

AIR MONITORING REPORT – 2001

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OVERVIEW

EPA Victoria's air monitoring program recorded more than two million air quality measurements in 2001 from 15 sites (13 in the Melbourne-Geelong airshed and two in the Latrobe Valley airshed). It found:

- Victoria's air is generally clean. In an international context Melbourne's air quality remains relatively good, consistent with results from recent years.
- Carbon monoxide, nitrogen dioxide, sulfur dioxide and lead levels meet the environmental quality objectives set in the *State Environment Protection Policy-Ambient Air Quality (SEPP (AAQ))*.
- Ozone still causes concern within the Melbourne-Geelong airshed. There was a single exceedence of the 4-hour objective in the Melbourne-Geelong airshed. There were no exceedences of the 1-hour objective.
- Particles (particularly visibility-reducing particles) remain an issue within Melbourne and the Latrobe Valley. In the Melbourne-Geelong airshed, 8 per cent of days in 2001 did not meet the SEPP objective. In the Latrobe Valley airshed, 4 per cent of days in 2001 did not meet the SEPP objective.

The incidence of elevated levels of pollutants is significantly dependent on weather conditions. As a

consequence, comparisons with 2000 data are only given where appropriate.

EPA is continuing to work to improve air quality, notably with the declaration of the *State Environment Protection Policy-Air Quality Management (SEPP (AQM))* in December 2001 and the finalisation of the Air Quality Improvement Plan, of which a draft was published in June 2000.

AIR QUALITY IN DETAIL

Air quality objectives are set in the *SEPP Ambient Air Quality (SEPP (AAQ))* for seven common pollutants: carbon monoxide, ozone, nitrogen dioxide, sulfur dioxide, lead, particles smaller than 10 micrometre (μm)¹ and visibility-reducing particles. These objectives, with the exception of visibility², are consistent with the National Environment Protection Measure (NEPM). Air quality for 2001 has been assessed against the SEPP (AAQ).

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

¹ For comparison, $10\mu\text{m}$ is about $1/10^{\text{th}}$ of the width of a human hair.

² In addition to the NEPM objectives, which are health based, Victoria also has an aesthetic objective based on visibility.

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

Summer smog

Summer smog contains 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 greatest single contributor to ozone formation is the motor vehicle, notably emissions from cold engines during short trips in the average motorcar.

The 1-hour and 4-hour policy objectives for ozone are 0.10 parts per million (ppm) and 0.08 ppm respectively. These levels are designed to protect community health. Days that record greater than the environmental quality objective are referred to as exceedences. The SEPP goals are no more than one exceedence per year for each of the 1-hour and 4-hour objectives.³

The SEPP ozone goals were met in the Melbourne-Geelong airshed, with no exceedences of the 1-hour objective and only one exceedence of the 4-hour objective (as measured at Point Cook and Point Henry on 4 January). Air quality in the Melbourne-Geelong airshed has not always met the SEPP goals for ozone but these problems are now less frequent (the 20-year trends are shown in Graph 1).

³ As part of the 2001 review of the SEPP (Ambient Air Quality) the 8-hour ozone standard, designed to protect vegetation, was removed as it does not provide a justifiable basis for protection of Australian vegetation from photochemical pollution.

In 2001, there were no exceedences of the 1-hour and 4-hour ozone objectives in the Latrobe Valley airshed. Ozone exceedences in the Latrobe Valley airshed are rare.

The monthly 1-hour ozone readings for the Melbourne-Geelong airshed are shown in Graph 2, and for the Latrobe Valley airshed in Graph 3. Ozone data can be downloaded from the EPA website (www.epa.vic.gov.au/air/air_monitoring_report_2001/O3_Tables.pdf).

Winter smog

Winter smog generally occurs when there is a build up of particles from combustion sources.

These particles are trapped in the atmosphere under still weather conditions, mainly during autumn and winter. EPA monitors a number of different indicators of these particles. One method measures visibility reduction, which is expressed as an Airborne Particulate Index (API). Studies show a reasonable agreement between API and concentration of particles smaller than 2.5µm.

The API is related to Local Visual Distance by a simple inverse ratio. The SEPP goal for visibility states that Local Visual Distance should not be below 20km (equivalent to 2.35 API units) on more than three days in any year.

Whilst air quality does not always meet the SEPP goal for the 1-hour visibility objective, these problems are now less frequent in the Melbourne-Geelong and Latrobe Valley airsheds (the 20-year trends are shown in Graphs 4 and 5). Improvements are a direct consequence of controls placed on industry, motor vehicles, backyard burning and education and communication programs.

The monthly 1-hour API readings for the Melbourne-Geelong airshed are shown in Graph 6, and for the Latrobe Valley airshed in Graph 7. The monthly averages were generally low, however, there were 30 exceedences measured in the Melbourne-Geelong airshed (compared to 26 in 2000) and 15 in the Latrobe Valley airshed (compared to 11 in 2000). API data can be downloaded from the EPA website (www.epa.vic.gov.au/air/air_monitoring_report_2001/API_Tables.pdf).

A yearly distribution of API exceedences for both airsheds is shown in Graphs 8 and 9. These indicate that most API exceedences 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 domestic solid fuel heaters without emission reducing technology (for example 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.

Smog Events

There were six smog events in Melbourne in 2001 (compared to 5 in 2000). A smog event occurs when:

- visibility becomes less than 20km, for at least one daylight hour, as recorded by at least two monitoring stations;
- a primary pollutant (carbon monoxide, sulfur dioxide or particles as PM_{10}) exceeds an objective as recorded by at least two monitoring stations; or

- a secondary pollutant (1-hour ozone or nitrogen dioxide) exceeds an objective at any station in the EPA network.

One smog event occurred in January as a result of the King Island fire and five in July due to visibility-reducing particles. A list of all the smog events can be found on the EPA website (www.epa.vic.gov.au/Air/Bulletins/smogevents.asp).

Particles

EPA also monitors for particles with a diameter of less than $10\mu\text{m}$ (PM_{10}) in the Melbourne-Geelong airshed. The SEPP goal, designed to protect community health, specifies there should be no more than five exceedences per year of the daily average objective of 50 micrograms per cubic metre ($\mu\text{g}/\text{m}^3$). EPA measures particles via a combination of HiVol⁴ and TEOM⁵ instruments.

The 2001 monitoring data complied with the goal, with three exceedences of the objective, namely:

- an exceedence across Melbourne on 12 January as a result of the King Island fire;
- one exceedence on 24 July at Alphington; and
- one exceedence on 26 September at RMIT-City.

⁴ A high volume sampler, operated one day in six, collects particles on a filter for subsequent weighing.

⁵ A Tapered Element Oscillating Microbalance is an on-line method for measuring particles. TEOM values are corrected with temperature to give equivalence to HiVol data. 2001 is the first year that EPA has applied these corrections.

In comparison, there were five exceedences of the objective in 2000⁶. Monthly variation of average daily and maximum daily PM₁₀ levels is shown in Graph 10. Details of the year's data can be found on the EPA website (www.epa.vic.gov.au/air/air_monitoring_report_2001/PM10_Tables.pdf).

Other Pollutants

In 2001, there were no exceedences of the SEPP objectives for carbon monoxide, nitrogen dioxide, sulfur dioxide and lead. Details of these measurements are available on the EPA website (www.epa.vic.gov.au/air/air_monitoring_report_2001/Other_Tables.pdf).

In addition to monitoring the seven common pollutants, EPA also measures oxides of nitrogen, non-methane hydrocarbons and fine particles (as PM_{2.5}) to develop further understanding of the sources of air pollutants and their behaviour in the airshed.

OTHER HIGHLIGHTS

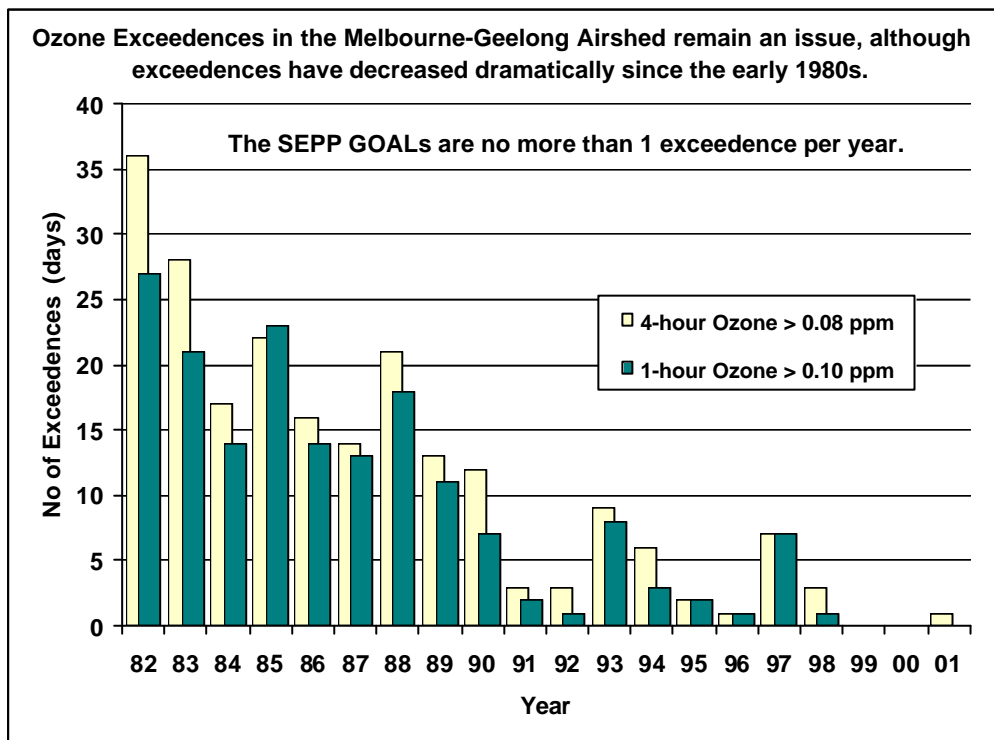
- Day to day air quality (as an air quality index) continues to be reported on EPA's website, and in *The Age* and *Herald Sun*. Daily summaries and air quality forecasts were made available through the EPA Voice Response Unit (03 9695 2771).
- A new web site (Air Quality for Kids) will enable direct interrogation of EPA's air quality database. Whilst targeted at school children, it enables easy access to both current and historical data for all members of the public.

Public access to the web site will be available in the next few months.

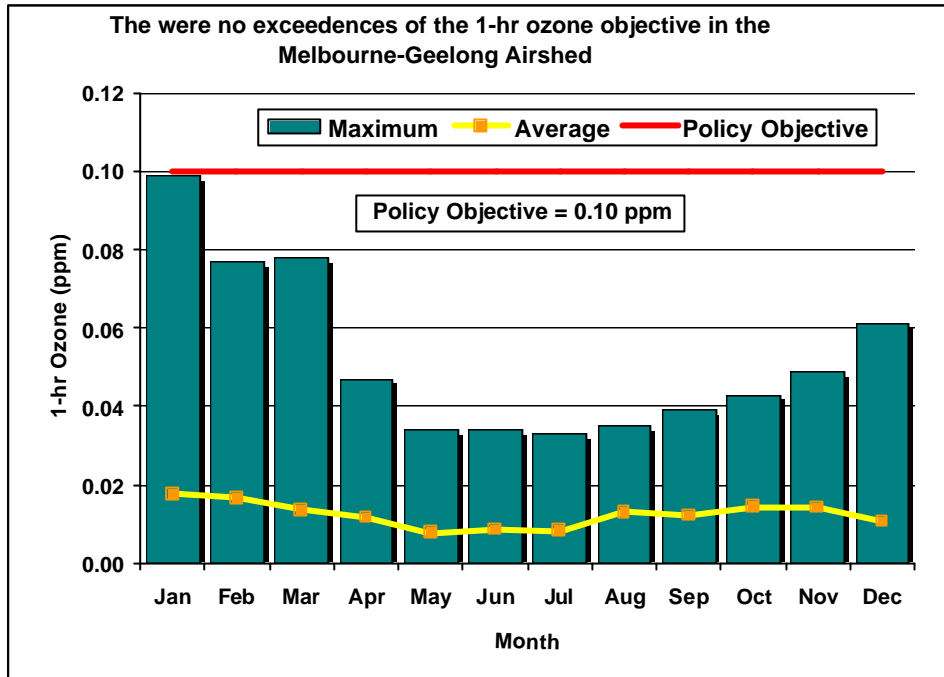
- EPA continued its commitment to the Community Access to Air Monitoring (CAAM) project
- EPA continued its use of the mobile air monitoring laboratory to facilitate monitoring of 'hot spots'.
- Due to the sale of the site, the Footscray air monitoring station was relocated to a nearby location.
- EPA's air monitoring was further extended with campaign monitoring of particle levels conducted at Bendigo, with monitoring commencing at Ballarat in 2002.
- Victoria's Air Quality Monitoring Plan under the National Environment Protection Measure (NEPM) for ambient air quality was approved in February 2001 (www.epa.vic.gov.au/Air/Monitoring/vicaqmp.asp).
- In accordance with NEPM protocols, Victoria now applies a temperature-based correction to PM₁₀ levels measured by TEOM. This correction enables TEOMs to be used to assess compliance with the PM₁₀ objective.

⁶ As determined by HiVol and corrected TEOM levels.

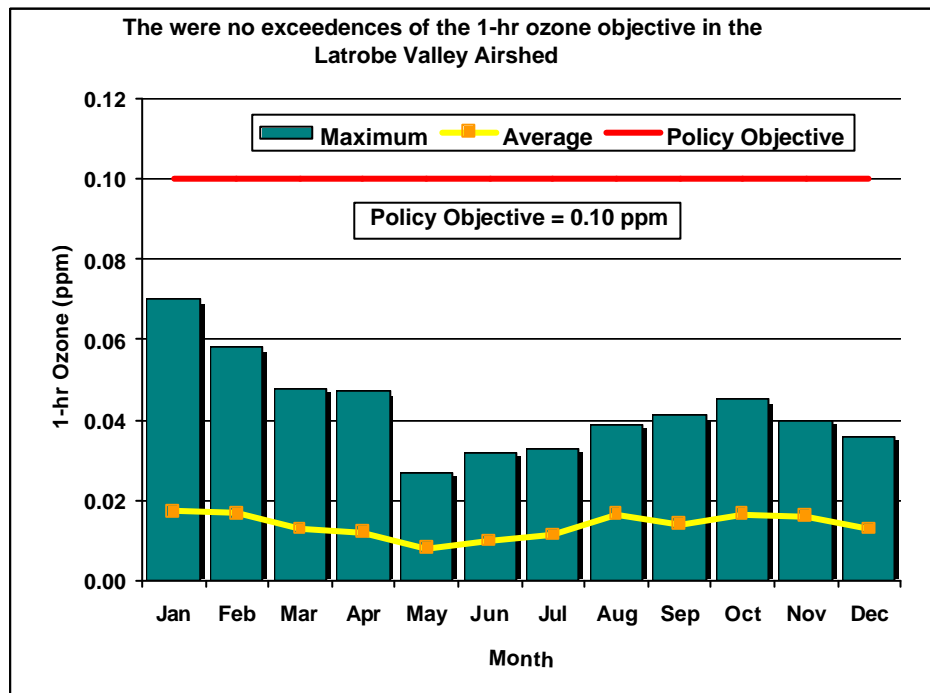
- In December 2001 the State Environment Protection Policy (SEPP) was changed. The eight-hour ozone objective was removed from the SEPP (Ambient Air Quality), making it consistent with national standards. The SEPP (Air Quality Management) was also declared to provide a framework for the protection of the air environment. (www.craftpress.com.au/gazette/Gazettes2001/S240-01ps.pdf).
- The Australian Air Quality Forecasting System (AAQFS), a collaborative project of EPA Victoria, EPA New South Wales, Bureau of Meteorology and CSIRO, is currently being trialed within EPA to determine how it might be integrated into EPA's current forecasting procedures.



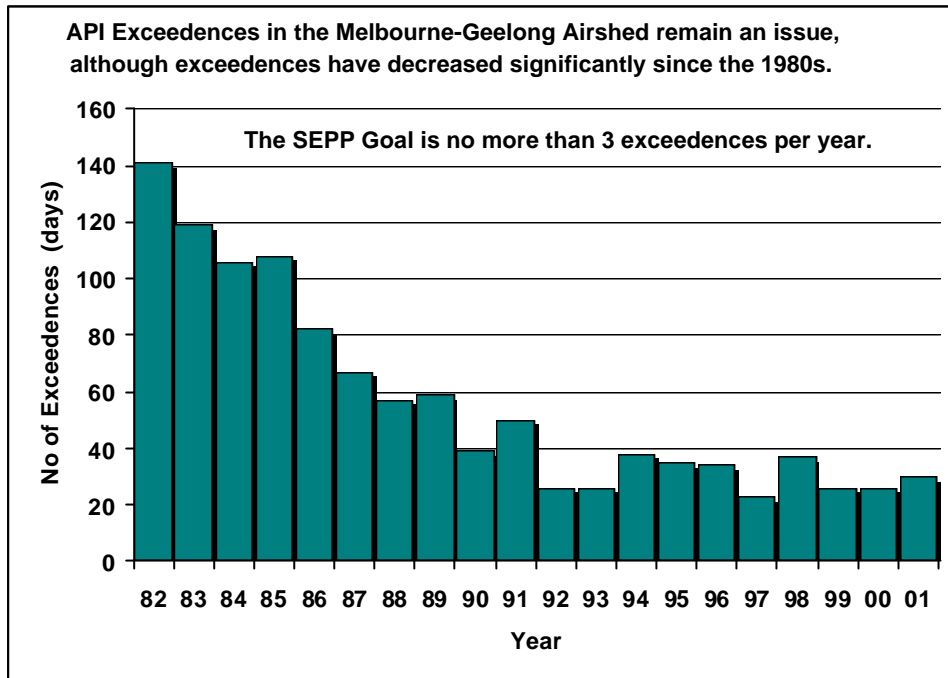
**Graph 1: 1-hour and 4-hour average Ozone exceedences-
20-year trend in the Melbourne-Geelong airshed.**



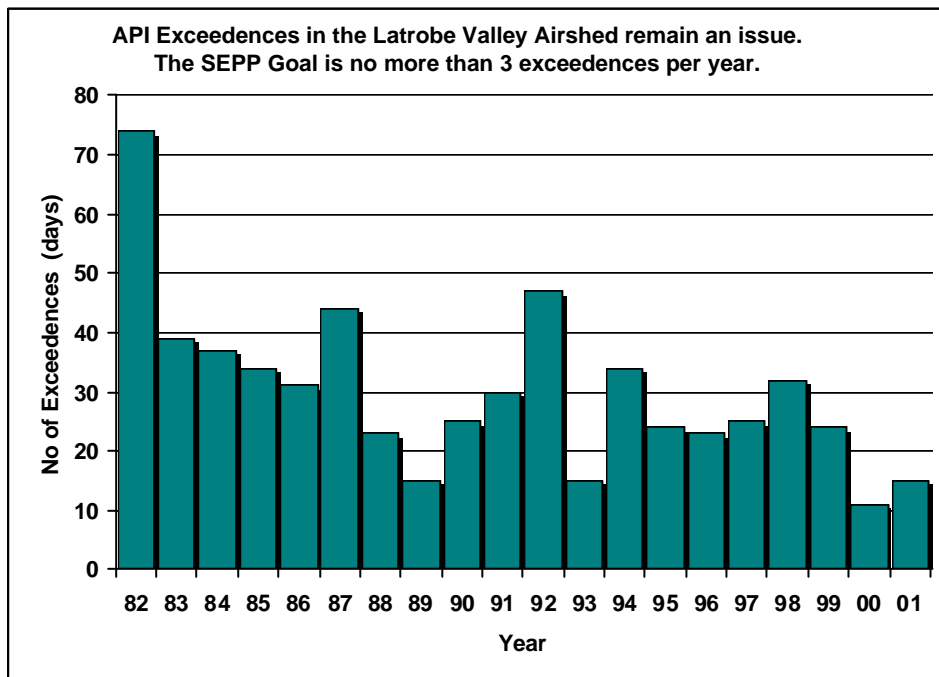
Graph 2: Maximum and average 1-hour average Ozone – Melbourne-Geelong airshed in 2001.



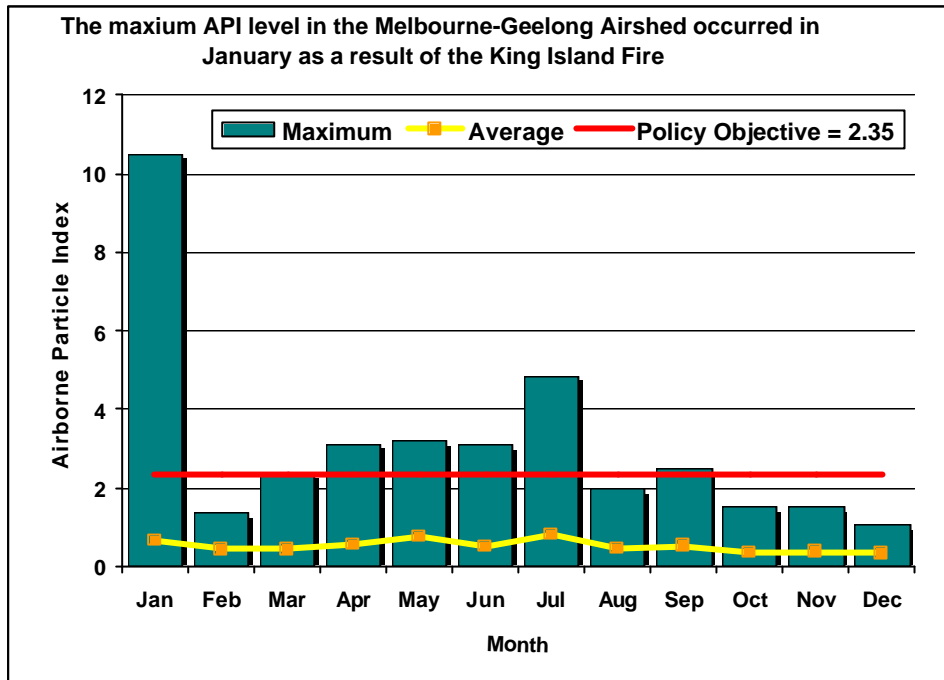
Graph 3: Maximum and average 1-hour average Ozone – Latrobe Valley airshed in 2001.



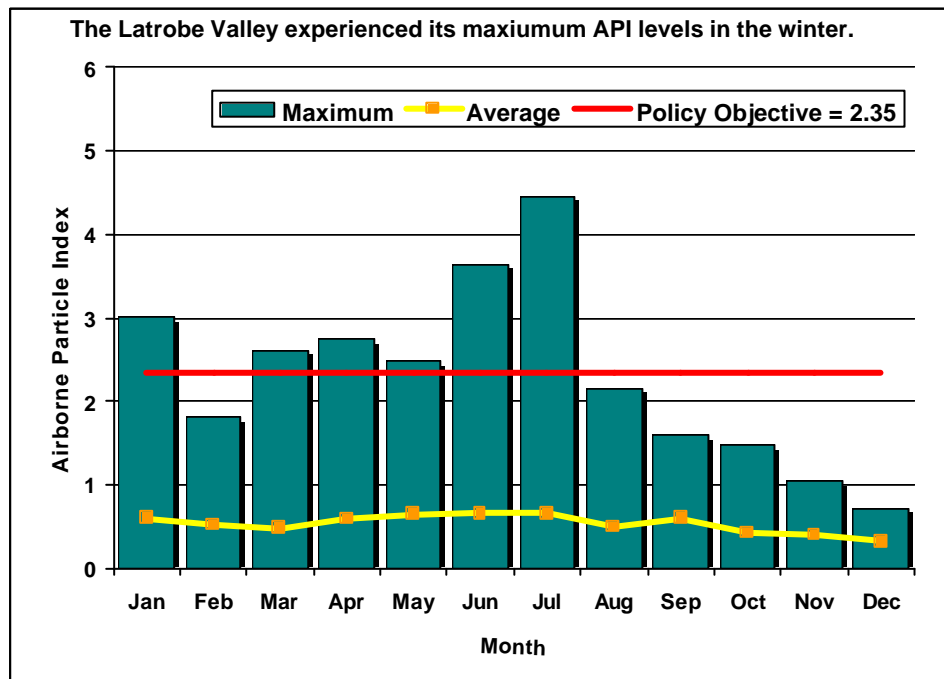
Graph 4: 1-hour average API exceedences-20-year trend in the Melbourne-Geelong airshed.



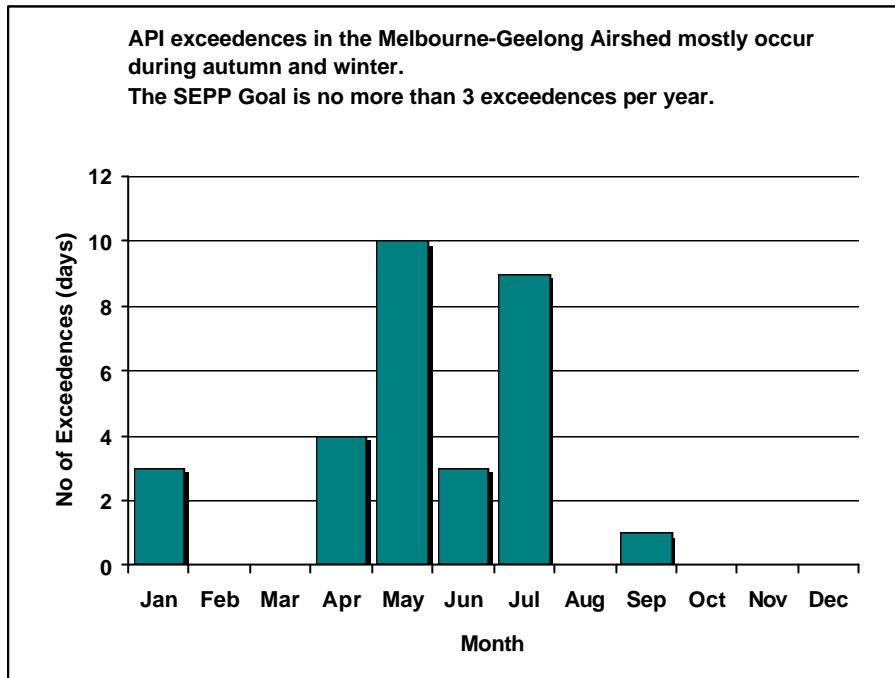
Graph 5: 1-hour average API exceedences-20-year trend in the Latrobe Valley airshed.



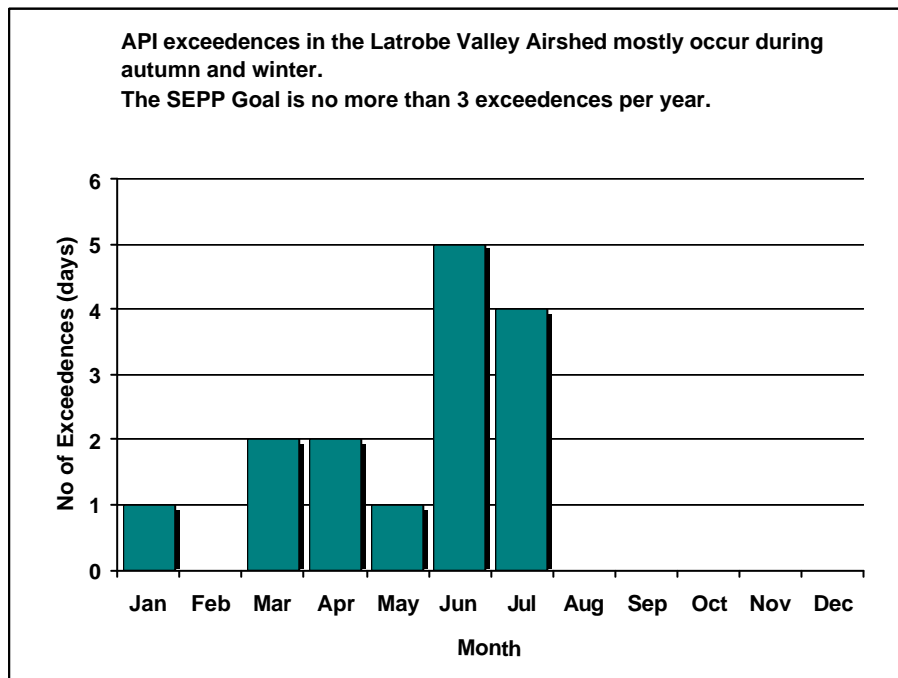
Graph 6: Maximum and average 1-hour average Airborne Particle Index – Melbourne-Geelong airshed in 2001.



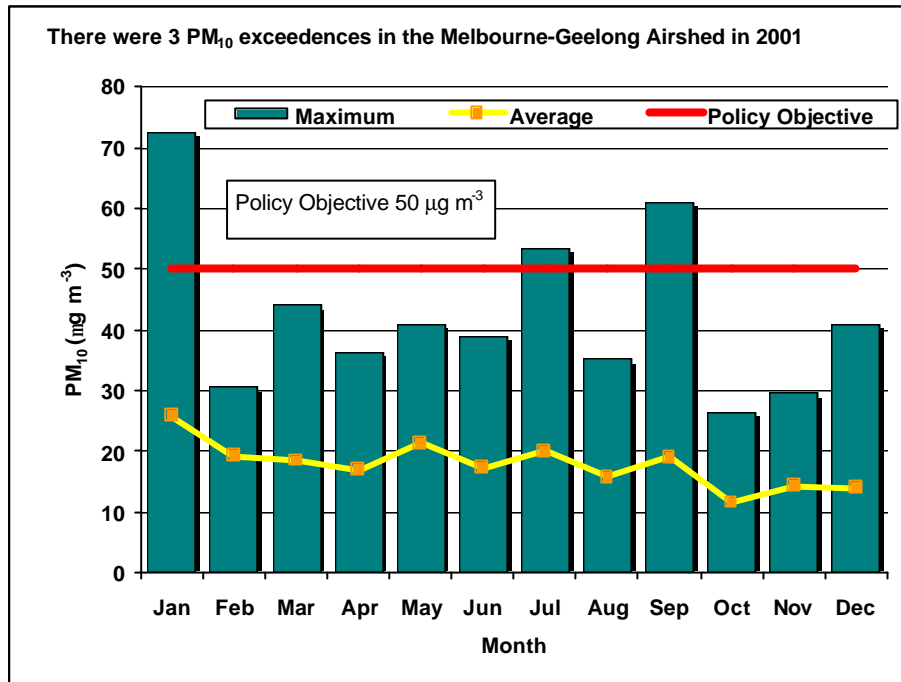
Graph 7: Maximum and average 1-hour average Airborne Particle Index – Latrobe Valley airshed in 2001.



**Graph 8: 1-hour average API exceedences-
Melbourne-Geelong airshed in 2001.**



**Graph 9: 1-hour average API exceedences-
Latrobe Valley airshed in 2001.**



**Graph 10: Maximum and average daily PM₁₀—
Melbourne-Geelong airshed in 2001.**

RELATED EPA PUBLICATIONS

Ambient Air Quality in the Port Phillip Control Region, 1979-1993: Compliance and Observed Trends, Publication 468, EPA 1995.

Air Monitoring Data 1992-95, Publication 584, EPA 1997.

Air Emissions Inventory Port Phillip Region, Publication 632, EPA 1998.

Draft Air Quality Improvement Plan, Publication 707, EPA 2000.

Ambient Air Quality NEPM Monitoring Plan Victoria, Publication 763, EPA 2001

Air Monitoring Report 1999, Publication 773, EPA 2000.

Air Monitoring Report 2000, Publication 778, EPA 2001.

State Environment Protection Policy (Ambient Air Quality), Victorian Government Gazette No. S19, 09/02/1999 (Amended in Dec 2001).