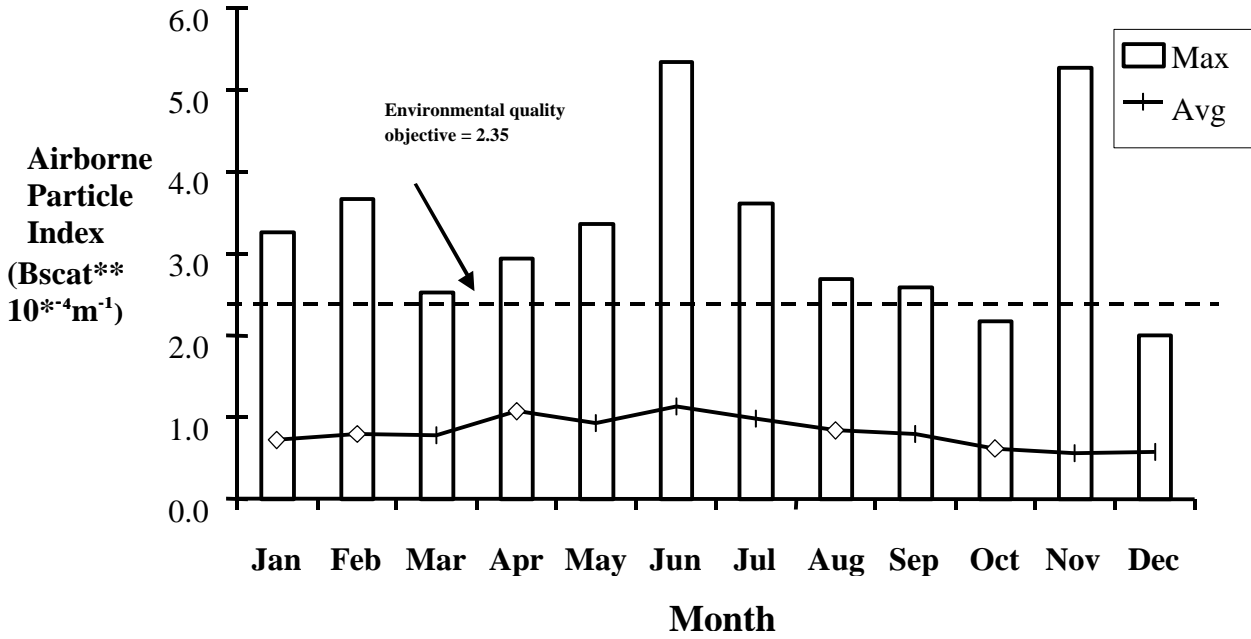
**Graph 1: 1999 8- Hour Daily Maxima
Melbourne-Geelong Airshed**



**Graph 2: 1999 Exceedances in days of the 8-Hour
Ozone Acceptable Level
Melbourne-Geelong Airshed**



**Graph 3: 1999 Highest and Average 1-Hour Daily API
Melbourne-Geelong Airshed**



**Graph 4: 1999 Number of Days Exceedances
of the 1-Hour API Acceptable Level
Melbourne-Geelong Airshed**

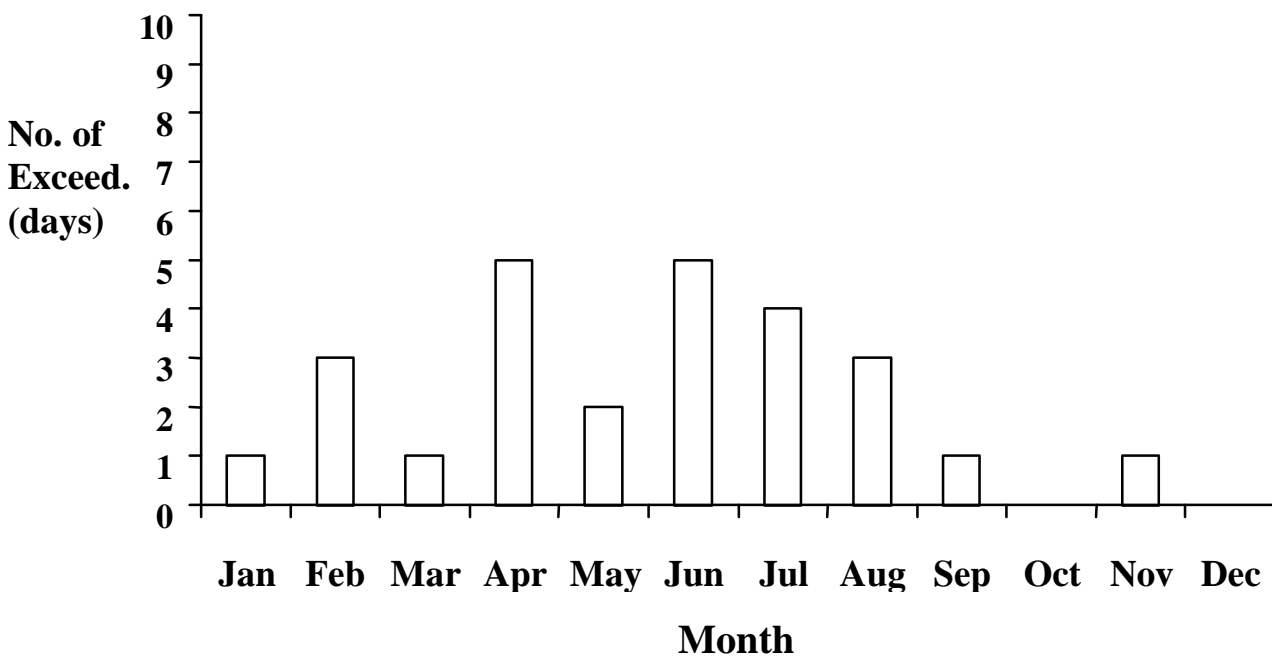
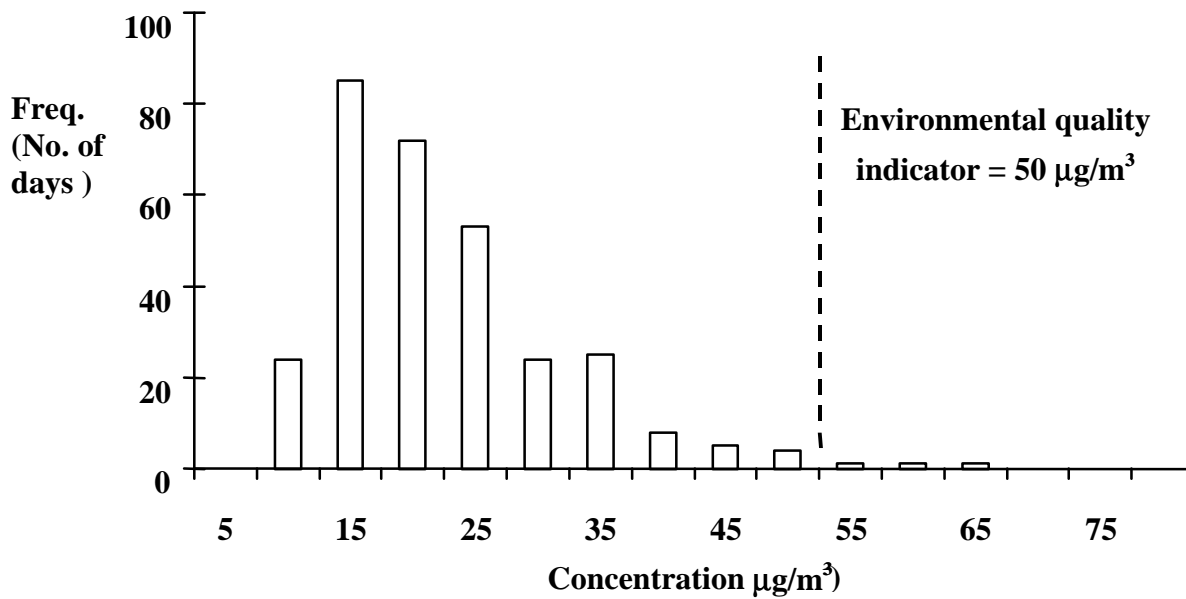


Table 1: Summary of the PM₁₀ monitoring network

Site	% Recovered Data	Median* $\mu\text{g}/\text{m}^3$	Exceedances $>50 \mu\text{g}/\text{m}^3$	Breach of NEPM
Alphington	98	17.4	1	no
Collingwood	98	21.8	1	no
Richmond	100	17.4	0	no
Paisley	85	17.7	1	no
RMIT	100	19.0	0	no
Geelong South	43	13.4	0	no

* Median = the value either side of which 50% of the data values lie

Graph 5: 1999 Frequency plot of 24-Hour Network PM₁₀ data



RELATED EPA PUBLICATIONS

EPA 1995, *Ambient Air Quality in the Port Phillip Control Region, 1979–1993: Compliance and Observed Trends*, EPA Publication 468, Environment Protection Authority, State Government of Victoria.

EPA 1995, *Air Monitoring Data 92–95*, EPA Publication 584, Environment Protection Authority, State Government of Victoria.

EPA 1996, *Air Monitoring Data 1996*, EPA Publication 614, Environment Protection Authority, State Government of Victoria.

EPA 1997, *Air Quality Management Plan*, EPA Publication 535, Environment Protection Authority, State Government of Victoria.

EPA 1998, *Air Emissions Inventory*, EPA Publication 632, Environment Protection Authority, State Government of Victoria.

EPA 1999, *Air Monitoring Data 1997*, EPA Publication 683, Environment Protection Authority, State Government of Victoria.

Victorian Government 1981, *State Environment Protection Policy (The Air Environment)*, Victorian Government Gazette No. 63 13/07/81.

Victorian Government 1999, *State Environment Protection Policy (Ambient Air Quality)*, Victorian Government Gazette No. S 19 09/02/1999.

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