

AIR MONITORING REPORT 1998

Publication 687

March 2000

OVERVIEW

The Environment Protection Authority's monitoring program recorded more than two million data points in 1998, from 16 sites. It found:

- Victoria's air quality is generally clean. In an international context Melbourne's air quality is relatively good.
- Carbon monoxide, nitrogen dioxide, sulphur dioxide and lead levels were below the limits set in the *State Environment Protection Policy (The Air Environment)*.
- Ozone and visibility-reducing particles still cause concern within Victoria, although limits were exceeded on relatively few occasions. In 1998, 99.9% and 99.4% of all data for ozone and visibility-reducing particles, respectively, were below the Policy limits (*Acceptable Level*).
- 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 Air Quality Management Plan.

THE DETAILED STORY ON MELBOURNE'S AIR

Objectives have been set to protect human health for six common pollutants: carbon monoxide, ozone, nitrogen dioxide, sulphur dioxide, lead,

and visibility-reducing particles, in the *State Environment Protection Policy (SEPP) (the Air Environment)*, which was declared in 1981. In the Policy the *Acceptable Level* is, where there is no significant effect to the general population. The *Detrimental Level* is where a substantial proportion of the population is adversely affected. Data for 1998 has been assessed against this Policy, which applied during 1998.

The next air monitoring report will assess 1999 air quality data against the *State Environment Protection Policy (Ambient Air Quality)*, which was declared in February 1999 to reflect the new National Environment Protection Measure for Ambient Air Quality (Air NEPM). This measure is designed to nationally standardise air quality objectives.

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

The trend report EPA Publication 468 has shown that since the late 1970s Victoria's air has improved. Our air quality did not always meet the Policy objectives for the 8-hour ozone and the 1-hour visibility objectives, but Victoria's program of air quality management means that these problems are now less frequent. Improvements are a direct consequence of controls placed on industry, motor vehicles and backyard burning. Trends will be incorporated within every fifth Annual Air Monitoring Report, the next being due in 2001. Incorporation of

trends on a yearly basis can be misleading due to the variations in weather conditions, which can have a significant effect on pollution episodes.

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 two Policy objectives applicable in 1998 for ozone cover 1-hour and 8-hour exposures, these have *Acceptable* and *Detrimental* Levels. The Policy objective for the one hour standard has not been breached for the last five years in the Melbourne–Geelong Airshed, and never in the Latrobe Valley Airshed (since monitoring began in the mid 1970s). The highest monthly 8-hour averages for the year in graph 1, show that the monthly averages are well below the *Acceptable Level*, with only one peak above the *Detrimental Level* (on 10 December).

The peaks which are greater than the *Acceptable Level* are referred to as exceedances, and are detailed in graph 2. The highest exceedances for the year occur during the summer months. Since the early 1980's these have been decreasing.

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

In Latrobe Valley Airshed there were three exceedances of the 8-hour Policy *Acceptable Level* at EPA monitoring sites. A summary of all the ozone data can be found at **EPA's website**.

Winter smog

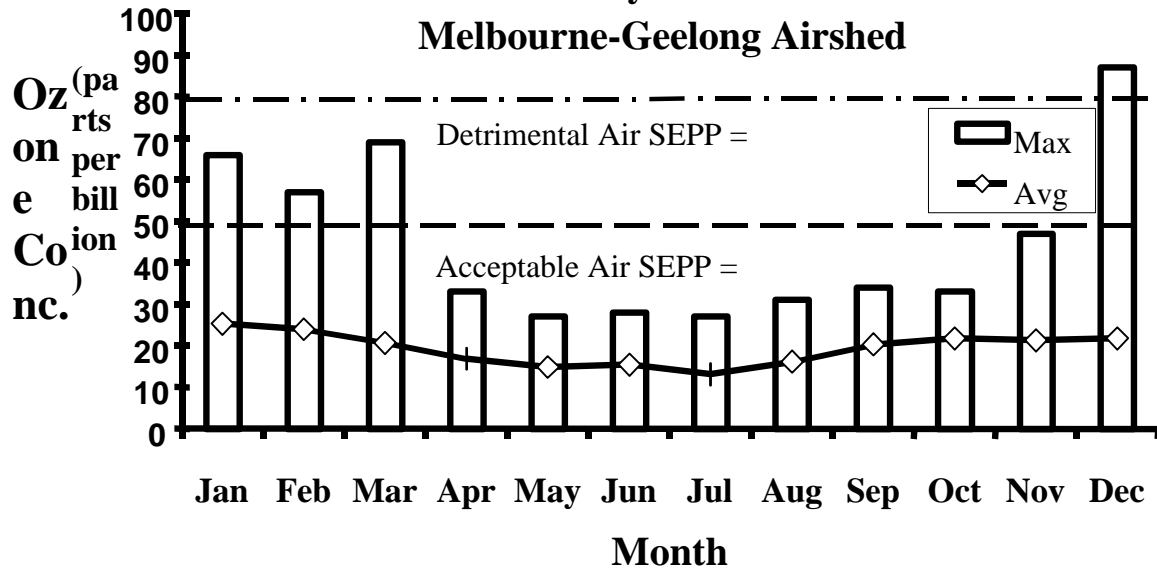
Winter smog generally occurs when there is a build up of fine particles from man-made sources in the atmosphere. These particles are trapped in the atmosphere due to still weather conditions, mainly during autumn and winter. EPA takes a number of different measures of these particles. One method measures visibility, which is expressed as an Airborne Particulate Index. 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 (smaller than 2.5 μm in size). Graph 3 shows the highest monthly 1-hour readings for the Melbourne–Geelong Airshed. The monthly averages were well within the Policy *Acceptable Level*. However there were 37 exceedances measured in the Melbourne–Geelong Airshed and 34 in the Latrobe Valley Airshed. A yearly distribution of the Melbourne–Geelong Airshed exceedances is shown in graph 4. It indicates most occur during autumn and winter.

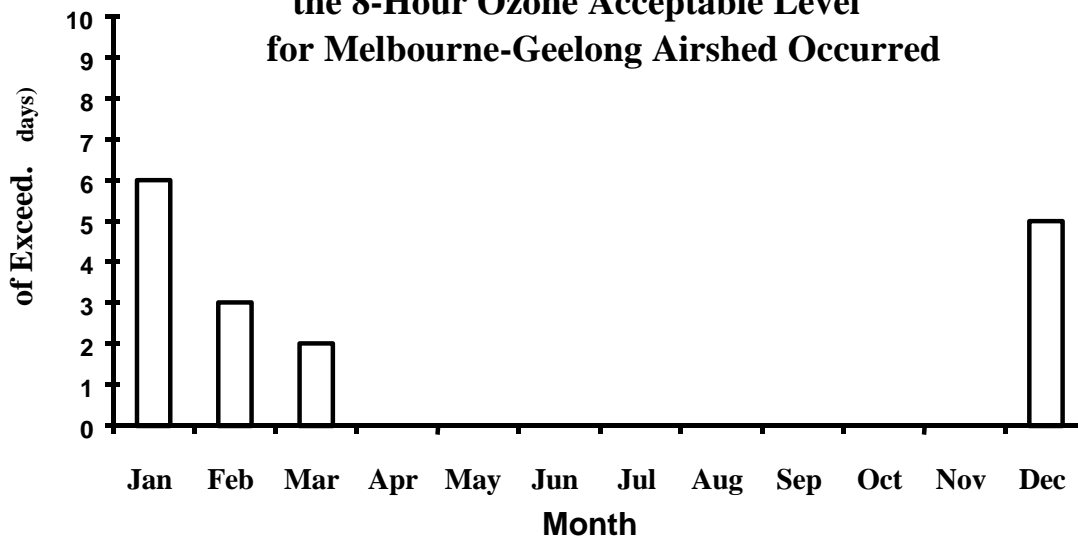
According to a recent inventory of pollution sources within the Melbourne–Geelong Airshed (**Air Emissions Inventory**), the greatest contributor to elevated particle levels is from domestic **solid fuel heaters** without emission reducing technology (eg old wood heaters) and open fires. Limiting the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

EPA also measures particles less than 10 μm (**PM₁₀**) (about one 10th of width of a human hair). The Air Policy does not specify a limit on PM₁₀, so the NEPM objective has been used to interpret this data.

**Graph 1: 1998 Highest and Average
8-Hour Daily Ozone**



**Graph 2: 1998 Number of Days when Exceedances of
the 8-Hour Ozone Acceptable Level
for Melbourne-Geelong Airshed Occurred**



The NEPM objective specifies there should be no more than five yearly exceedances of the maximum daily average of $50 \mu\text{g}/\text{m}^3$. The 1998 monitoring data was within the NEPM limits. Table 1 gives a summary of EPA's network, relative to the NEPM limits. A frequency plot of all monitoring data points is shown in graph 5. It can be seen that most daily averages are within the range 10 to $30 \mu\text{g}/\text{m}^3$. A summary 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 Air Policy. These pollutants are carbon monoxide, nitrogen dioxide, sulphur dioxide and lead. All were within Air Policy limits. Tables and graphs of the year's data can be found 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**.

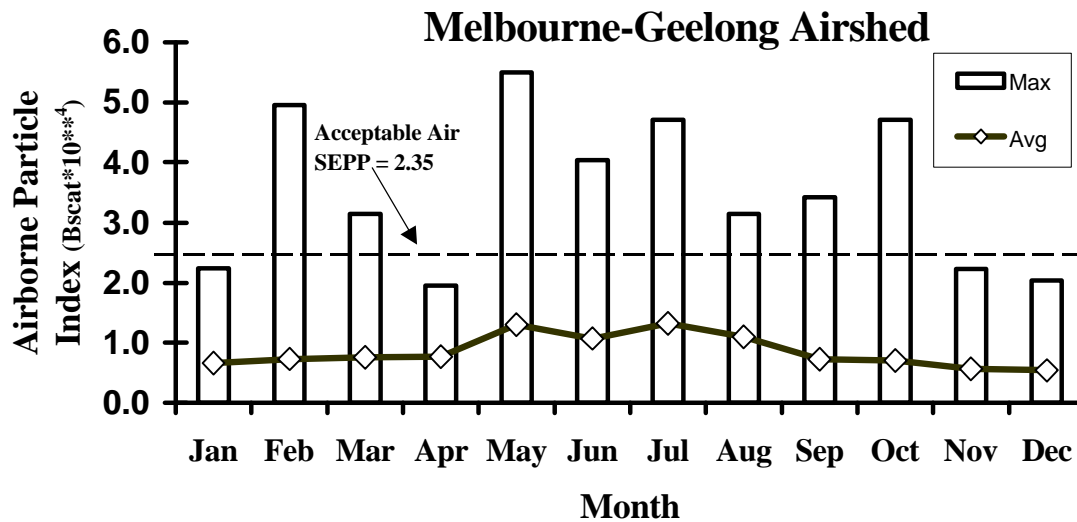
OTHER HIGHLIGHTS

- Particle monitoring using new technology instrumentation 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} , $\text{PM}_{2.5}$ and PM_1 . Tables of the year's data can be found on the **EPA website**.

- An air monitoring trial project commenced in June 1998 to assess volatile organic compounds at a central business district site. The trial instrument measures benzene, toluene, para-xylene, formaldehyde, sulphur dioxide and nitrogen dioxide. The project is continuing.
- Five automatic weather stations were installed on the urban fringe of Melbourne, to further enhance modelling of pollutants.
- An **air quality index** was developed, so days and particular areas could be rated with one number regardless of pollution type. This is reported on EPA's webpage, and in the daily newspapers.
- EPA opened its Air Monitoring Network to the community with the Community Access to Air Monitoring (**CAAM**) pilot project. This was a world first, and involved the community helping to run air monitoring sites. The objective of the project has been to raise the awareness of the community on air quality issues, and provide an opportunity for them to engage EPA in a two-way exchange on air quality issues.

**Graph 3: 1998 Highest and Average
1-Hour Daily API**



**Graph 4: 1998 Number of Days when Exceedances
of the 1-Hour API Acceptable Level for
Melbourne-Geelong Airshed Occurred**

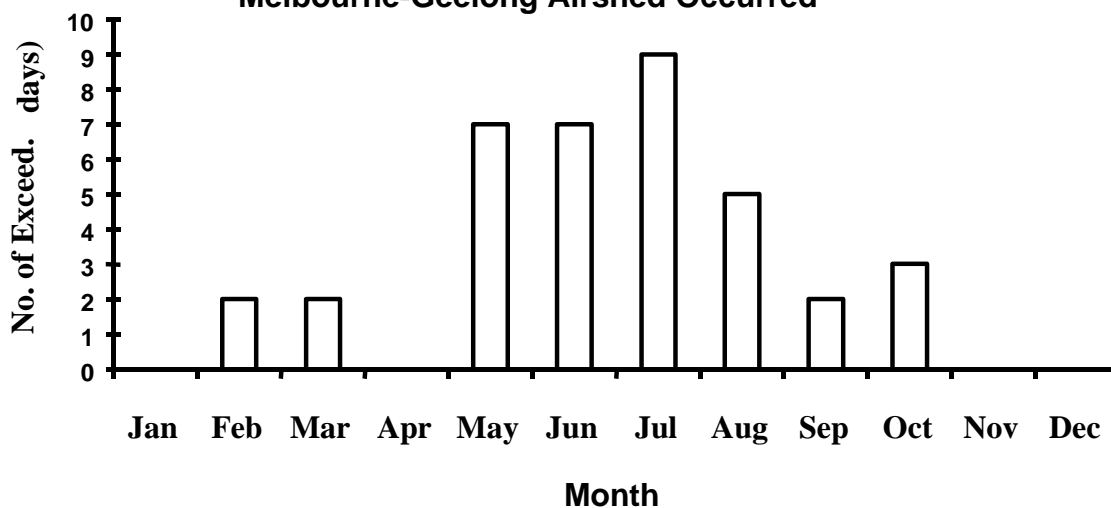
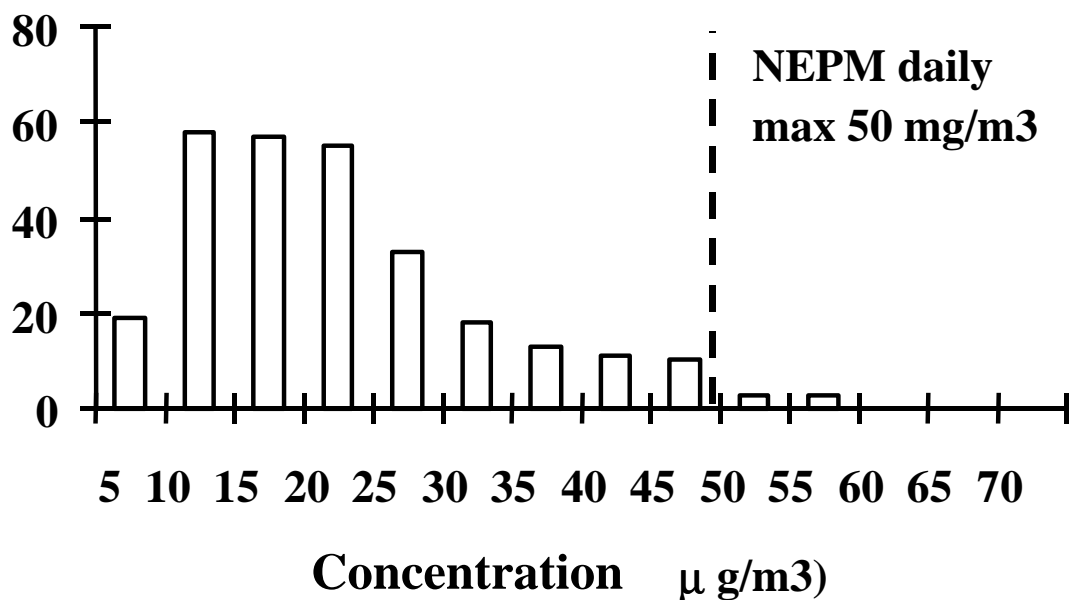


Table 1: Summary of the PM10 monitoring network

Site	% Recovered	Median* $\mu\text{g}/\text{m}^3$	Exceedances $>50\mu\text{g}/\text{m}^3$	Breach of NEPM
Alphington	100	18.2	0	no
Collingwood	95	24.6	4	no
Richmond	92	19.7	0	no
Paisley	59	17.5	0	no
RMIT	75	23.1	1	no
Geelong South	43	16.0	0	no

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

Graph 5: 1998 Frequency plot of 24-Hour Average Network PM10



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 (Victoria), State Government of Victoria.

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

EPA 1997, *Air Monitoring Data 92–95*, EPA Publication 584, Environment Protection Authority (Victoria), State Government of Victoria.

EPA 1998, *Air Monitoring Data 1996*, EPA Publication 614, Environment Protection Authority (Victoria), State Government of Victoria.

EPA 1999, *Air Emissions Inventory*, EPA Publication 632, Environment Protection Authority (Victoria), State Government of Victoria.

EPA 2000, *Air Monitoring Data 1997*, EPA Publication 683, Environment Protection Authority (Victoria), 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.

FURTHER INFORMATION

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EPA internet site

www.epa.vic.gov.au



Hyper Links

CO: http://www.epa.vic.gov.au/aq/info/air_co.htm + need tables of data

NO₂: http://www.epa.vic.gov.au/aq/info/air_nox.htm + need tables of data

O₃: http://www.epa.vic.gov.au/aq/info/air_o3.htm + need tables of data

SO₂: http://www.epa.vic.gov.au/aq/info/air_sox.htm + need tables of data

Lead: <http://www.epa.vic.gov.au/aq/info/pub376.htm> + need tables of data

Visibility-reducing particles: <http://www.epa.vic.gov.au/aq/aqindex.htm#b2> + need tables of data

Air Policy: <http://www.epa.vic.gov.au/aq/info/aq9121.htm> ⇒ Government Sets Air Quality Objectives

State Environment Protection Policy: <http://www.epa.vic.gov.au/aq/airsepp.htm>

Air NEPM: <http://www.epa.vic.gov.au/aq/AirSepp.htm>,

PM₁₀: http://www.epa.vic.gov.au/aq/info/air_part.htm + tables of data

Port Phillip Region: <http://www.epa.vic.gov.au/aq/airmonlc.htm>

Latrobe Valley: Not defined also need to reference to a map showing network

Summer Smog: <http://www.epa.vic.gov.au/aq/info/smogalerts.htm> ,

Winter Smog: <http://www.epa.vic.gov.au/aq/info/smogalerts.htm> ,

CAAM: http://www.epa.vic.gov.au/programs/caam/station_monitoring.htm

Smog Alerts: <http://www.epa.vic.gov.au/aq/info/smogalerts.htm>

TEOM: data

Air Emissions Inventory: <http://www.epa.vic.gov.au/programs/aqmp/default.htm>

EPA routinely monitors: <http://www.epa.vic.gov.au/cleanmachine/html/inairb.htm>

Soild fuel heaters: http://www.epa.vic.gov.au/programs/aqmp/airemisinv_wood.htm

EPA Publication 468:

<http://epanote2.epa.vic.gov.au/EPA/Publications.nsf/227778dcb7ffe62b4a2566d70016c8c8/0b5a6ba8d8689ba24a2566d70016880f?OpenDocument>

Air Quality Index: <http://www.epa.vic.gov.au/aq/aqindex.htm>

Control: <http://www.epa.vic.gov.au/aq/info/aq9121.htm> ⇒ EPA Control Programs and Future Air Quality Trends