AIR MONITORING REPORT 2000

Publication 778
September 2001

OVERVIEW

EPA's air monitoring program recorded more than two million air quality measurements in the year 2000 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 meet 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 2000, there were no breaches of 1-hour and 4-hour ozone objectives, with only the 8-hour objective being breached. Ninety three percent of days in the year 2000 were below the SEPP objective for visibility-reducing particles.
- The incidence of elevated levels of pollutants is significantly dependent on weather conditions. With this proviso, comparisons with 1999 data are given where appropriate.

EPA is continuing to work to improve air quality, notably with the development of the Air Quality Improvement Plan, of which a draft was published in June 2000 (EPA publication 707).

AIR QUALITY IN DETAIL

Background

Objectives are set in the SEPP–(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 2000 have been assessed against the 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), showed that since the late 1970s Victoria's air has improved. Air quality does not always meet the SEPP goals for the 8-hour ozone and the 1-hour visibility objectives but these problems are now less frequent. 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 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 ozone cover policy objectives applicable in 2000 for the 1-hour, 4-hour and 8-hour objectives were 0.10 parts per million (ppm), 0.08 ppm and 0.05 ppm respectively. Days that record greater than the environmental quality objective are referred to as exceedences. The 1-hour and 4-hour objectives were met during 2000 in the Melbourne-Geelong and Latrobe Valley airsheds. The 8-hour objective was also met in the Latrobe Valley airshed.

There were, however, 10 exceedences of the 8-hour ozone objective in the Melbourne-Geelong airshed (compared to 18 in 1999). The highest monthly 8-hour averages for the year 2000 are shown in Graph 1, with the exceedences of the policy objective in Graph 2. Ozone data can be downloaded from the EPA website (www.epa.vic.gov.au/air/air_monitoring_report_2000/O3_Tables.pdf).

The SEPP goal specifies there should be no more than three exceedences for 8-hour average ozone. Only one exceedence is allowed for 1 and 4-hour average ozone.

The greatest single contributor to ozone formation is the motor vehicle, notably emissions 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 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 very fine particles concentration (in the diameter range 2.5 micrometre (µm) – for comparison the width of a human hair is 100 µm).

The Airborne Particulate Index is related to Local Visual Distance by a simple inverse ratio.

The SEPP goal 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 are shown in Graph 3. The monthly averages were generally low, however there were 26 exceedences measured in the Melbourne-Geelong airshed (compared to 26 in 1999) and 11 in the Latrobe Valley airshed (compared to 24 in 1999). A yearly distribution of the Melbourne-Geelong airshed exceedences 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 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 (www.epa.vic.gov.au/Air/Bulletins/smogevents.asp).

EPA also measures particles less than 10 µm (PM_{10}) (about 1/10 of the width of a human hair). The SEPP goal specifies there should be no more than five yearly exceedences of the daily average objective of 50 micrograms per cubic metre (µg/m^3). The 2000 monitoring data complied with the goal. Only two exceedences (at Paisley and Geelong South) occurred (in February 2000) compared to the single exceedence in 1999 (July).

Most monthly averages are within the range 12 to 30 µg/m^3 (see Graph 5). Details of the year's data can be found on the EPA website (www.epa.vic.gov.au/air/air_monitoring_report_2000/PM10_Tables.pdf).

OTHER POLLUTANTS

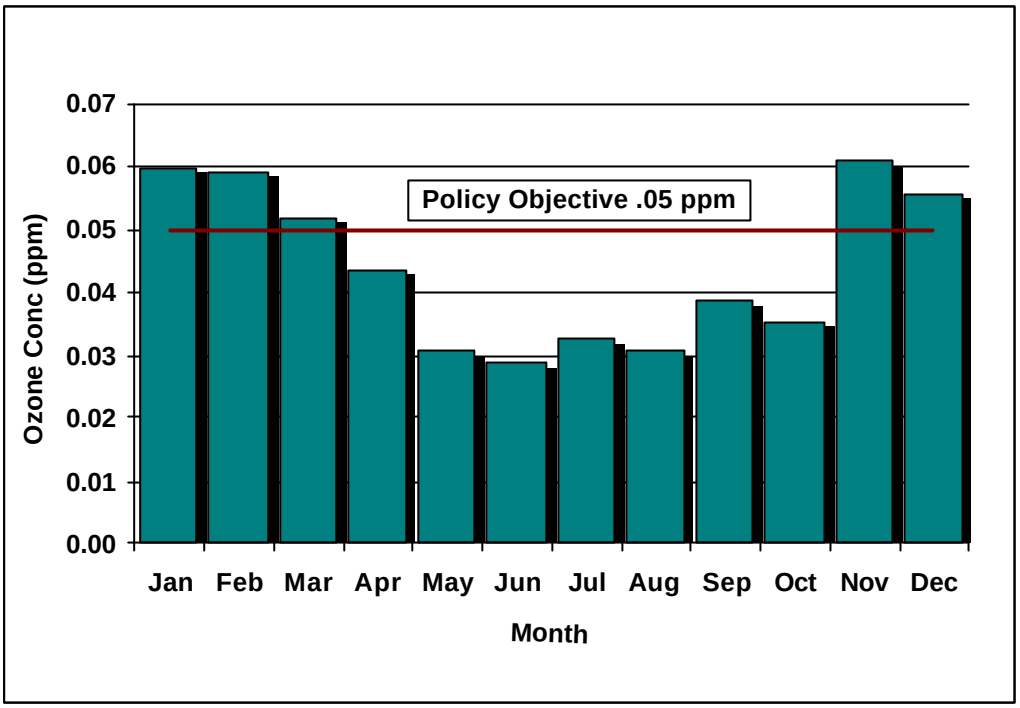
There are objectives for the other common pollutants stated within the SEPP. These pollutants are carbon monoxide, nitrogen dioxide, sulfur dioxide and lead. All measurements were within SEPP objectives.

In addition to monitoring the six common pollutants, EPA also measures 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 the EPA website (www.epa.vic.gov.au/air/air_monitoring_report_2000/NO2(SO2)_Tables.pdf).

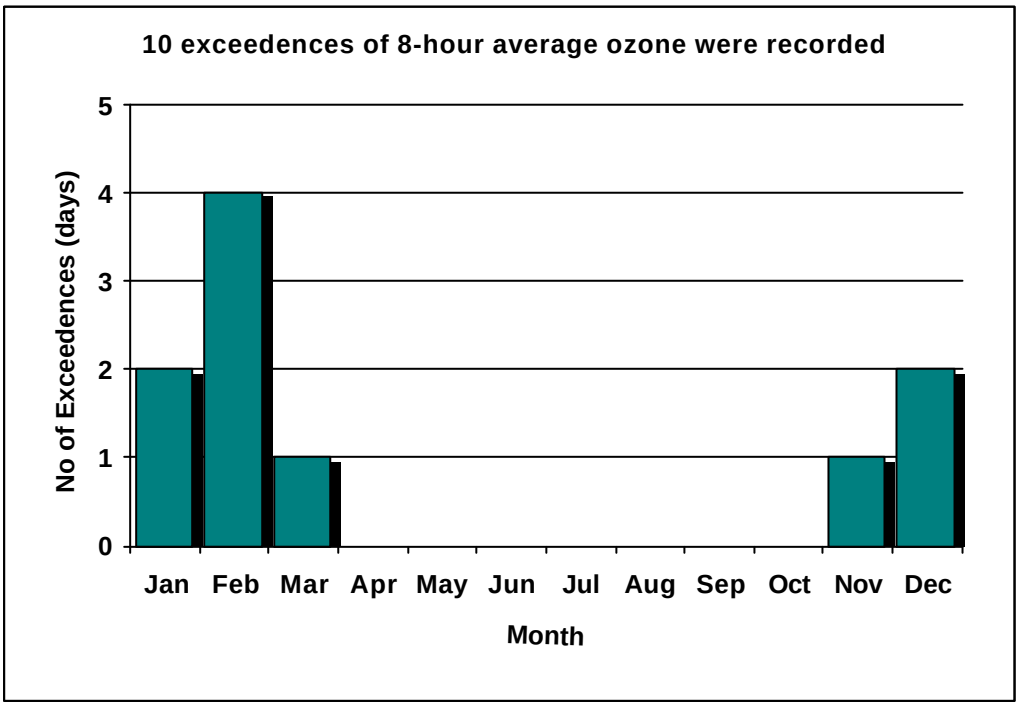
OTHER HIGHLIGHTS

- 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 database system (MONSYS 2) has been designed to make air quality data more accessible by automatically calculating useful information such as: 4-hour and 8-hour averages; statistics (daily, monthly, and annual); and exceedences of SEPP and NEPM objectives.
- EPA continued its commitment to the Community Access to Air Monitoring (CAAM) project. Three more air monitoring stations, Footscray, RMIT and Brighton, were designated as CAAM stations in 2000 to raise community awareness of air quality issues.
- EPA is now equipped with a mobile air monitoring laboratory to facilitate monitoring of 'Hot Spots'.
- A new data acquisition and logging system was trialed for the air monitoring stations.
- Dandenong air monitoring station was relocated.

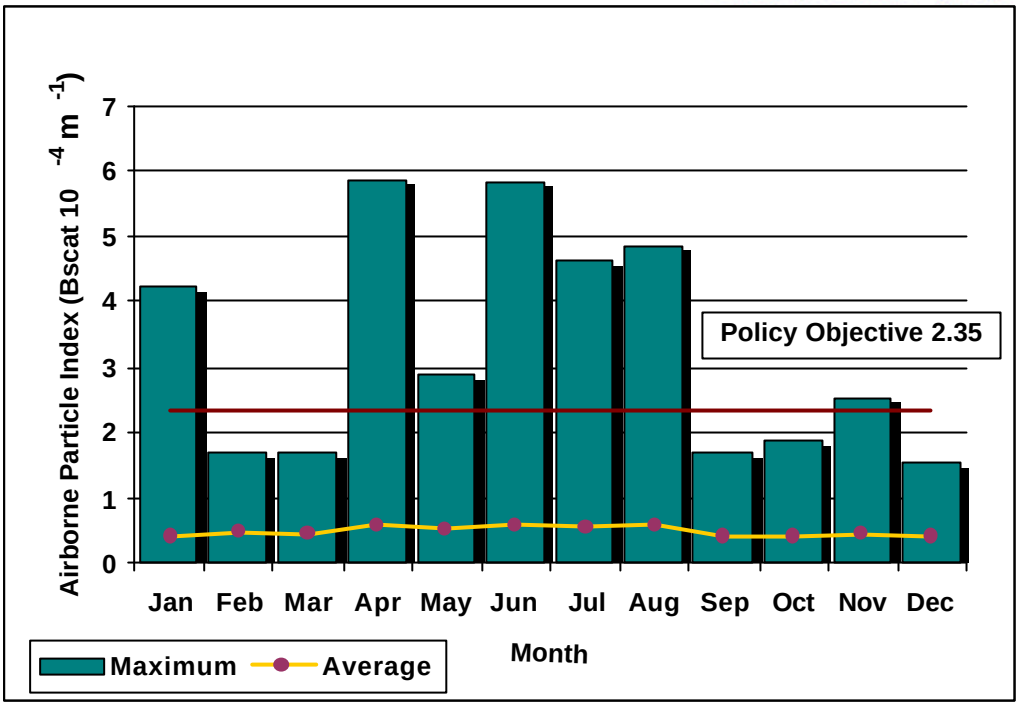
- EPA's air monitoring was further extended with campaign monitoring of particle levels commencing at Bendigo.
- Victoria's Air Quality Monitoring Plan for monitoring and reporting air quality levels against national standards was completed. Victoria became the first Australian State to receive national approval for its air quality monitoring system.
- The Australian Air Quality Forecasting System (AAQFS), a collaborative project of EPA Victoria, EPA NSW, Bureau of Meteorology and CSIRO, has shown a potential to forecast air quality. The forecasting system is currently being trialed within EPA.



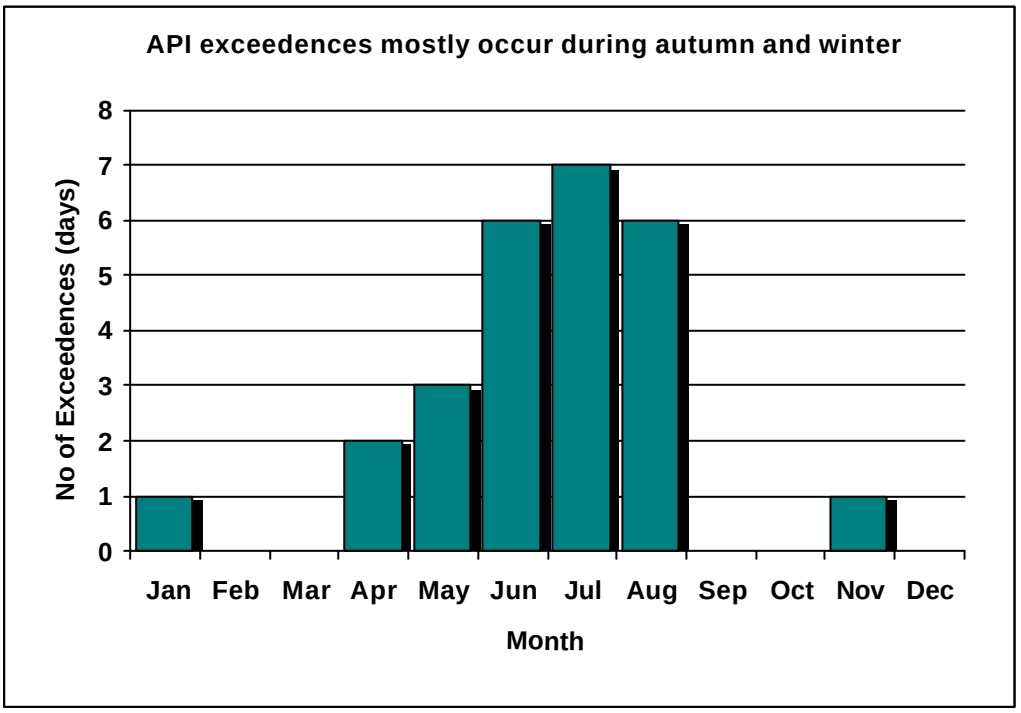
Graph 1: Maximum 8-hour average ozone concentration – Melbourne -Geelong airshed in the year 2000.



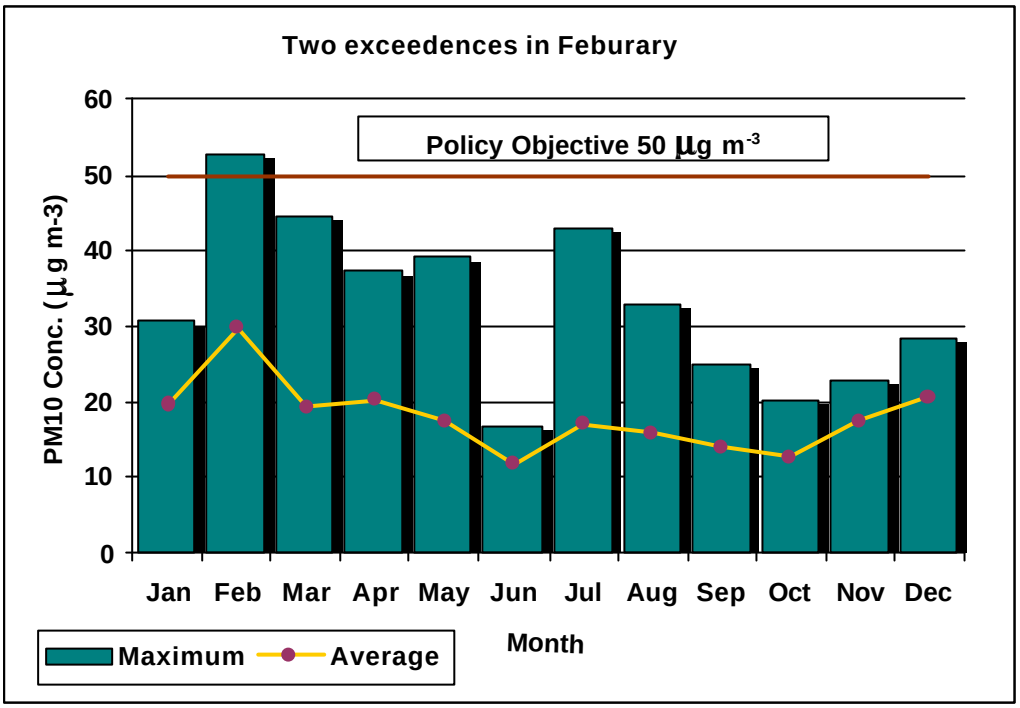
Graph 2: 8-hour average ozone exceedences – Melbourne-Geelong airshed in the year 2000.



Graph 3: Maximum and average 1-hour average Airborne Particle Index – Melbourne-Geelong airshed in the year 2000.



Graph 4: 1-hour average API exceedences - Melbourne-Geelong airshed in the year 2000.



Graph 5: Maximum 24-hour average and average PM10 - Melbourne-Geelong airshed in the year 2000.

RELATED EPA PUBLICATIONS

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

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

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

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

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

Further information

EPA Information Centre

Tel: (03) 9695 2722

Fax: (03) 9695 2780

EPA internet site

www.epa.vic.gov.au