VICTORIA

Auditor General
Victoria

Managing Victoria's air quality

Ordered to be printed by Authority.
Government Printer for the State of Victoria

No. 155 - Session 1999-2002

ISSN 1443 4911
ISBN 0 7311 5989 6

AUDITOR GENERAL
VICTORIA

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Sir

Under the provisions of section 16 of the *Audit Act* 1994, I transmit my performance audit report on *Managing Victoria's air quality.*

Yours faithfully

J.W. CAMERON
Auditor-General

4 June 2002

Contents

Foreword

Throughout the developed world, contemporary lifestyles place the natural environment under increasing pressure. The growth of cities, the level of industrialisation, increasing motor vehicle usage and urban expansion, i.e. factors that signal increased economic affluence, continue to impact upon the world's ecology and the health of its inhabitants.

In Victoria, one effect of our lifestyle choices can be seen in the quality of the air that we breathe. Melbourne's air quality compares favourably with that of similar cities. The most obvious example of air quality is the poor visibility that can occur from time-to-time. This is substantially due to our continuing reliance on the motor car and the use of fossil fuels.

The Victorian Environment Protection Authority has effectively controlled emissions to air from major industry. However, control over emissions from other sources, i.e. from motor vehicles (one of the major sources of air pollutants), from small-to-medium enterprises, and diffuse sources such as wood heaters, are more difficult to address and present a significant challenge for the future.

Air quality is an issue of considerable community concern within many jurisdictions. It is, therefore, particularly important that governments maintain appropriate arrangements for encouraging the behavioural changes necessary to address those concerns and to achieve sustainable solutions. It is because of this concern and the importance of air quality to our health that the current audit has been undertaken.

J.W. CAMERON
Auditor-General

4 June 2002

Part 1

Executive summary

INTRODUCTION

1.1 The Environment Protection Authority is the principal public sector agency in Victoria responsible for managing the State's air quality. The Authority operates within a national framework for dealing with environment and conservation issues, as agreed by the Commonwealth, State and Territory governments and the Australian Local Government Association in 1992 under the *Inter-Governmental Agreement on the Environment*.

1.2 The national framework establishes national air quality standards which have been adopted in State Environment Protection Policies relating to air quality.

AUDIT OBJECTIVE AND SCOPE

1.3 The objective of the audit was to determine whether the Environment Protection Authority's activities in monitoring and managing air quality in the short-term, and reducing air pollution in the longer-term, are undertaken in an efficient and effective manner. Specifically, the audit examined the Authority's activities in relation to:

- its strategic approach and planning for air quality control;
- monitoring air pollution;
- controlling motor vehicle emissions;
- licensing of industry to control air pollution generated, including the utilisation of the regulatory framework;
- other mechanisms such as public information and education; and
- reporting and accountability.

1.4 The Environment Protection Authority was the major focus of our examination. The issue of greenhouse gas emissions was not covered by this audit. The audit did not seek to assess the adequacy of the Authority's technical solutions to air quality monitoring.

AUDIT CONCLUSION

1.5 Trends over the past 30 years show that Victoria's air quality has improved significantly for 5 of the 7 key indicator pollutants monitored by the Authority. The exceptions are sulfur dioxide, which shows no change but which is at a level well below the Australian standard, and particles, for which sufficient data is not available.[1] Melbourne's air quality compares favourably with that of other international cities. The implication is that the Authority's air quality monitoring and management activities have been effective. Nevertheless, air quality is linked to around 300 deaths and 1 000 hospital admissions in Melbourne each year, and the number of days where visibility is impacted by particles is still a matter for concern.

[1] Trend data for particles less than 10 microns in size are only available from 1994, and this is not a sufficiently long period to establish trends. Measurements of visibility reducing particles, as a surrogate for particles less than 2.5 microns in size, date from 1979, and these do indicate a marked downward trend.

1.6 The Authority has played a key role in the development of national air quality standards and, as a result of its activities, Victoria was the first State to adopt an *Ambient Air Quality National Environment Protection Measure Monitoring Plan* under the national framework. The Authority was also instrumental in the introduction of unleaded petrol and catalytic converters in Australia, which have been major contributors to improved air quality.

1.7 In common with many environmental issues, air quality requires a long-term perspective. It can take decades before an accurate assessment of the effectiveness of air quality management initiatives can be made. This sits poorly with the annual public sector budgeting process which determines resource allocation based on shorter-term priorities. The Authority needs to better link its mid to long-term planning with the annual process. Particular attention needs to be given to the long-term sustainability of its air quality monitoring network.

1.8 At the State level the Authority, as the principal agency responsible for the protection of the air environment in Victoria, needs to be included in decision-making and the development of policy where such activities have the potential to impact on the environment, such as transport planning, road infrastructure development, land-use and development, energy, and encouraging identification and take-up of sustainable solutions.

1.9 The Authority has effectively controlled emissions to air from major industry. However, control over emissions from motor vehicles (one of the major sources of air pollutants), from small-to-medium enterprises, and diffuse sources such as wood heaters, remains a challenge. The Authority uses a range of tools and resources to manage air quality and has increasingly focused on encouraging other agencies, industry, manufacturers and community members to share the responsibility for reducing emissions to air. This approach is consistent with other jurisdictions. Given the difficulty in measuring the impact of specific initiatives, we support the application of a range of tools and resources to manage air quality and ongoing evaluation of their effectiveness. This is essential given that pollution sources, potential control mechanisms and scientific understanding change over time.

1.10 The Authority's air quality monitoring activities are undertaken in accordance with requirements established under the national and State monitoring frameworks. In the past, these activities were largely confined to the Port Phillip and Latrobe Valley regions. However, these activities have recently taken on a wider perspective with increased monitoring in regional Victoria. Local area or "hot spot" monitoring has also been expanded with the acquisition of a mobile monitoring laboratory. We welcome this broader approach.

1.11 In order to better assess its effectiveness, both overall and in relation to individual air quality programs and initiatives, the Authority requires an evaluation framework, with performance indicators relevant and appropriate to measuring its contribution to air quality outcomes. Public reporting and accountability can also be improved through the adoption of best practice environmental reporting.

AUDIT FINDINGS

Victoria's air quality

1.12 Victoria's air quality compares favourably with that of other jurisdictions and with the State Environment Protection Policy objectives. International comparisons of air quality place Melbourne's ozone, sulfur dioxide, nitrogen dioxide and particle levels at the lower end of the range. However, its levels of carbon monoxide place it in the mid-range when compared with other cities. ***(paras 2.39, 2.40 and 2.53)***

1.13 One of the greatest improvements in air quality over the past 30 years has been the reduction in lead in the Port Phillip and Latrobe Valley regions. Levels in the Latrobe Valley are now considered so low it is no longer monitored on an ongoing basis. ***(para. 2.45)***

1.14 Downwards trends have also been recorded for carbon monoxide, ozone, nitrogen dioxide and volatile organic compounds in the Port Phillip region. Levels of these pollutants are generally much lower in the Latrobe Valley. However, there is no clear trend in the levels of sulfur dioxide in either region, with levels staying comparatively higher in the Port Phillip region due to the greater volume of industry in the region. However, even in that region, the levels are very low and well within the Australian standard. ***(paras 2.46 to 2.47)***

1.15 Despite the improvements in air quality, visibility remains an issue in Victoria. While the number of days with poor visibility has decreased since 1979, the Authority's target for both the Port Phillip and Latrobe Valley regions has not been met. ***(para. 2.54)***

1.16 Despite the comparatively good air quality in Victoria, recent health and hospital admissions studies show that there are around 300 deaths and 1 000 hospital admissions per annum associated with Melbourne's ambient air quality. In addition, the Authority received around 5 000 complaints regarding air quality from the public in 2000-01, and around 13 500 complaints relating to smoky vehicles. ***(paras 2.55 to 2.56)***

Planning and resourcing

Planning

1.17 The *Draft Air Quality Improvement Plan, Port Phillip Region* provides a long-term plan for managing air quality in that region. The Air NEPM Monitoring Plan sets the Authority's medium-term strategic direction for fixed-site ambient air quality monitoring. ***(para. 4.3)***

1.18 The Authority develops the plans required under the national air quality framework and the State Environment Protection Policies within an informed environment and after extensive consultation. ***(para. 4.4)***

1.19 While the Authority has recently developed its Draft Air Quality Improvement Plan for the Port Phillip region, it has yet to develop similar plans for the remainder of the State. It has identified a plan for the Latrobe Valley region as its next priority. ***(para. 4.4)***

1.20 In contrast to the extensive medium to long-term plans in place relating to the Authority's responsibilities under the national framework and State policies, the identification of priorities and allocation of resources is largely driven by the annual public sector budgeting process, with its inherent uncertainty regarding the provision of ongoing funding. ***(para. 4.8)***

Resourcing

1.21 Parliament provides the Authority with a yearly allocation for output groups relating to air, water, groundwater, land, noise, waste and neighbourhood environment improvement. The Authority's internal budget process then allocates resources within these output groups to its wide range of environmental responsibilities, resulting in trade-offs being made between monitoring and managing the environment, between environmental management approaches, and between operating expenditure and maintenance of its corporate infrastructure. The outcome of this process is that air quality consumes 19 per cent of the Authority's budget and air quality monitoring is around one-third of the total air quality budget. ***(paras 4.9 to 4.13)***

1.22 The Authority has clearly articulated its long-term objectives and strategies in the Draft Air Quality Improvement Plan and its medium-term objectives in its Corporate Plan. The achievement of these medium-term objectives will require priorities to be set based on assessment of relative effectiveness and resourcing implications of its activities. This is not well addressed beyond the annual budget process. ***(para. 4.14)***

1.23 Special purpose monitoring in local areas, i.e. short-term, mobile monitoring of "hot spots" in response to complaints, emergencies, and enforcement activities or for other purposes, is planned on a short-term basis. ***(para. 4.16)***

1.24 The minimum level of fixed-site (ambient air) monitoring is set by national agreement, but the amount of additional fixed-site monitoring and local area special purpose monitoring is dependent on the Authority's resources. Monitoring is expensive and the need for local monitoring is expected to increase when Neighbourhood Environment Improvement Plans are introduced. It is important for the Authority to develop a longer-term strategy for establishing the resourcing mix between additional fixed-site and local area special purpose air quality monitoring. ***(paras 4.16 to 4.17)***

1.25 While Victoria's air quality performance has been relatively good and the Authority has received increasing budget allocations in recent years, community expectations continue to rise and the sources of pollution to be managed are more diffuse and difficult to address. Given this and the high cost and increasing commitments for air quality monitoring, the Authority will face increasing budget pressure. A particular difficulty will arise in the fulfilment of the Authority's legislative responsibilities for air quality monitoring, including replacement or maintenance of its ageing equipment, within existing budget levels. The Authority does not currently have a strategy to provide for acquisition and progressive replacement of equipment and to address issues relating to its fixed-site network. ***(paras 4.21 and 4.33)***

Managing Victoria's air quality

Ensuring consideration of air quality in government decision-making

1.26 Government operations such as road development projects, urban and regional planning, public transport and major infrastructure projects have the potential to significantly impact on the environment. We found that the Authority has made valued contributions to other government agencies and national bodies by assisting development of environmental policies or advising them on activities that may impact on the environment. However, the Authority advised that in the past it has had difficulty in being included in, or becoming aware of, Victorian public sector developments, more so than with private sector developments. ***(paras 5.3 to 5.6)***

1.27 The Authority acts as a facilitator for environmental outcomes and takes opportunities to influence policy development nationally and in other public sector agencies, when aware of those activities. However, as an independent watchdog for the environment, it does not have a central role in government decision-making. Given the Government's *Growing Victoria Together* strategy, which calls for a greater focus on the environment and sustainability across government, it is important that the Authority is consulted by the Government and other agencies to ensure that environmental matters are adequately considered in decision-making and policy development. ***(paras 5.3 and 5.7)***

Encouraging improved air quality outcomes through regulatory and other tools

1.28 Over the past 30 years, consistent with emerging international trends, the Authority has supplemented the traditional approach to controlling air emissions through prescriptive regulation with increased collaboration and partnering with industry and the community as a whole. ***(para. 5.18)***

1.29 The Authority uses a wide range of tools including regulation and co-operative or partnership-based programs to encourage major industry and small-to-medium enterprises to improve their environmental performance. Its regulatory interventions are targeted to the major pollution sources, with 292 major polluters licensed to emit to air. The Authority also issues around 30 works approvals, and undertakes around 300 inspections each year dealing with air emissions. ***(paras 5.21, 5.34, 5.38 and 5.48)***

1.30 The ability to control motor vehicle emissions rests largely with the national bodies responsible for setting standards for technology and fuel. The Authority, therefore, participates in the development of such standards, to complement the lesser range of tools available to directly influence improved environmental outcomes from motor vehicle users. ***(paras 5.27 to 5.28)***

1.31 Emissions from other sources are much harder to identify, estimate and manage and are another challenge to the Authority. As emissions from major industry and transport sources are addressed, these sources become increasingly important. The Authority deals with these through guidelines, codes of practice with peak bodies, provision of funding for community activities, and public education and information. ***(para. 5.29)***

1.32 We are satisfied that the Authority has appropriate controls over the processing of works approvals, ensuring that the works approval requirements are met and the approved works completed prior to licences being issued. ***(para. 5.35)***

1.33 Licensing decisions were made with consideration of the impact of the premises on air quality within the region, when applicable, and on the air quality in the immediate vicinity of proposed sites. Works approvals that require premises to put in place controls to minimise emissions are used to lessen the impact in the immediate vicinity. ***(para. 5.39)***

1.34 We found that the Authority reviews annual reports of performance and monitoring submitted by licensees (both accredited and other licensees) and checks that the reporting requirements were met. However, the reports are not routinely audited by the Authority, i.e. reports of independent auditors are not routinely checked and reports of emissions are not always compared with licences to ensure licence conditions are still being met. ***(para. 5.40)***

1.35 Sixteen of the 17 accredited licences issued by the Authority include components related to air emissions. Decisions to accredit premises were made with due regard to the legislative requirements. ***(para. 5.43)***

1.36 The Authority's risk-based assessment of all licensed sites was used to target its inspection activity towards poor environmental performers. As a result, not all premises licensed to emit to air are inspected each year, but there is a reasonable coverage of licensed premises. ***(para. 5.47)***

1.37 While being relatively small contributors to air pollution in the past, as the major emission sources are reduced, the performance of small-to-medium enterprises will become a greater concern. The Authority relies on complaints to identify poor environmental practice in regard to these operators but has not evaluated the effectiveness of its approach to this sector of industry. The Authority uses its Cleaner Production Partnerships Program to drive improved performance by this sector and hopes that the introduction of Neighbourhood Environment Improvement Plans will also be effective in reducing the level of emissions to air. ***(paras 5.50 to 5.51)***

1.38 Over the past 4 years, while the numbers of roadside operations and car yards inspected have reduced, the number of vehicles inspected has increased, suggesting a more efficient use of inspection resources. However, the inspection of 5 874 vehicles in Victoria in 2000-01 has also to be contrasted with a fleet of around 1.7 million cars greater than 10 years old. The number of smoky vehicles reported and the number of tampered vehicles detected have grown over the period. In some jurisdictions more rigorous initiatives have been introduced to address the problem of motor vehicle emissions. ***(paras 5.62 to 5.63)***

1.39 In addition to motor vehicle inspections, warning letters and penalty infringement notices, the Authority raises awareness through education of industry participants and public information. The effectiveness of these activities may be undermined by the Authority's relatively poor responsiveness to public complaints and the low visibility of roadside operations and car yard inspections. However, the success of these activities cannot be determined given the absence of up-to-date information on total motor vehicle emissions, targets and evaluations by the Authority. ***(paras 5.64 to 5.65)***

1.40 The Authority's most recent emissions inventory for the Port Phillip region indicated a 16 per cent increase in the number of vehicle kilometres travelled between 1990 and 1995-96 at the same time as the levels of emissions from all major pollutants decreased. The inventory reported that this decrease was due directly to the introduction of catalytic converters and unleaded petrol. ***(para. 5.66)***

1.41 We found that the Authority had used a number of means to encourage stakeholders to contribute to improved air quality outcomes, including Environment Improvement Plans, the Cleaner Production Partnerships Program, guidelines and codes of practice, grants and sponsorships, and information and educational activities. The Authority has also shown initiative in becoming involved in the United Nations Environment Finance Programme Initiative to promote better environmental outcomes. ***(paras 5.68 to 5.86)***

1.42 The Authority does not have a formal marketing strategy. We found that while a large number of publications are produced and educational activities are undertaken by the Authority, including some in partnership with other parties, there is a lack of strategic focus. However, the Authority is currently in the process of developing a marketing strategy. ***(paras 5.81 to 5.84)***

Evaluating effectiveness

1.43 The Authority has formally evaluated only some of its activities. It is, therefore, not in a good position to assess the relative effectiveness of the various regulatory and non-regulatory tools it currently uses to manage Victoria's air quality. While evaluation can be difficult and costly, it provides evidence to support decision-making which best uses limited resources. ***(paras 5.87 to 5.89)***

Monitoring Victoria's air quality

Monitoring air quality across the State

1.44 Monitoring of ambient air quality in the Port Phillip and Latrobe Valley regions is undertaken in accordance with the requirements of the SEPP (Ambient Air Quality) and the Air NEPM Monitoring Plan. Victoria was the first State to develop such a plan. ***(paras 6.23 to 6.25)***

1.45 We found that the Authority also conducts special purpose monitoring of ambient air quality within the Port Phillip region, as circumstances require and resources permit. ***(para. 6.29)***

1.46 Prior to 2000, when the Authority commenced monitoring under the Air NEPM Monitoring Plan, ambient monitoring of air quality outside the Port Phillip and Latrobe Valley regions was not undertaken. The Authority advised that during the 1980s the most significant air quality issue was smog, which only occurred within these regions. Motor vehicle usage and industry outside these regions was not great enough to contribute to the production of smog. However, now that the smog issue has been reduced through unleaded petrol and catalytic converters, industry licensing and better management of backyard and fuel reduction burning, the Authority is in a position to focus on other priorities and issues based on new knowledge about air quality issues. ***(paras 6.31 to 6.32)***

1.47 The Authority has now committed to preliminary ambient monitoring in regional Victoria for periods of one to 2 years, as part of its strategic approach to obtaining data to guide its future activities and resource allocation. Monitoring in Bendigo in 2000-01 identified the need for ongoing monitoring of particles in that area. Monitoring in Ballarat recently commenced and is planned to commence in Shepparton-Mooroopna later in 2002. Monitoring in other regional centres is planned once monitoring instruments become available. Given the Authority's stated concerns regarding its equipment, it is unclear when this will occur. ***(paras 6.33 to 6.35)***

1.48 In 1999-2000, the Authority purchased a mobile laboratory to expand and to increase the efficiency of its local area or "hot spot" monitoring. Between 2000 and 2002 the mobile laboratory was used primarily to investigate traffic pollution issues in metropolitan Melbourne. The Authority advised that the mobile laboratory would next be located in Geelong. ***(paras 6.30 and 6.43)***

1.49 The mobile laboratory has been used to assist research, to respond to public concern and to support public information activities. We did not observe a clear process for assessing relative priorities to guide these uses. We found that the Authority has not conducted a broad scale assessment of its local monitoring priorities. ***(para. 6.44)***

Ensuring the quality of data

1.50 The Authority has a series of quality assurance and control procedures in place covering instrumentation, calibration, data validation and staff training to meet the accreditation requirements of the National Association of Testing Authorities, as required under the Air NEPM monitoring protocol. ***(paras 6.55 to 6.56)***

1.51 Procedures for accrediting the mobile monitoring laboratory are currently being developed and accreditation will be sought once those procedures have been established. The Authority requires operators of outsourced monitoring stations in the Latrobe Valley to be accredited with the National Association of Testing Authorities. ***(paras 6.56 to 6.57)***

1.52 The Authority's 2000-01 report on ambient air quality to the National Environment Protection Council indicated that it did not have sufficient data to demonstrate compliance with the Air NEPM standards for 3 pollutants across 9 stations largely due to the need to relocate air monitoring stations and the use of alternate monitoring equipment. However, this period was prior to endorsement of the Authority's Air NEPM Monitoring Plan. The Authority advised that many of the issues with conforming data will be removed in relation to the 2001 data following further implementation of the Air NEPM Monitoring Plan. ***(paras 6.59 to 6.60)***

1.53 In the past, the Authority has been slow to publicly release its annual Air Monitoring Report. However, the Report for 2000 was produced on a more timely basis and the Authority plans to further improve its performance in this regard. Timely reporting is provided through the Authority's website which provides unvalidated data from the Authority's fixed-site air quality monitoring stations on an hourly basis, and its Annual Report tabled in the Parliament which provides data on the air environment. ***(paras 6.63 to 6.66)***

Reviewing and evaluating

1.54 A 1999 review of the Authority's modelling and monitoring programs by representatives from the Ministry of Environment and Energy, Ontario, Canada found that the Authority's air monitoring program was fundamentally sound, and provided a series of recommendations for improvement. The Authority has addressed most of these recommendations and has yet to act on others such as the more regular update of emissions inventories. ***(paras 6.69 to 6.70)***

1.55 The Authority has identified the need to review its fixed-site monitoring program again, given the need to meet the expanding Air NEPM requirements within its existing budget and to address longer-term issues of risk and change. The Authority advised that this will be considered during its next corporate planning cycle. ***(para. 6.72)***

Reporting and accountability

1.56 The Authority reports formally on its activities through its Annual Report, the annual Air Monitoring Report and Minister's Report to the National Environment Protection Council. The Authority intends to streamline its reporting to ensure utilisation of the same datasets and graphics for the 3 reports, supplemented in each report by additional information as required. ***(paras 7.4 and 7.10)***

Performance reporting

1.57 While the *State Environment Protection Policy (Ambient Air Quality)* establishes the broad aims and objectives for the State's air quality as well as 10-year goals for the 7 indicator pollutants, it does not provide incremental targets to enable measurement of progress, and by inference, to assess the effectiveness of the Authority's air quality management activities during the interim period, i.e. between 1998 and 2008. ***(para. 7.16)***

1.58 The *State Environment Protection Policy (Air Quality Management)* identifies policy intents but does not provide any targets to enable monitoring or measurement of achievements against them. ***(para. 7.16)***

1.59 The implementation of the State Environment Protection Policies is binding on all Victorians. The Authority considers that while it has responsibility for encouraging others to achieve the objectives and intents of those policies, it should not be held solely accountable for the outcomes achieved, particularly as the activities of many other government agencies impact on those outcomes. Nevertheless, we believe that the Authority should be accountable for its performance and needs to develop a suite of performance indicators and measures appropriate to this end. ***(paras 7.17 to 7.18)***

1.60 The Authority reports against a number of performance measures in its Annual Report. We found that most of the performance measures reported covered trends over a 5-year period. However, few of them were analysed with respect to how they contributed to meeting the Authority's objectives. ***(para. 7.19)***

Triple bottom line reporting

1.61 The Authority encourages industry to provide triple bottom line reporting. However, the Authority does not itself undertake reporting that addresses the environmental, social and economic effects of its air quality operations, nor is it currently required to do so. While the Authority's Annual Report addresses its activities in relation to the air environment, it does not report on social and economic impacts. The Authority advised that it intends to commence triple bottom line reporting next year and will consult with the community, industry and staff to determine the information to be reported. ***(paras 7.20 to 7.22)***

RECOMMENDATIONS

Report reference	*Paragraph number*	*Recommendation*
Planning and resourcing	4.34	We recommend that the Authority establish a timeframe for development of an Air Quality Improvement Plan for the Latrobe Valley region, and for subsequent plans for the remainder of the State.
	4.35	An explicit assessment of relative effectiveness and resourcing implications of the Authority's activities should be undertaken to inform its budget and business planning processes, and to enable clear priority setting across the agency and within business units, and between air quality management and monitoring activities. This will provide a basis for future resourcing submissions to be made through the annual public sector budget process.
	4.36	The Authority should develop a longer-term plan for determining the appropriate resourcing mix between fixed-site and local area air quality monitoring.
	4.37	We recommend the development of a long-term plan for the acquisition and progressive replacement of equipment, to ensure the sustainability of the monitoring network and to enable the Authority's legislative responsibilities to be met.

RECOMMENDATIONS - *continued*

Report reference	*Paragraph number*	*Recommendation*
Managing Victoria's air quality	5.16	We recommend that the Authority should develop Memoranda of Understanding with its main governmental agency contacts to formally establish arrangements between the agencies and to encourage continued co-ordination between them in areas of mutual interest, including public and private transport, and planning and urban environment-related matters.
	5.95	We recommend that the Authority should ensure that information provided by accredited licensees and other licensees about emissions to air be properly assessed, i.e. reports of independent auditors checked and reports of emissions compared with licence requirements, to ensure licence conditions are still being met.
	5.96	We recommend that management information maintained by the Authority, such as data in relation to complaints, inspections, Penalty Infringement Notices and Pollution Abatement Notices, be categorised according to pollution source, to assist monitoring of performance, development of strategies to improve performance in those sectors, and assessment of the Authority's performance and to enhance accountability.
	5.97	For its motor vehicle-related activities, we recommend that the Authority should: • follow-up smoky vehicle reports to ensure that appropriate action to repair the vehicles is undertaken; • collect data and establish measurable targets to enable assessment of the Authority's effectiveness in addressing the level of emissions from motor vehicles; and • evaluate the effectiveness of the Smoky Vehicle Program.
	5.98	We recommend that the Authority should complete development of its marketing strategy as soon as possible.
	5.99	We recommend that the Authority should evaluate its practices and activities to enable assessment of its effectiveness and the appropriateness of the mix of policy tools used.

RECOMMENDATIONS - *continued*

Report reference	*Paragraph number*	*Recommendation*
Monitoring Victoria's air quality	6.52	We recommend that the Authority should: • develop, as a high priority, a plan to resource and implement its commitments for ambient air monitoring in regional centres; • develop a local monitoring strategy to guide its program of mobile and special purpose local area air quality monitoring and ensure that its process for prioritising these activities is transparent; and • have a plan in place for regular updates of its emissions inventories.
	6.68	We recommend that the Authority: • develops an equipment replacement strategy to ensure that it has sufficient annual data available to meet the reporting requirements of the Air NEPM; • sets a timeline to achieve accreditation with the National Association of Testing Authorities for its mobile laboratory, as a way of providing the community with assurance over the quality of the data it collects; and • ensures that its annual Air Monitoring Reports to the public are published in a timely manner.
	6.74	We recommend that the Authority: • reviews its fixed-site network and mobile monitoring activities together, to identify an appropriate balance for meeting ambient and local air quality monitoring requirements and information needs from within the Authority's current budget allocation; • establishes a program for regular review of its monitoring activities; and • continues to address the recommendations of the 1999 review of its monitoring, emissions inventory and modelling activities.
Reporting and accountability	7.25	We recommend that the Authority meets the reporting requirements of the recently introduced SEPP (Air Quality Management), particularly in relation to: • progress towards meeting the policy's intentions; and • impacts of air quality (including on matters such as health and the occurrence and impact of "hot spots").

RECOMMENDATIONS - *continued*

Report reference	*Paragraph number*	*Recommendation*
Reporting and accountability *- continued*	7.26	We recommend that the Authority should supplement the indicators measuring the 10-year goals for air quality established under the Air NEPM and the SEPP (Ambient Air Quality) with a set of performance indicators or measures that enable: • measurement and monitoring of progress in the short-term and effectiveness of activities in the medium-term; and • measurement and monitoring of achievements against the policy intents identified in the SEPP (Air Quality Management).
	7.27	We recommend that the Authority's Annual Report should: • provide discussion in relation to the success or otherwise of particular initiatives and strategies in meeting the Authority's objectives; and • reflect best practice triple bottom line principles.

RESPONSE *provided by Deputy Chairman, Environment Protection Authority Victoria*

Thank you for providing the Environment Protection Authority Victoria with the opportunity to comment on the draft performance audit report.

The Authority appreciates the requirement to be subject to external audit of its functions, believing that audit processes are vital to the process of improving performance, and providing information to the community about how efficiently and effectively its government's resources are being used.

The performance audit confirms the improving air quality in Melbourne, Geelong and the Latrobe Valley over the past 30 years, and that our air now meets the national standards, with very few exceptions associated with adverse meteorological conditions.

In particular, the Authority notes the very positive findings in respect to our management of air quality, which addresses a range of emission sources, our monitoring effort and processes instigated to ensure integrity of the data, and the reporting of this data.

The report cites the reduction of lead in the air as "One of the greatest improvements in air quality ..." (para. 1.13). This is important of itself, but does not make the critical connection with the fact that unleaded petrol allowed the use of catalytic converters in motor vehicles, dramatically reducing the levels of many other pollutants emitted by motor vehicles.

The report highlights previously published Authority research that shows that our community still bears a significant health burden associated with air pollution in urban areas. The report cites 300 premature deaths and 1 000 hospital admissions "linked" to air pollution. The Authority is an organisation that values sound science, and emphasises that these are statistical estimates. However, the Authority stands behind the figure of 300-400 deaths as the best estimate possible at the present time.

The Authority recognises the need to continue to strive even further to reduce the effects of modern city living. It takes pride in the significant improvements to date exemplified by the fact that photochemical smog has reduced from around 35 days per year in the early 1980s to only one day in the last 3 years. The reader might reflect on the improvements in air quality over the last 30 years, and the implications for deaths and hospital admissions prevented as a result of improvements in air quality over this time.

Part 2

Understanding air quality

INTRODUCTION

2.1 Air is an essential element for maintaining life on earth. On average, a human takes in around 14 cubic metres of air each per day. A mixture of gases and particles, the main components of air, are nitrogen, oxygen, carbon dioxide, water vapour and various inert gases. Air also contains trace quantities of other components or pollutants, some of which arise from natural processes such as volcanic eruptions, bush fires and lightning strikes, and some of which occur as a result of human activity including domestic fires, agricultural burning, fuel reduction during unfavourable weather conditions and photochemical smog.

2.2 An international poll in November 2000[1], and a 1999 survey by the Australian Bureau of Statistics[2] found that the Australians surveyed ranked air pollution as the most important environmental issue.

WHAT IS GOOD AIR QUALITY?

2.3 Good air quality is the earth's natural atmosphere, in which the relative proportions of gases remain almost constant as a result of the planet's natural physical and biological systems, i.e. the earth's natural capital[3] comprising vegetation, water lifecycles, ecological systems and the metabolic processes of all forms of life.[4] These natural living processes clean and filter the air and water through:

- dilution and dispersal by wind action;
- biochemical breakdown of pollutants into harmless molecules;
- removal through deposition and uptake by soil micro-organisms, vegetation and surface waters; or
- washing out of the atmosphere by rain into watercourses.

2.4 In these ways, the natural processes work to lessen the impact of pollutants emitted into the atmosphere. However, if pollutant loads are too high for atmospheric and natural processes to cope with, the build up of pollutants in the atmosphere degrades air quality until the concentration of pollutants reaches levels that can affect the health and wellbeing of humans.

[1] Environics International Ltd, *Environment Monitor: Global Public Opinion on the Environment*, Australian results, Toronto, 2000.

[2] Australian Bureau of Statistics, *Environmental Issues: People's Views and Practices*, Publication No. 4602.0 (1999) Canberra, March 1999.

[3] Natural capital is the intrinsic value of natural systems that help to maintain earth's life support systems. See Paul Hawkens, Amory Lovins, L. Hunter Lovins, *Natural Capitalism: Creating the next industrial revolution*, Earthscan Publications, 2000.

[4] For example, see James E. Lovelock, *Gaia: A new look at life on earth*, Oxford University Press, NY, 1979.

Indicators of air quality

2.5 The quality of the air is gauged by how well it meets the requirements of the uses it supports. These uses are termed "beneficial uses" and include the health and wellbeing of humans and other forms of life, local amenity and aesthetics, visibility, durability of materials and structures, and climate systems.

2.6 The suitability of the air for various uses depends on the type of contaminants and on their concentrations, which differ for different uses. For example, for some contaminants such as ethyl acrylate (used in the production of acrylic resins, plastics, rubber and denture materials), the concentration in air at which it can cause an odour nuisance is very much lower than that required for the protection of human health. For other chemicals, for example, formaldehyde (used as a bactericide and fungicide, in pressed wood products and fabric finishing), the reverse is the case, and human health can be affected at concentrations that cannot be detected by smell.

2.7 There is, therefore, no simple way of gauging the quality of the air, and clear odourless air is not necessarily better than air that has a characteristic odour or haze. For this reason, air quality is assessed by using a number of "indicator" pollutants that are widely occurring and representative of various sources. These pollutants are measured and compared with established criteria or objectives. The criteria are based on levels necessary to protect human health and wellbeing, and it is generally taken that other beneficial uses are also protected at these levels.

2.8 The indicator pollutants measured in Victoria, the first 6 of which are similar to those used by other environmental agencies in Australia and overseas, are set out in Table 2A.

TABLE 2A
INDICATOR POLLUTANTS

Indicator pollutant	*Characteristics*	*Sources*
Carbon monoxide (CO)	A colourless, odourless and tasteless gas that, in high concentrations, is poisonous to humans.	Carbon monoxide is a trace constituent of the atmosphere. It is produced from natural sources such as volcanoes, and by human activities including motor vehicles and the incomplete combustion of fossil fuels and industrial processes such as steel making.
Nitrogen dioxide (NO_2)	An orange brown gas with a characteristic pungent odour.	Nitrogen dioxide is one of several oxides of nitrogen produced by the combustion of fuels and some industrial processes. Most of the nitrogen dioxide emitted by combustion is nitric oxide which is converted slowly to nitrogen dioxide in the atmosphere. Soil and marine bacteria are natural sources of nitrogen dioxide.
Sulfur dioxide (SO_2)	A colourless, pungent, irritating and reactive gas, soluble in water.	Natural sources of sulfur dioxide are volcanic and geothermal activity. Man-made sources include various industrial processes, the combustion of sulfur-bearing fuels such as coal, and oil combustion in power stations, mineral ore processing and manufacture of chemicals.
Lead (Pb)	A soft bluish or silvery-grey metal.	Lead is naturally present in low concentrations in the earth's crust. Most of the lead in cities comes from the exhaust gases from motor vehicles that use leaded petrol. Smelters are another source.
Ozone (O_3)	A relatively insoluble gas with a characteristic sharp odour, which is the main component of photochemical smog. Ozone that forms near ground level should not be confused with ozone in the protective ozone layer in the stratosphere, some 15 to 50 kilometres above ground level.	Ozone is not emitted directly but forms in the atmosphere from the chemical reaction of volatile organic compounds including hydrocarbons, and oxides of nitrogen (chemicals released by motor vehicles and industry) in the presence of sunlight.
Particles less than 10 microns[5] in size (PM_{10})	Airborne particles are very diverse in their chemical composition and physical properties.	Particles arise from a variety of natural and man-made sources such as volcanic activity, sea spray, bushfires, motor vehicles particularly diesels and various industrial processes.
Visibility reducing particles	Airborne particles (less than 2.5 microns in size) that reduce visibility by scattering light. While this is a measure for of visibility, the airborne particle indicator can be correlated with fine particle concentration (less than 2.5 microns) provided a calibration is undertaken.	As above.

Source: Adapted from *Draft Air Quality Improvement Plan, Port Phillip Region,* 2000 and CSIRO, 2001.

[5] These are very small particles - a micron is one millionth of a metre. The diameter of human hair is 100 microns and that of cigarette smoke about 1 micron.

2.9 In addition to the listed indicator pollutants, hazardous air pollutants, or "air toxics" also exist at relatively low concentrations in urban air. These include organic compounds (e.g. benzene, polycyclic hydrocarbons), mineral fibres (e.g. asbestos), inorganic gases (e.g. chlorine, hydrogen fluoride) and metals (e.g. arsenic, cadmium and mercury). The Authority controls and monitors emissions of these pollutants. With the exception of lead, the indicator pollutants are emitted or formed in much greater volume than hazardous air pollutants.

WHAT IS THE IMPACT OF POOR AIR QUALITY?

The association between air quality and health outcomes

2.10 The effects of very poor air quality on health have been known for a long time and a number of extreme pollution incidents have been well documented, including the Meuse Valley, Belgium in 1930; Donora, Pennsylvania in 1948; and London, England in 1952. During the latter incident, a combination of high levels of sulfur dioxide and particles resulted in 4 000 deaths in excess of the normal rate over 5 days.[6] Deaths and illness are also associated with natural air emission events such as volcanic eruptions and bushfires.

2.11 While the health effects from such extreme pollution events are dramatic, many studies have associated a variety of adverse health effects at much lower pollution levels. For example, epidemiological studies[7] have shown associations between ambient air pollution levels (i.e. air pollution levels within a region) and adverse health effects, including increases in daily mortality, hospital admissions and emergency room attendances, as well as exacerbation of conditions such as asthma.

2.12 Consistent with overseas research, recent studies of mortality and hospital admissions in Melbourne[8] indicate that although the specific effects for individual pollutants could not always be separated, even at generally low pollution levels, some adverse health effects occur, including:

- increased mortality (mainly associated with ozone and nitrogen dioxide); and
- increased hospital admissions (associated with nitrogen dioxide, carbon monoxide and particles, and increased levels of ozone).

[6] Denison L et al, *Health Effects of Five Common Air Contaminants and Recommended Protective Ranges*, Air Quality Technical Report 12, Ministry for the Environment, New Zealand, 2000.

[7] These studies of statistical differences between people, categorised according to their environment, socio-economic conditions, health and health outcomes, are usually unable to provide sufficient evidence to show cause and effect due to the complexities involved. However, the associations they identify are statistically sound.

[8] Environment Protection Authority, *Melbourne Mortality Study: Effects of Ambient Air Pollution on Daily Mortality in Melbourne 1991 – 1996*, EPA Publication No. 709, 2000; and Environment Protection Authority, *Hospital Admissions Report: Ambient Air Pollution and Daily Hospital Admissions in Melbourne, 1994 – 1997*, EPA Publication No. 789, 2001.

Known health effects of the indicator pollutants

2.13 The range of adverse health effects from poor air quality is very wide. They range from minor effects such as sore eyes and a runny nose, to more serious effects such as the triggering and aggravation of asthma, respiratory and cardiovascular disease, and death. Some health effects can occur after exposure for a short time, while others require exposure for longer periods. Studies of health effects are used to set ambient air quality criteria at levels protective of human health.

2.14 Table 2B provides a summary of known health effects of the indicator pollutants identified earlier.

TABLE 2B
KNOWN HEALTH EFFECTS OF THE INDICATOR POLLUTANTS

Pollutant	*Health effects*
Carbon monoxide	Carbon monoxide is absorbed more readily into the blood than oxygen, reducing the amount of oxygen that can be carried in the blood to the tissues. Carbon monoxide can produce tiredness and headaches. People with heart problems are particularly at risk.
Nitrogen dioxide	Nitrogen dioxide is a corrosive oxidising gas that attacks bronchial and lung tissue at very high concentrations. Lower concentrations can irritate the respiratory system, trigger or increase respiratory problems, and increase health effects from exposure to other pollutants.
Sulfur dioxide	Sulfur dioxide is a powerful respiratory irritant which attacks the throat and lungs. People with breathing problems can suffer severe illness and asthma attacks may be triggered by exposure to this pollutant.
Lead	Particles containing lead in the air can enter the lungs. Lead particles may also be ingested if they land on food. The lead can then be absorbed into the blood stream. Lead is toxic to the nervous system, and over a period can affect the body's ability to produce blood and affect the intellectual development of children.
Ozone	Ozone is a strong oxidising agent and a powerful irritant that reacts with human tissue, attacking the throat and lungs and irritating the eyes.
Particles less than 10 microns in size (PM_{10})	Particles smaller than 10 microns in size are capable of penetrating the lungs. They have been associated with a range of health effects including respiratory and heart problems. They may cause breathing difficulties and worsen respiratory diseases. Some particles contain cancer-producing materials.
Visibility reducing particles	Particles less than 2.5 microns in size have been found to increase the risk of dying from lung cancer and heart disease, and to be comparable to the risk of non-smokers being exposed to cigarette smoke over a long period of time.[9]

Source: CSIRO, 2001.

[9] Dr Arden Pope and Associate Prof. George Thurston, *Long term exposure to fine particles*, New York University, Brigham Young University, Utah, 2002.

2.15 In addition, some common volatile organic compounds, such as those that contribute to the development of ozone, may cause eye and skin irritation, headaches or nausea. Some are also classed as carcinogens. There are also other pollutants such as heavy metals which are source specific. Volatile organic compounds distinguish themselves by being common and widespread.

2.16 As well as effects on human health, poor air quality can have adverse effects on other organisms, ecosystems and biodiversity, local amenity and aesthetic enjoyment, visibility, the useful life and appearance of physical assets, and climate systems.

WHAT FACTORS IMPACT ON AIR QUALITY?

2.17 Air quality is affected by:

- the emissions of air pollutants;
- meteorological factors; and
- topography.

Emissions

2.18 Emissions of air pollutants contribute directly to the quality of the air. Sources of emissions are many and varied, as are the types of pollutants. On a global scale, emissions from natural sources of the common pollutants are orders of magnitude higher than emissions from man-made sources. For example, the emissions inventory for the Greater Brisbane area indicates that 60 per cent of the volatile organic compounds emitted in that area are produced from vegetation. Within Victoria, the blue haze in the Dandenong Ranges is associated with the emission of volatile organic compounds from eucalypt and other tree species.

2.19 However, emissions from man-made sources dominate air pollution in urban environments because of the concentration of sources, which include:

- industrial processes such as car manufacturing, petroleum refining, chemical production, metal fabrication and power generation;
- transport including cars, trucks, ships, and planes; and
- domestic and commercial activities such as painting, lawn mowing, cooking, and heating.

Local air quality

2.20 Air quality levels vary significantly over time and between locations because conditions that impact on those levels can vary greatly during a day or season, or across an airshed. As a result there are locations within an airshed where pollution levels are higher than those generally experienced across the region. For example, the air quality next to a pile of burning leaves can be quite poor, but good away from the immediate vicinity or when the burning stops.

2.21 Areas that experience higher levels of pollution are referred to as "hot spots". These can be very localised or can cover a broader area. Examples of the latter are areas close to busy major roads. Hot spots are common and are a cause of great concern for local communities who live with the impacts of those emissions.

Emissions inventories

2.22 Emissions inventories are an important tool for identifying the sources and levels of emissions. Detailed emissions inventories are common for overseas cities and have also been developed for a number of areas in Australia. Within Australia, the *National Pollutant Inventory* is an internet database maintained by Environment Australia to provide the community, industry and government with information on the types and amounts of certain substances being emitted to the environment.[10]

2.23 The data captured by inventories enable environmental agencies to assess the likely future impacts of actions to curb emissions on air quality, and where to target these actions. Reporting of the data also raises public awareness of the levels of emissions to air. However, care needs to be taken to avoid misinterpretation of the data reported, as the data are estimates rather than actual data. In addition, while the inventories identify emission levels from particular industry sites, they do not provide an accurate indication of the long-term exposure of humans to those emissions. This is because natural atmospheric processes may dilute and disperse air pollutants to harmless levels reducing the risk of potential health impacts.

Emission height

2.24 The greater the height at which pollutants are emitted, the greater the dispersion and dilution close to the source. The use of chimney stacks to reduce the impact of a pollutant source at ground level is standard practice. Stacks can be effective in reducing local impacts, as demonstrated by the use of vertical exhausts on diesel trucks. However, since stacks do not eliminate the pollutant but merely spread it around, they are not effective when the total pollution loads are too high for the atmosphere to accommodate. For this reason emission reductions are also necessary.

[10] The substances listed on the National Pollutant Inventory were selected based on their health and environmental effects, and have a range of toxicities. Most of the reporting by industry to the National Pollutant Inventory is now mandated. Data for certain sectors, such as small industry are also provided by State government environment agencies. The National Pollutant Inventory can be found at www.npi.gov.au

Industrial chimney stacks are used to reduce pollution at ground level.
(Photograph courtesy of Environment Protection Authority.)

Meteorological factors

2.25 Even though emissions to air may be relatively constant over a period of days, large variations in air pollution levels can occur, due to the impact of meteorological factors. The most important meteorological factors are winds, atmospheric structure (i.e. the stability of atmospheric conditions) and sunlight. The ways in which they can impact on air quality are outlined below.

Winds

2.26 Pollutants emitted from a source are carried and spread by the wind. The original concentration of pollutant is greatly diluted by the action of the wind, with the degree of dilution depending on the strength of the wind and its turbulence. The direction, strength and turbulence of the wind are determined by large-scale weather patterns, as well as local factors.

2.27 Near the coast, heating of the land during the day and cooling during the night can lead to local sea breezes in the afternoon. When this occurs, pollution that is carried towards the sea in the morning winds can be returned on the afternoon sea breeze.

Atmospheric structure

2.28 Pollutants emitted into the air spread both horizontally and vertically. Air is said to be vertically stable when there is very little vertical turbulence and mixing. This is common on clear calm nights when the air close to the ground cools and becomes heavier than the air above. During the day, as the land warms, so does the air close to the ground, causing bubbles of hot air to rise and leading to increased mixing. Unstable conditions are conducive to good mixing and movement of air pollutants.

2.29 Heating of the air does not penetrate upwards indefinitely, as a layer of stable air usually sits on top of the mixed layer beneath. This stable layer, or inversion, acts as a lid on the upward mixing of pollutants and can lead to high pollution levels. Inversions very close to the ground develop on clear calm nights leading to, for example, high levels of particles from wood heaters in some locations.

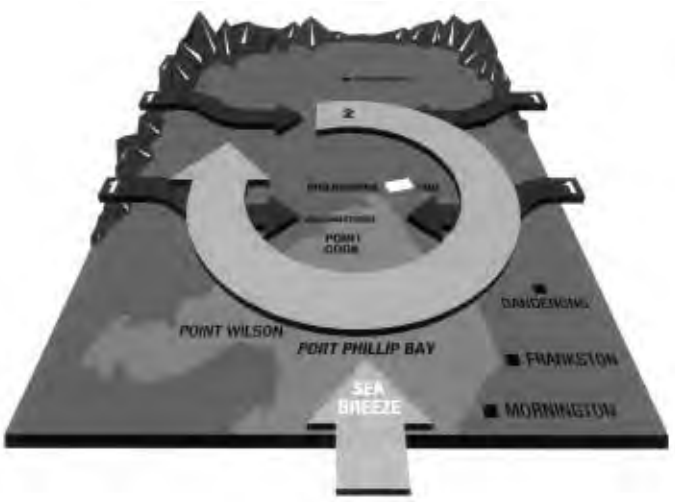
Sunlight

2.30 Sunlight, or more correctly ultra violet radiation, is a vital element in the formation of photochemical smog. Photochemical smog is the result of a number of complex chemical reactions occurring in the atmosphere between oxides of nitrogen and volatile organic compounds. Its principal component is ozone. Since several hours of sunlight and high temperatures are required for ozone to form, it is a summer/early autumn phenomenon.

Topography

2.31 Local and broader regional topography can both be important for air quality. Physical situations that constrain the mixing and dilution of pollutants are obvious influences. An example is a deep valley with low winds where pollutants are trapped and levels can build up. Regional scale topography can lead to complex air circulation patterns that affect local winds. For example, the clockwise circulation of winds that can occur in Melbourne leading to a build up of pollution levels has been attributed to the Melbourne or “Spillane” Eddy that forms to the south of the Great Dividing Range under certain weather patterns. Chart 2C illustrates the action of the Spillane Eddy.

CHART 2C
THE MELBOURNE OR "SPILLANE" EDDY



Under a special set of meteorological conditions, air flowing from the north-east is funnelled by mountains to the north and east of Port Phillip Bay (1) creating a circular, horizontal motion of about 100 kilometres in diameter (2) trapping pollution over the Bay, taking it away from Melbourne. The eddy pushes air pollution out over the Bay and back over Melbourne with afternoon sea breezes.

Source: Environment Protection Authority.

MITIGATING THE RISKS TO AIR QUALITY

2.32 Approaches for mitigating the risks to air quality include reducing emissions from sources; managing population density and source locations through urban planning; and changing the behaviour of industry and the community, including encouraging use of cleaner production methods and take-up of cleaner fuels. Environmental agencies can only directly employ the first of these approaches but have a clear role in indirectly influencing the other approaches necessary for achieving good air quality.

Reducing emissions at source

2.33 A range of techniques is available for reducing emissions at the source. For larger individual sources they include use of cleaner technology, waste minimisation techniques for reducing pollutants from processes and use of filters to trap or reduce emissions produced through industrial processes. In addition, industry and the community in general can be encouraged to use cleaner fuels: for example, gas instead of oil for heating in domestic, commercial and industrial applications; unleaded petrol in motor vehicles; and water-based paints in domestic, commercial and industrial applications.

Reducing motor vehicle emissions

2.34 Because of the dominance of their emissions in large cities, good air quality cannot be achieved without attention to motor vehicles. One of the major problems in Australian cities, particularly Melbourne and Sydney, is photochemical smog and motor vehicle emission standards have been progressively tightened to deal with the problem. Another major issue in cities is inhalable particles from diesel vehicles. Emission standards for diesel vehicles within Australia have been introduced and are being progressively phased in to counter this adverse impact.

2.35 Decisions on individual source controls can be made and implemented at the State and even regional level based on local conditions. However, because of economic considerations in global economies which require production of vehicles to satisfy global and national markets, decisions on motor vehicle controls are handled at the national and even international level.

2.36 Motor vehicle emission control technologies, such as catalytic converters and combustion controls, are not effective unless the quality of the fuel is also controlled. New national fuel quality standards are therefore also being implemented. In addition to the elimination of lead from petrol from 1 January 2002, other aspects of fuel quality are being progressively controlled.

2.37 Current controls are likely to continue the downward trend in emissions from vehicles, but it is predicted that this will eventually be reversed under the impact of increased vehicle kilometres travelled.[11]

VICTORIA'S AIR QUALITY

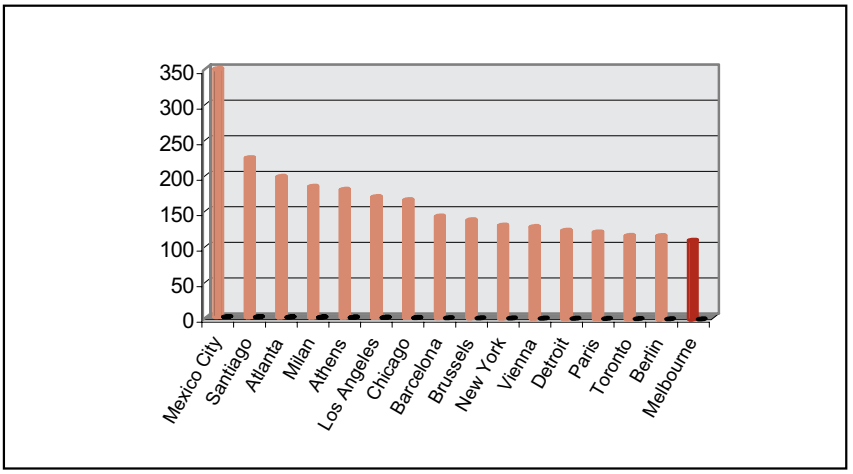
Comparison with other jurisdictions

2.38 In order to gauge Victoria's air quality it is useful to compare it with that of other jurisdictions. However, as the size, extent, length of record, meteorology, and monitoring and reporting procedures differ between jurisdictions, comparisons of air quality data are not a perfect indicator of relative performance. This needs to be borne in mind when comparing the data.

2.39 Melbourne's air quality compares favourably with that of other cities internationally. For example, Melbourne's ozone levels are at the lower end of the scale recorded across a selection of cities, as shown in Chart 2D.

[11] Environment Protection Authority, *Draft Air Quality Improvement Plan, Port Phillip Region,* 2000.

CHART 2D
MAXIMUM ONE HOUR OZONE LEVELS, SELECTED CITIES, 1995
(parts per billion)



Source: Adapted from Environment Protection Authority, *Draft Air Quality Improvement Plan, Port Phillip Region*, 2000.

2.40 Melbourne's levels of sulfur dioxide, nitrogen dioxide and particles are similarly good in comparison with other cities, although its carbon monoxide levels place it in the mid-range of such a comparison.

2.41 Another way to compare air quality between large cities is the number of days on which ozone levels exceed recommended levels.[12]

2.42 In 1991, Melbourne and Sydney recorded high levels of ozone on zero[13] and 4 days, respectively. In the same year, American cities which experienced high levels included Atlanta (5 days); Chicago (16 days); Los Angeles (135 days); New York (29 days); and San Francisco (2 days).

2.43 A global survey of quality of life factors, using air quality as an environmental factor, recently rated Melbourne, Adelaide and Brisbane equally as the 17th cleanest cities in the world. Perth (10th) was rated as Australia's cleanest city and Sydney was ranked 55th out of the 215 cities included in the survey. The New Zealand cities of Wellington and Auckland were rated at 7th and 9th, respectively.[14]

[12] Peter Manins, *Transport: The Future Is Clearer,* CSIRO Atmospheric Research, Australia presented at OUTLOOK '97 ABARE Conference, Canberra, February 1997.

[13] The zero level reflected weather patterns that were not conducive to smog formation. By contrast, in 1989 Melbourne exceeded the standard for ozone 6 times.

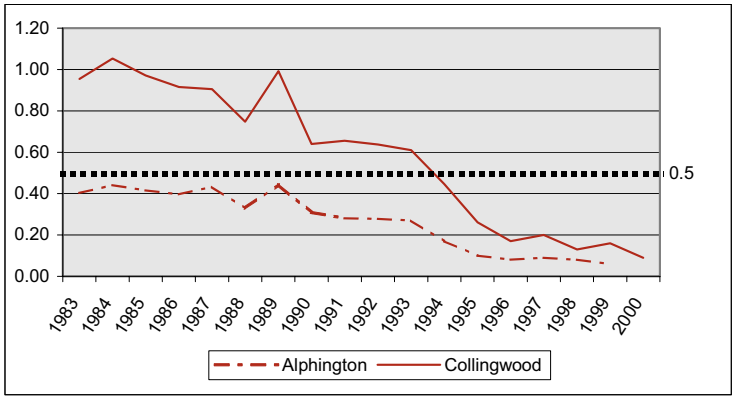
[14] William M Mercer Consultants, *Press Release: Worldwide Quality of Life Survey*, March 2002.

Trends in Victorian air quality

2.44 To determine a trend in levels of air pollutants, 10 or more years of data are generally required to ensure the changes are not due to particular weather conditions. Data collated by the Authority for the Port Phillip and Latrobe Valley regions show that, in many respects, air quality in Victoria has improved over the past 30 years and continues to do so.

2.45 One of the greatest improvements has been the reduction in lead concentrations, through reductions in the lead content of petrol and the introduction of the catalytic converter in 1986, to the extent that ambient lead levels are no longer considered to be an issue in Victoria. Chart 2E illustrates this downward trend as recorded at 2 stations in the Port Phillip region. Levels of lead in the Latrobe Valley are so low that it is no longer monitored on an ongoing basis.

CHART 2E
TRENDS IN ANNUAL LEAD CONCENTRATIONS, PORT PHILLIP REGION
(micrograms per cubic metre)



Note: The current standard under the SEPP (Ambient Air Quality) is 0.5 micrograms per cubic metre per year.

Source: Adapted from *Environment Protection Authority. Draft Air Quality Improvement Plan, Port Philip Region, 2000.*

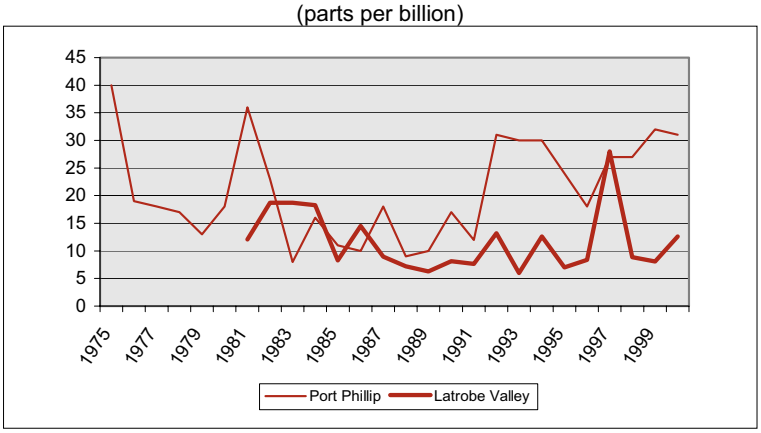
2.46 Downward trends have also been recorded in the Port Phillip region for carbon monoxide, ozone, nitrogen dioxide and volatile organic compounds. Levels of these pollutants are generally much lower in the Latrobe Valley.

2.47 In comparison, there is no clear trend for sulfur dioxide in either the Port Phillip or Latrobe Valley regions. Chart 2F shows that sulfur dioxide concentrations are consistently higher in the Port Phillip region where there are high levels of industry. However, even in that region, the levels are very low and well within the Australian standard.

2.48 Although electricity generation from coal generates significant sulfur dioxide pollution in other parts of the world, this is not the case in the Latrobe Valley as the brown coal used has naturally low levels of sulfur dioxide.[15]

[15] Environment Protection Authority, *Draft Air Quality Improvement Plan, Port Phillip Region,* 2000.

CHART 2F
DAILY SULFUR DIOXIDE CONCENTRATIONS, PORT PHILLIP AND LATROBE VALLEY REGIONS
(parts per billion)



Note: The SEPP (Ambient Air Quality) objective for sulfur dioxide is 80 parts per billion.

Source: Environment Protection Authority.

2.49 Trend data for particles less than 10 microns in size are only available from 1994, and this is not a sufficiently long period to establish trends. Measurements of visibility reducing particles, as a surrogate for particles less than 2.5 microns in size, date from 1979, and these indicate a marked downward trend.

2.50 A series of additional charts illustrating the changes in air quality over the past 30 years may be found in Appendix A to this report.

Composition of emissions

2.51 The estimated annual emissions vary considerably between the indicator pollutants in the Port Phillip region, as shown in Table 2G. Lead in particular is emitted in much smaller quantities than the other indicator pollutants.

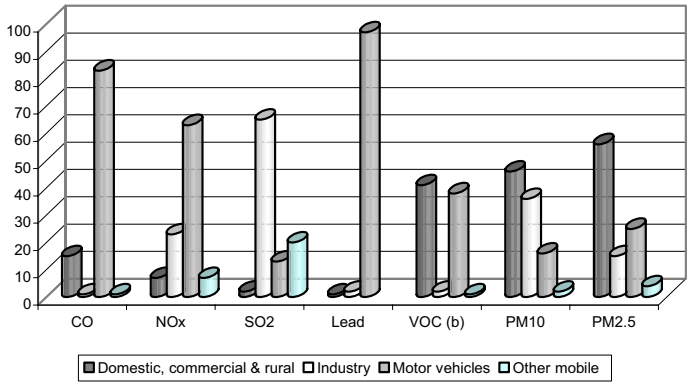
TABLE 2G
ESTIMATED ANNUAL EMISSIONS OF INDICATOR POLLUTANTS, PORT PHILLIP REGION, 1995-96
(tonnes per annum)

Pollutant	*Estimated emissions*
Carbon monoxide	680 000
Nitrogen oxides	86 000
Sulfur dioxide	17 000
Lead and compounds	190
Volatile organic compounds	170 000
Particles less than 10 microns in diameter	86 000
Particles less than 2.5 microns diameter	37 000

Source: Environment Protection Authority, *Air Emissions Inventory for the Port Phillip Region,* 1998.

2.52 Chart 2H shows the proportion of emissions for each indicator pollutant from man-made sources for the Port Phillip region (which includes Greater Melbourne and Geelong) for the 1995-96 financial year (the latest year for which these data are available). It shows that motor vehicles were the largest contributor of lead, oxides of nitrogen and carbon monoxide to the Port Phillip region, with industry the largest contributor of sulfur dioxide. Domestic, commercial and rural sources combined are the major contributors to particle emissions.

CHART 2H
CONTRIBUTION TO EMISSIONS PER MAN-MADE SOURCE, PORT PHILLIP REGION, 1995-96*(a)*
(percentage per indicator pollutant)



(a) Because the indicator pollutant nitrogen dioxide is partly emitted directly and partly formed in the atmosphere from oxides of nitrogen, the latter is shown in this chart.

(b) Emissions of volatile organic compounds are an important precursor to ozone formation.

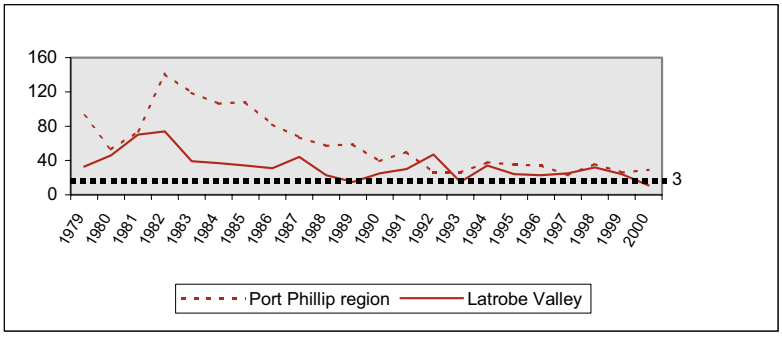
Source: Environment Protection Authority, *Air Emissions Inventory for the Port Phillip Region,* 1998.

Current air quality

2.53 Assessment of air quality against the State Environment Protection Policy objectives for the common pollutants confirms the indication from the international comparisons that Melbourne has relatively good air quality. In 2000, air quality in the Port Phillip and Latrobe Valley regions met the objectives for all common pollutants except particles less than 10 micons in size, which exceeded the objective on 2 days in the Port Phillip region (it was not measured in Latrobe Valley). This was within the target set by the Authority of a maximum of 5 days per annum. The Authority's longer-term goal is to have no exceedences of this objective.

2.54 In addition to the common pollutants, Victoria also monitors for the levels of visibility reducing particles against an objective set by the Environment Protection Authority as a result of concerns about visibility. In 2000, the level of visibility reducing particles exceeded the objective on 26 days in the Port Phillip region and 11 days in the Latrobe Valley region. The target set by the Authority is a maximum of 3 days per annum. However, as illustrated in Chart 2I, the number of days with poor visibility has decreased substantially since 1979, particularly for the Port Phillip region.

CHART 2I
TRENDS IN EXCEEDENCES OF THE VISIBILITY OBJECTIVE, PORT PHILLIP AND LATROBE VALLEY REGIONS
(days)

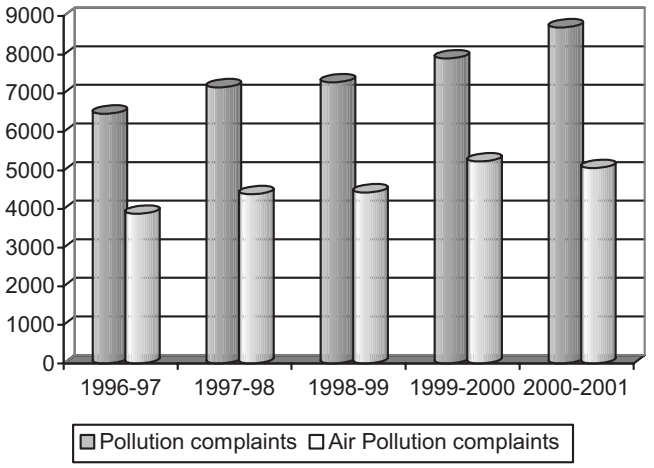


Note: The current standard under the SEPP (Ambient Air Quality) is exceedences of the visibility objective for a maximum of 3 days per year.
Source: Environment Protection Authority.

2.55 Despite the comparatively good air quality in Victoria and the general improvements achieved over the past 30 years, recent health and hospital admissions studies undertaken by the Environment Protection Authority show that there are around 300 deaths and 1 000 hospital admissions per annum associated with Melbourne's air quality.

2.56 In addition, the Authority continues to receive complaints about the quality of air, as illustrated in Chart 2J. The Authority also receives complaints about smoky vehicles, which in 2000-01 totalled 13 465.

CHART 2J
POLLUTION COMPLAINTS



Source: Environment Protection Authority, Annual Reports.

A poor visibility day in Melbourne.
(Photograph courtesy of Environmental Protection Authority.)

LEGISLATIVE RESPONSIBILITY FOR VICTORIA' S AIR QUALITY

2.57 The Environment Protection Authority, established under the *Environment Protection Act* 1970, is the principal agency responsible for the protection of Victoria's air environment. The Authority operates within a national framework for dealing with environment and conservation issues, as agreed by the Commonwealth, State and Territory Governments and the Australian Local Government Association in 1992 under the *Inter-Governmental Agreement on the Environment.*

2.58 The Agreement was made to ensure that:

- people enjoy the benefit of equivalent protection from air, water or soil pollution and from noise, wherever they live in Australia; and
- decisions of the business community are not distorted, and markets are not fragmented, by variations between participating jurisdictions in relation to the adoption or implementation of major environment protection measures.

National Environment Protection Measures

2.59 The *Inter-Governmental Agreement on the Environment* required that the Commonwealth, the States and Territories make joint legislative provision for the establishment of a body to determine National Environment Protection Measures. Accordingly, Victoria introduced the *National Environment Protection Council (Victoria) Act* 1995, which obliges the State Government to implement National Environment Protection Measures.

2.60 The Commonwealth Government established the National Environment Protection Council (NEPC) comprising 9 Ministers of the Commonwealth, State and Territory governments with the primary task of making National Environment Protection Measures on specific environmental matters identified in the *National Environment Protection Council Act* 1994. National Environment Protection Measures, once agreed by the Council, become law and their implementation is mandatory for all participating jurisdictions.

2.61 In June 1998, following a 2-year process involving extensive research, public consultation and input from the Commonwealth, State and Territory governments the *National Environment Protection Measure for Ambient Air Quality* (the *Air NEPM*) was released. It established the Australian ambient air quality standards based on specific levels of indicator pollutants considered necessary to protect human health and wellbeing. It also established 10-year goals for the extent to which air quality should meet these objectives by 2008.

2.62 The Air NEPM requires each jurisdiction to develop a monitoring plan for measuring air quality against the standards and to report annually to the National Environment Protection Council on its compliance with the Air NEPM.

State Environment Protection Policies

2.63 The Victorian *Environment Protection Act* 1970 provides for the development of State Environment Protection Policies to address specific aspects of the environment. For the Victorian air environment, 2 State Environment Protection Policies[16] have been developed and are commonly referred to as the SEPP (Ambient Air Quality) and the SEPP (Air Quality Management).

2.64 The aims of these policies are to:

- ensure that the environmental quality objectives of the SEPP (Ambient Air Quality) are met;
- drive continuous improvement in air quality and achieve the cleanest air possible having regard to the social and economic development of Victoria; and
- support Victorian and national measures to address the enhanced greenhouse effect and depletion of the ozone layer.

2.65 The SEPP (Ambient Air Quality) adopts the air quality standards of the Air NEPM as air quality objectives for Victoria. It also includes an additional objective relating to visibility, which has been retained frohm the previous SEPP as visibility levels are still considered be of importance to the Victorian air environment.

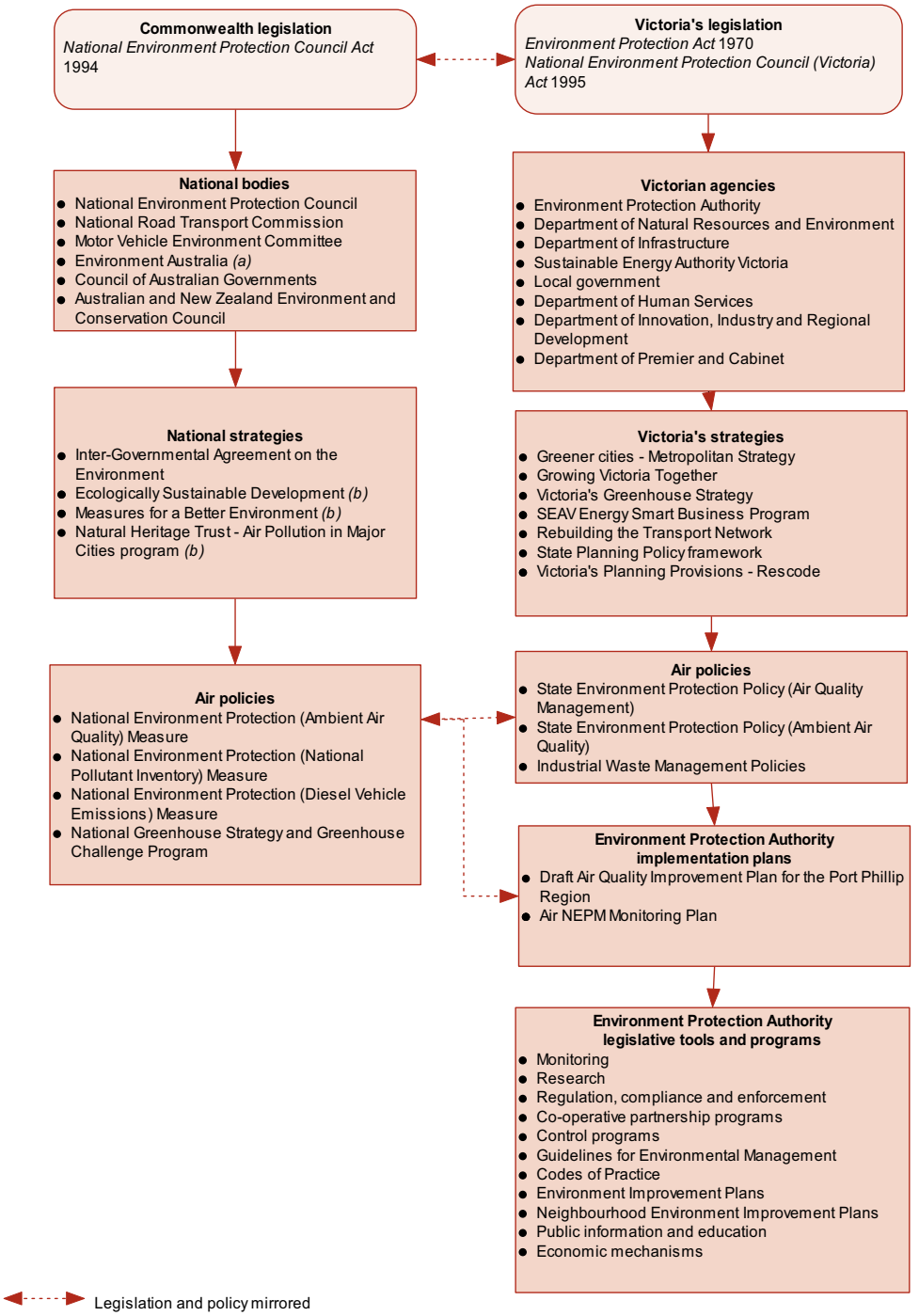
2.66 The SEPP (Air Quality Management) sets the management framework, i.e. the aims, intent and principles of the policy, and provides an attainment program for the protection of ambient air quality and the management of particular sources and regional and local air quality impacts. The initiatives and approaches outlined in the SEPP (Air Quality Management) are meant to reflect the aspirations of all Victorians for the air environment.

2.67 The 2 SEPPs replaced the SEPP (The Air Environment) 1981 in 1999 and 2001 respectively. The SEPP (The Air Environment) put in place air quality standards and an air quality management framework. Victoria was the first State to have such arrangements in place.

2.68 Chart 2K shows the relationships between Australia's and Victoria's legislative and policy frameworks for air quality management.

[16] *State Environment Protection Policy (Ambient Air Quality)* and the *State Environment Protection Policy (Air Quality Management)*.

CHART 2K
LEGISLATIVE AND POLICY FRAMEWORKS FOR AIR QUALITY MANAGEMENT



(a) Commonwealth Government agency.
(b) Commonwealth Government strategies.

Source: Victorian Auditor-General's Office.

Part 3

Conduct of the audit

AUDIT OBJECTIVE

3.1 The objective of the audit was to determine whether the Environment Protection Authority's activities in monitoring and managing air quality in the short-term, and reducing air pollution in the longer-term, are undertaken in an efficient and effective manner. Specifically, the audit examined the Authority's activities in relation to:

- its strategic approach and planning for air quality control;
- monitoring air pollution;
- controlling motor vehicle emissions;
- licensing of industry to control air pollution generated, including the utilisation of the regulatory framework;
- other mechanisms such as public information and education; and
- reporting and accountability.

AUDIT SCOPE

3.2 The Environment Protection Authority was the major focus of our examination. The issue of greenhouse gas emissions was not covered by this audit. The audit did not seek to assess the adequacy of the Authority's technical solutions to air quality monitoring.

3.3 The audit included:

- research and review of the Australian and international literature relating to air quality to provide contextual information for the report;
- implementation of a work program focusing on the Authority's activities in the areas identified;
- interviews with licensed operators; and
- interviews with administrative staff at the Authority as well as with staff from other State and local government agencies, and national and private sector bodies, active in related areas.

PERIOD COVERED BY THE AUDIT

3.4 Examinations of the Authority's air quality activities, related files and publications covered the period from 1 July 2000 to 30 April 2002. For the purposes of establishing trends, data was supplied by the Authority for a 5 year period, from 1996-97 to 2000-01.

COMPLIANCE WITH AUDITING STANDARDS

3.5 The audit was performed in accordance with Australian Auditing Standards applicable to performance audits and, accordingly, included such tests and other procedures considered necessary in the circumstances.

ASSISTANCE TO THE AUDIT TEAM

3.6 Specialist assistance in preparing contextual information for this report was provided by:

- Ms Catherine Wilson, Director, Environment Link Pty Ltd – an expert environmental consultant; and
- Mr Jack Chiodo, CH Environmental – a specialist in environmental management.

3.7 In addition, advice was provided to the team by a Reference Group comprised of:

- Mr Francis Grey, Principal, Economists@Large & Associates – a consulting economist with particular expertise in environmental economics;
- Mr Ian Swann, General Manager, Plastics and Chemicals Industries Association;
- Mr John Stanley, Executive Director, Bus Association Victoria Incorporated;
- Mr Peter Bettess, Director, PRB Consulting Pty Ltd - an expert in planning matters;
- Associate Professor Michael Buxton, School and Social Science and Planning, Royal Melbourne Institute of Technology; and
- Mr Nigel Holmes, Director, Holmes Air Sciences – a consultant in environmental sciences and an expert in air quality monitoring.

3.8 Support and assistance was provided to my officers and the specialists by the management and staff of the Environment Protection Authority. I wish to express my appreciation to the Authority for this assistance.

Part 4

Planning and resourcing

INTRODUCTION

4.1 As with all government agencies, the Environment Protection Authority is required to follow sound management principles consistent with the Government's integrated management cycle as shown in Chart 4A below. The cycle provides a framework for linking planning, resource allocation, service delivery and accountability.

CHART 4A
INTEGRATED MANAGEMENT CYCLE

Source: Department of Treasury and Finance.

4.2 We examined the Authority's management of air quality under each key element of the framework, i.e.:

- planning – addressed in this Part of the report;
- resource allocation – addressed in this Part of the report;
- service delivery, i.e. the Authority's air quality management and monitoring activities – addressed in Parts 5 and 6; and
- accountability – addressed in Part 7.

PLANNING

4.3 The Authority has 2 major plans under which it implements the requirements of the national air quality framework and the State Environment Protection Policies for the air environment, namely:

- the Air NEPM Monitoring Plan[1], which sets the strategic direction for the State's fixed-site air quality monitoring for the medium-term, i.e. 3 to 5 years; and
- the Draft Air Quality Improvement Plan[2] for the Port Phillip region, which provides a long-term plan (out to 2020) for managing air quality in that region.

4.4 These plans were developed within an informed environment and after extensive consultation. However, the Authority has not yet developed air quality improvement plans for the remainder of the State. We were advised that development of a Plan for the Latrobe Valley region is the Authority's next priority. A timeline for its development has not yet been established.

4.5 The Authority is in the process of developing an internal plan to guide its staff in implementing the SEPP (Air Quality Management). The draft plan identifies a number of key actions, broad priorities and indicates:

- a timeline for completing some actions by the end of 2002; and
- an annual commencement plan for some other actions, from 2001-02 to 2003-04.

4.6 The Authority's draft internal plan for implementing the SEPP (Air Quality Management) identifies broad resourcing requirements but does not indicate the financial implications of the planned actions.

4.7 In terms of organisational plans, the Authority produces a 3-year Corporate Plan annually which provides a 3-year strategic direction, but only identifies resource allocations for a one year period.

4.8 Like all government agencies, the Authority is subject to an annual public sector budgeting process which drives the identification of priorities and allocation of resources. The inherent uncertainty regarding the provision of ongoing funding is in contrast to the extensive medium to long-term plans in place relating to the Authority's responsibilities under the national framework and State policies.

[1] *Ambient Air Quality NEPM Monitoring Plan Victoria*, Environment Protection Authority, Publication 763, November 2001.

[2] *Draft Air Quality Improvement Plan, Port Phillip Region*, Environment Protection Authority, Publication 707, 2000.

RESPONSE *provided by Deputy Chairman, Environment Protection Authority Victoria*

Air quality planning in the Environment Protection Authority is carried out in relation to time scales which range from the very long-term (20 years) through medium-term to relatively short-term (one to 3 years). Our very long-term planning is reflected in the Air Quality Improvement Plan, which provides strategic direction and describes options for the next 20 years.

The core strategic documents are the State Environment Protection Policies, which provide the framework for air management for a 10-year period. They are based on extensive scientific knowledge of air quality trends and factors impacting on air quality and take into account goals set out in relevant National Environment Protection Measures. Policies are developed with extensive consultation, setting statutory goals and directions and highlighting key priorities for the State. It is important to note that the policies are supported by a Policy Impact Assessment. The Policy Impact Assessment is specifically intended to consider the social, economic and environmental impacts of the Policy, and the Authority has adopted this "triple bottom line" analysis since the early 1990s.

The report suggests some lack of integration of these longer-term planning processes with the short time horizon of the annual public sector budgeting process. However, what seems to be overlooked is that the Authority's Corporate Plan is a strategic rolling document that annually updates plans and outlines activities and priorities for the next 3 years, with a particular focus on the budget for the following financial year. It is the mechanism that translates the priorities and goals identified through the longer-term planning processes into the context of specific fundable programs and projects.

Thus, the Authority has several "nested" horizons for planning. The SEPP provides the strategic and statutory anchor with a 10-year horizon, it is supported by longer-term planning out to 20 years, and implemented via more focused budget planning at a 3 and one-year timeframe.

RESOURCE ALLOCATION

4.9 Parliament appropriates an amount of funds to the Authority for each of the areas of the environment under its control. For 2001-02 the total appropriation was around $54 million. Table 4B provides a summary of the Authority's budget appropriations for the past 3 years as well as the allocations to the Authority's key result areas for the period.

TABLE 4B
ENVIRONMENT PROTECTION AUTHORITY,
BUDGET BY OUTPUT GROUP
($million)

Output group	*1999–2000 (a)*	*2000-01*	*2001-02*
Enhanced air quality *(b)*	7.6	8.4	10.5
Enhanced water quality	8.5	*(c)* 14.8	15.5
Protecting groundwater and the land environment	2.5	2.7	2.6
Control of noise	1.2	1.6	1.6
Reduction and management of wastes *(d)*	17.7	20.5	23.1
Improved organisational practices	3.7	-	-
Neighbourhood environment improvement	n.a.	n.a.	1.0
Total budget	**41.2**	**48.0**	**54.3**

(a) As the output groups for the Authority were not consistent in 1999-2000, the figures for that year are taken from the Authority's Corporate Plan.

(b) These figures do not include externally-funded research projects or commercial activities, which generated revenue of $312 500 in 2000-01 and $476 475 in 2001-02 to date.

(c) The 2000-01 budget received new initiative funding of $5 million for the "Stormwater Action Program" ($7.5 million in 2001-02). The funds shown for the Enhanced Water Quality key result area do not include the extension of the environmental audit system.

(d) Reduction and management of wastes in each year includes $12 million landfill levy; $4 million prescribed industrial waste levy; and $3.4 million from temporary landfill levy increase. Of the estimated $12 million collected through the landfill levy system, some $9.6 million will be paid to EcoRecycle Victoria and regional waste management groups to implement waste management programs within an agreed policy framework.

Source: 1999-2000 figures from Environment Protection Authority's Corporate Plan; *Budget Estimates Paper No. 3*, Department of Treasury and Finance 2000-01 and 2001-02.

4.10 Table 4B shows that the Authority's total budget has increased by $13 million (or an average of 15 per cent per annum) over the period, and that the air quality portion of the budget has increased by around $2.9 million.[3] For 2001-02, approximately 19 per cent of the Authority's total budget was allocated to air quality. This is less than the Authority budgets for protecting Victoria's water (29 per cent) and land (47 per cent) environments. To some extent the relative proportions are a reflection of the funding sources available to the Authority.[4]

Allocating resources between business units

4.11 Allocations of the air quality budget are made to the business units responsible for specific activities. Table 4C shows the allocations made for 2001-02.

[3] This figure is indicative only because the change in output groups over the period makes direct comparison difficult.

[4] Under the Environment Protection (Landfill Levy) Regulations 1992, a landfill levy is collected from landfill operators based on the amount of waste disposed to landfill, the *Environment Protection Act* 1970 prescribes specific uses for landfill levy funds. Activities which address air quality related matters such as emissions of toxic or greenhouse gases from landfill operations may be funded from the levy.

TABLE 4C
AIR QUALITY RESOURCES BY BUSINESS UNIT, 2001-02
($'000)

Unit	*Air quality-related function*	*Budget (a)*
Atmospheric and Energy Policy	To develop policies, strategies and programs that inform and support Victorians' aspirations for a safe and ecologically sustainable atmospheric environment.	712
Centre for Air Quality Studies	To understand the sources of pollutants, predict the behaviour of pollutants in the airsheds, and interpret and communicate air quality information.	1 067
Environmental Chemistry	To provide specialised advice and training to the Authority and its stakeholders, so that good science is used to guide and influence environmental programs, policies and projects. To provide information on the presence, fate and behaviour of chemicals in the environment. To undertake targeted monitoring and research programs to improve the state of knowledge on the fate and behaviour of chemicals in the environment.	871
Scientific and Administrative Support	To enhance the outputs of the Environmental Science Units through the provision of scientific and administrative support and to deliver services related to these functions.	*(b)* 340
Operations	To operate 7 regional offices to assess industry development proposals, investigate pollution incidents, support emergency response, undertake enforcement and prosecution activities and advise on a range of technical matters for environmental protection.	5 510
Administrative overheads	To provide human resources and communications, finance, library, motor vehicle fleet, legal services, information technology services, rent and power.	2 000
Total		**10 500**

(a) Budget split is notional only. The Authority does not divide its functions along environmental areas. Apart from the Centre for Air Quality Studies, each of the Units identified above is involved in activities relating to all parts of the environment.

(b) Salaries only. Operating costs are included in "Operations Unit" budget.

Source: Environment Protection Authority.

4.12 We were advised that around $3.02 million (or 29 per cent) of the $10.5 million budget relates to air quality monitoring and research.[5]

[5] The Authority's chart of accounts does not distinguish between air, land, water etc. therefore the air quality budget is an estimate only. The accounts also do not distinguish between air quality monitoring and research activities.

4.13 Allocations within output groups are made based on deliberations during the Authority's annual budget and business planning processes. This results in trade-offs being made between monitoring and managing the environment, between environmental management approaches and between operating expenditure and maintenance of its corporate infrastructure. The process involves assessing needs of the business units against corporate and government priorities, legislative requirements, current activities, identified information gaps and emerging priorities. This process is informed by monitoring data, emissions inventories, modelling, research, information gathering and the experience and knowledge of the Authority's staff.

4.14 The Authority has clearly articulated its long-term objectives and strategies in the Draft Air Quality Improvement Plan and its medium-term objectives in its Corporate Plan. The achievement of these medium-term objectives will require priorities to be set based on assessment of relative effectiveness and resourcing implications of its activities. This is not well addressed beyond the annual budget process.

Determining the monitoring mix

4.15 While the minimum level of fixed-site (ambient air) monitoring is set by national agreement, the amount of additional fixed-site monitoring and special purpose monitoring in local areas required under the State policy and planning framework is dependent on the Authority's resources. The Authority's plans for both the fixed-site monitoring to meet the national agreement and its additional fixed-site monitoring are identified in the Air NEPM Monitoring Plan.

4.16 We found that special purpose monitoring in local areas, i.e. short-term, mobile monitoring of "hot spots" in response to complaints, emergencies, and enforcement activities or for other purposes, is planned on a short-term basis by an internal steering committee. The additional fixed-site monitoring needs are determined by the Authority's Centre for Air Quality Studies. We were unable to determine how the Authority determines the appropriate resource mix between additional fixed-site monitoring and special purpose monitoring in local areas.

4.17 Air quality monitoring is an expensive activity. Figures provided by the Authority indicate that in 2000-01 and 2001-02, air quality monitoring and research consumed $2.9 million (or 34.5 per cent) and $3.02 million (or 29 per cent) of the air quality budget, respectively. For this reason we believe it is important for the Authority to develop a longer-term strategy for establishing the appropriate resourcing mix between fixed-site and local area special purpose air quality monitoring. This will be particularly important with the introduction of Neighbourhood Environment Improvement Plans, which have the potential to increase the need for monitoring in local areas. Development of additional measures under the national framework is also likely to increase the need for monitoring.

Sustaining the air quality monitoring network

4.18 The Authority advised that the new monitoring requirements of the Air NEPM have placed it under significant budgetary pressure. According to the Authority the capital cost of modifications required to its fixed-site monitoring network was approximately $500 000, to cover new particles monitoring, campaign ozone monitoring, a new monitoring station and upgrade of another station. The ongoing average operating costs are estimated to be around $50 000 per year.

4.19 With proposed increased monitoring requirements, the Authority believes it will become more difficult for it to fulfil its legislative responsibilities for air quality monitoring, including replacement or maintenance of its ageing equipment, within existing budget levels. The Authority advised that it plans to review and rationalise the fixed-site monitoring network. In the absence of additional funds, the Authority's Air NEPM obligations will take priority over the special purpose monitoring undertaken to meet its additional information needs. This is likely to reduce the Authority's capacity to undertake local "hot spot" monitoring in response to community concern or one-off incidents.

4.20 Table 4D provides details of the amounts allocated to air quality over the past 3 years, for capital equipment.

TABLE 4D
AIR QUALITY CAPITAL BUDGET *(a)*
($'000)

	1999-2000	*2000-01*	*2001-02*
Capital budget (excluding GST)	*(b)* 484	365	480

(a) The figures are estimated.
(b) $250 000 of this amount relates to the purchase of the mobile monitoring laboratory.
Source: Environment Protection Authority.

4.21 The Authority does not currently have a medium to longer-term plan that provides for the progressive replacement of equipment and to address issues relating to its fixed-site network. While the Authority's budget and business planning process is rigorous, we consider that its annual budgetary focus could result in short-term prioritisation of resource allocation, at the expense of medium to longer-term requirements such as the sustainability of the Authority's air monitoring equipment network. We were advised that to date, monitoring equipment has been replaced on a priority basis.

4.22 The Authority advised that it is planning to develop an equipment strategy to identify and address issues relating to its fixed-site monitoring equipment. Such a strategy is essential to ensure that the monitoring network is managed efficiently and effectively.

Interstate comparison

4.23 State environmental agency budgets and expenditures are traditionally reported on functional lines, i.e. environmental science, operations etc. rather than on an environmental media basis (land, air and water). It is therefore difficult to obtain comparative funding data for air quality from the interstate environment protection agencies, with the exception of the New South Wales Environment Protection Authority.

4.24 Table 4E compares indicative funding for New South Wales Environment Protection Authority's program with that of the Victorian Environment Protection Authority. On face value, the New South Wales budget is significantly higher than that of its Victorian counterpart, and funding per capita in New South Wales is around 13 per cent per head of population higher than in Victoria.

TABLE 4E
COMPARISON OF AIR QUALITY PROGRAM FUNDING, VICTORIA AND NEW SOUTH WALES
($'000 and $ per capita)

State	*1999-2000*	*2000-01*	*2001-02*
Total funding *(a)* -			
Victoria	6 850	7 630	10 100
New South Wales *(b)*	13 990	14 380	15 467
Funding per capita *(c)* -			
Victoria	1.45	1.60	2.12
New South Wales	2.18	2.22	2.39

(a) Figures for both States exclude education and communication relating to air quality.

(b) Includes both air quality and noise related activities. However, we were advised that expenditure on noise programs is comparatively small.

(c) In the absence of more recent population statistics, the 2001-02 calculations are based on population figures for 2000.

Sources: New South Wales Environment Protection Authority *Annual Report 2001*; Department of Treasury and Finance, Victoria, *Budget Paper No. 3*, 1999-2000, 2000-01 and 2001-02.

Additional funding

Research activities

4.25 In addition to its funding appropriation through the public sector budget process, the Authority receives funds from other agencies or external sources to undertake research, such as for health studies and air quality model development. Table 4F provides details of externally funded research projects undertaken in 2001-02.

TABLE 4F
EXTERNALLY FUNDED AIR QUALITY, RESEARCH PROJECTS, 2001-02
($'000)

Project	*In-house projects*	*External or outsourced projects*
In-Service Emission Factor Study	145	-
Compositional study of particles *(a)*	172	-
National Mortality and Morbidity study *(b)*	-	27.5
Total	**317**	**27.5**

(a) First year of funding for a 2-year study.

(b) The Authority's annual share of a 3-year research project undertaken with 3 other research partners.

Source: Environment Protection Authority.

4.26 For 2000-01 externally funded research projects were valued at $27 500. These funds are not included in Table 4B which only presents funds appropriated through the Parliament.

Commercial activities

4.27 The Centre for Air Quality Studies, a business unit of the Authority, raises private income through commercial projects. This provides funds to supplement the Authority's salary and operating budget. As well as being a source of additional income, commercial projects are undertaken by the Authority to assist in the retention and development of staff skills, for example, to maintain inventory and modelling skills that are otherwise called on sporadically or periodically. At present, 2 full-time positions in the Centre are effectively funded from this revenue source.

4.28 Table 4G shows the projects undertaken by the Centre for Air Quality Studies in 2000-01 and the revenue generated from those projects.

TABLE 4G
CENTRE FOR AIR QUALITY SERVICES, COMMERCIAL PROJECTS AND REVENUES, 2000-01 *(a)*
($'000)

Project	*Client*	*2000-01*
National Greenhouse Gas Inventory 1999 Transport Inventory.	Australian Greenhouse Office	16
Auckland Air Emissions Inventory	Auckland Regional Council	28
Queensland and Victoria Greenhouse Transport Inventory	Australian Greenhouse Office	5
South East Queensland Biogenics and Biomass Burning Inventory	Brisbane City Council	3
National Greenhouse Gas Inventory Participation in International Review	Australian Greenhouse Office	2
National Pollutant Inventory Manuals	Environment Australia	36
Australian Air Quality Forecasting System *(b)*	Environment Australia	145
Sales of Ausplume, Meteorological Files, Monitoring Data	Various	50
Hong Kong Air Quality Modelling	Environment Protection Department Hong Kong	*(c)*
Total		**285**

(a) Includes projects commenced in 1999-2000 or earlier but completed in 2000-01; projects commenced in 2000-01, partially billed but due for completion and final billing in 2001-02; and projects billed in 1999-2000.

(b) The research project conducted jointly between CSIRO/Bureau of Meteorology and the Environment Protection Authority Victoria.

(c) Billed in 1999-2000, but completed in 2000-01.

Source: Environment Protection Authority.

4.29 For 2001-02 to date commercial projects to the value of $131 975 are underway. The income from commercial projects is highly variable as payments depend on contract conditions. Funds received for commercial activities are not included in Table 4B as that table relates only to funds appropriated by the Parliament.

Conclusion

4.30 The Environment Protection Authority has extensive processes for developing plans required under national agreements and the State policy framework for air quality. Plans addressing the management of air quality for areas other than the Port Phillip region need to be developed at an early stage.

4.31 We are not in a position to determine the appropriateness of the Authority's internal budget allocations, nor do we have any evidence to suggest that they are inappropriate. However, in the absence of an explicit assessment of relative effectiveness and resourcing implications of its activities to inform the Authority's budget decision-making and priority setting, we cannot substantiate the Authority's claims regarding the shortage of funds to meet its air quality monitoring and management requirements.

4.32 Victoria appears to have a lower allocation of funding for air quality than its New South Wales counterpart. The achievements of the Victorian Environment Protection Authority, as discussed throughout this report, need to be seen in this context. Many of the regulatory innovations and strategic approaches of the Authority have been borne of a need to efficiently apply limited resources.

4.33 While Victoria's air quality performance has been relatively good and the Authority has received increasing budget allocations in recent years, community expectations continue to rise and the sources of pollution to be managed are more diffuse and difficult to address. Given this, and the high cost and increasing commitments for air quality monitoring, the Authority will face increasing budgetary pressure. If funding for air quality in this State does not increase to meet this pressure, the Authority will need to increasingly focus on ways of leveraging others (other government agencies, industry and the community in general) to contribute to improved air quality outcomes.

Recommendations

4.34 We recommend that the Authority establish a timeframe for development of an Air Quality Improvement Plan for the Latrobe Valley region, and for subsequent plans for the remainder of the State.

4.35 An explicit assessment of relative effectiveness and resourcing implications of the Authority's activities should be undertaken to inform its budget and business planning processes, and to enable clear priority setting across the agency and within business units, and between air quality management and monitoring activities. This will provide a basis for future resourcing submissions to be made through the annual public sector budget process.

4.36 The Authority should develop a longer-term plan for determining the appropriate resourcing mix between fixed-site and local area air quality monitoring.

4.37 We recommend the development of a long-term plan for the acquisition and progressive replacement of equipment, to ensure the sustainability of the monitoring network and to enable the Authority's legislative responsibilities to be met.

***RESPONSE** provided by Deputy Chairman, Environment Protection Authority Victoria*

The language of the audit appears to question the level of resourcing devoted to monitoring by the Environment Protection Authority. While the Authority does not share this view it accepts that it needs to articulate more clearly the application and purpose of its monitoring system. Underlying the prominence given to monitoring by the Authority is its commitment to the right of the community to know the state of the air in Victoria. Monitoring provides this knowledge.

In addition to the formal requirements of the National Environment Protection Measure, the Authority has retained additional fixed monitoring stations for several reasons:

- *Victoria has long measured an "airborne particle index" as a highly relevant indicator of visibility. It is one of the longest data sets available in Australia as an indicator of particles in the air;*
- *The Authority has chosen to retain some stations beyond the formal national requirements of the NEPM monitoring plan so that it can maintain a capacity to conduct analyses of the health effects of air pollution. This is important information in policy development and for reporting the impact of poor air quality to the public; and*
- *Local communities often hold their regional monitoring stations in high value. This is obvious by the support for the Authority's Community Access to Air Monitoring Program, and by the concerns expressed when stations are to be moved or modified.*

The resourcing of air monitoring capacity has been a focus of the audit (para. 4.17). The Authority accepts that this area should be more explicitly planned and articulated. The Authority works within the depreciation and asset replacement regime established in government budgeting processes. Asset replacement is funded by the annual depreciation "charges" made on the Authority's budget for existing equipment.

To date, the Authority has maximised the operating life of its air monitoring equipment through attention to repair and servicing. Replacement has been undertaken on a priority basis within budget capacity. The Authority recognises a more planned approach is needed so as not to extend equipment beyond its useful and economic life. It should be recognised that, despite the audit report's criticism of process, the <u>outcome</u> of the Authority's approach is that Victoria has the most comprehensive and continuous set of air monitoring data available in Australia.

The report makes mention of the need to evaluate the "mix" of fixed-site and mobile monitoring. It is important to recognise that these monitoring tools serve very different purposes, and need to be deployed on very different time frames. Therefore, there is no "mix" in a technical sense, nor in the nature of the information provided. The only connection is the fact that both need resources.

In general terms the level of resourcing of the Authority can be judged by reference to Table 4E, which compares the program funding in New South Wales and Victoria. The table omits comparison of education and communication programs in the 2 States, because of difficulties in making entirely comparable comparisons. However, on face value, the budget allocated to these programs in New South Wales is significantly higher than in Victoria.

In the context of the significant behavioural change that will be needed to take the next steps in air quality improvement, funding for education and communication is most important.

Para. 4.34

The current priority for air quality planning is the completion of the Air Quality Improvement Plan – Melbourne region – targets have been set but uncertainties relating government approval processes and effective integration with the key government strategies (e.g. Metropolitan Strategy) mean that the timetable for Latrobe Valley is yet to be set. The Authority will establish a time frame as part of normal project planning and budget processes.

RESPONSE *provided by Deputy Chairman, Environment Protection Authority Victoria - continued*

Para. 4.35

The Environment Protection Authority Victoria is a statutory body and is limited by the powers and duties conferred by its statute. After providing resources to ensure that its core statutory duties are performed the Authority is left with limited "discretionary" funds. In determining the priorities for use of these funds the Authority evaluates strategic needs through its corporate planning processes and ensures that its available resources are effectively deployed to deal with the air quality problems of most concern. However, the Authority accepts that these internal planning priority processes could be made more explicit.

Para. 4.36

The Authority agrees with the recommendations - recognising that the aspect of "mix" only applies to budget distribution and not technical objectives. This is a matter of planning and allocating budget accordingly for both fixed and local area monitoring needs.

Para. 4.37

The Authority agrees with the recommendation, however, equipment replacement and review of monitoring will need to be undertaken within the context of overall budget allocation and distribution within the Environment Protection Authority.

Part 5

Managing Victoria's air quality

AUDIT EXPECTATIONS

5.1 To effectively undertake its role in managing Victoria's air quality we would expect the Environment Protection Authority to use its available resources to:

- ensure consideration of air quality in government decision-making processes; and
- encourage action by industry, motor vehicle users and the community in general towards achievement of desired air quality outcomes.

ENSURING CONSIDERATION OF AIR QUALITY IN GOVERNMENT DECISION-MAKING

5.2 The *Environment Protection Act* 1970 binds the Crown, meaning that government agencies may be prosecuted by the Authority for breaches of the legislation, i.e. for pollution offences. All agencies, therefore, have an obligation to comply with the regulatory requirements that contribute to the achievement of the *State Environment Protection Policy (Ambient Air Quality)* objectives. This, along with the Authority's commitment to guarding its independence, has placed it in some politically difficult positions over the past 3 decades.

5.3 Government operations such as road development projects, urban and regional planning, public transport and major infrastructure projects have the potential to significantly impact on the environment. Because of this, we believe it important that good relationships exist between the agencies involved. Given the Government's *Growing Victoria Together* strategy, which calls for a greater focus on the environment and sustainability across government, it is important that the Authority is consulted by Government and other agencies to ensure that environmental matters are adequately considered in decision-making and policy development.

5.4 Our examination revealed that generally positive relationships exist between the Authority and other government agencies. The agencies believe that establishment of the State Environment Protection Policies for ambient air quality and air quality management has helped in ensuring positive relationships are developed between the agencies. Most agencies report the Authority as accessible, providing valuable, informed assistance with resolution of environmental issues. However, the Authority is also regarded as being stretched for resources, with the natural consequence that timelines can be missed and sufficiently experienced staff may not always be available.

5.5 Table 5A provides examples of where the Authority has recently had input into the formulation of environmental policies, strategies and codes of practice of other government agencies.

TABLE 5A
EXAMPLES OF THE ENVIRONMENT PROTECTION AUTHORITY'S INVOLVEMENT WITH OTHER GOVERNMENT AGENCIES WITHIN VICTORIA

Government agency	*Environment Protection Authority's involvement*
Department of Natural Resources and Environment	Provided advice on smoke from prescribed burning, odour problems from broiler and pig farms, dust problems from extractive industries and mining, and Greenhouse gas emissions.
Department of Infrastructure	Member of Inter-Departmental Committee for the Melbourne Metropolitan Strategy and reference group/working party for the Transport Strategy.
	Provided assessment of Environment Effects Statements, e.g. for the Scoresby Freeway.
	Involved in State Planning Policy development.
Department of Innovation, Industry and Regional Development	Provided briefing on the impact of the SEPP (Air Quality Management) on industry.
	Acted as mediator between, and provided expert advice to, the Department and industry.
Department of Premier and Cabinet	Provided Policy Impact Assessment for sustainability issues.
	Consulted on environmental issues before Cabinet.
Department of Human Services	Refers Works Approvals to the Department for comment.
	Worked together on the technical working group on Works Approvals relating to the redevelopment of the chemical storage facility on Coode Island.
Sustainable Energy Authority Victoria	Assisting development of a renewable energy strategy and publication on wood heaters.
	Consulted SEAV on the Greenhouse provisions in the Air SEPP (Ambient Air Quality).
	Helping to develop a Greenhouse Toolkit for industry and the Greenhouse Scorecard.
VicRoads	Working with VicRoads on modelling projects.
	Consulted on proposed road projects.
	Invited to participate in consultative committees.
	Accesses motor vehicle registration data for the Smoky Vehicle Program.
Victorian WorkCover Authority	Mutual involvement and support of programs.
Local government	Developed model local laws for banning of backyard burning (early 1980s).
	Represented on the liaison group for the Dandenong Offensive Industrial Zone.
	Sought local government involvement in development of the Neighbourhood Environment Improvement Plans.
	Input into planning scheme amendments and planning permits.

Source: Victorian Auditor-General's Office.

5.6 Although the Authority's knowledge and experience in developing environmental policies is valued by other government agencies, we observed that for some interactions of the type outlined above, the Authority needs to be invited to participate or provide advice. The Authority advised that in the past it has had difficulty being included in, or becoming aware of, Victorian public sector developments, more so than with private sector developments. On the other hand, one agency indicated that at times they had not been approached by the Authority for input where they believed they could have made a valuable contribution.

5.7 While the Authority can act as a facilitator, influencing policy development outcomes in other agencies, under the State Environment Protection Policies and processes such as Environment Effects Statements, the Authority has clear legislative responsibilities. It is important that the Authority is proactive in ensuring its input and advice is an essential consideration in the decision-making process of government.

5.8 Memoranda of Understanding are in place, or are being negotiated to clarify roles and responsibilities with some agencies (e.g. VicRoads, Victorian WorkCover Authority and the Department of Human Services). We reviewed the Memorandum between the Authority and VicRoads. In line with forming a defined relationship through clear mutual commitments:

- protocols have been set to establish how often Executive and Senior Management from each organisation will meet;
- the organisations agree to consult each other in the development of standards and guidelines which may affect the other;
- a list of agreed priority issues have been set; and
- VicRoads has committed to notify the Authority promptly should an incident affecting the environment occur.

5.9 The Department of Human Services advised that the *Memorandum of Understanding*, currently under development, will be aimed at clarifying roles and responsibilities between the 2 agencies and enhancing working relationships.

5.10 The development of Memoranda of Understanding or protocols are a useful tool for encouraging government agencies to take into account the Authority's advice on environmental issues. We support this development.

Involvement with national bodies

5.11 The National Environment Protection Council informed us that the Authority has had a strong, continuing involvement at the national level in the development of the National Environment Protection Measures for ambient air quality. The Authority's participation has included:

- leading development of the *National Environment Protection (Ambient Air Quality) Measure* (the Air NEPM), the current process to introduce standards for fine particles (less than 2.5 microns) into this measure and the current processes to develop a new measure for harmful air pollutants;
- being involved on the National Environment Protection (National Pollutant Inventory) Measure project team; and
- producing the first Ambient Air Quality NEPM Monitoring Plan.

5.12 We found that the Authority is also actively involved with the National Environment Protection Council, the National Road Transport Commission and the National Motor Vehicle Environment Committee in the development of national design rules and standards for motor vehicles and fuel. For example, the Authority was a member of the project team that developed the *National Environment Protection (Diesel Vehicle Emissions) Measure*. We were informed that the Authority was also highly instrumental in the introduction of catalytic converters and unleaded fuel into Australia.

5.13 The Authority has entered into a Memorandum of Understanding with the Commonwealth Scientific and Industrial Research Organisation, which has a key role in atmospheric research and modelling within Australia. The 2 bodies, along with the Bureau of Meteorology, have worked together to develop the recently launched Australian Air Quality Forecasting System. The System is a sophisticated tool that uses meteorological and topographical data, the air emissions inventory and air quality chemistry data that can:

- examine air quality in a fairly small area (a couple of kilometres resolution);
- assist scenario predictions on air quality (e.g. work out what the air quality would be like if public transport use was to increase); and
- enable forecasting of air quality, similar to weather predictions.

5.14 Some funding for the development of the model was provided through the Commonwealth Government's Natural Heritage Trust.

Conclusion

5.15 The Authority is necessarily involved with other government agencies, both at the State and national levels, in matters that impact upon its key role of protecting the State's environment. It is important that the Authority continues to play a large role in the decision-making processes of other agencies and is consulted when decisions with the potential to impact on the environment are being made.

Recommendation

5.16 We recommend that the Authority should develop Memoranda of Understanding with its main governmental agency contacts to formally establish arrangements between the agencies and to encourage continued co-ordination between them in areas of mutual interest, including public and private transport, planning and urban environment-related matters.

RESPONSE *by Deputy Chairman, Environment Protection Authority Victoria*

The importance of environmental factors in government decision-making has been a feature of government policy for many years. On some occasions co-ordination has been less effective than desirable, but overall the Authority has good contacts with other agencies. While the audit focuses on air quality, it is important to recognise that governments have a broader set of considerations, and air quality may not be the primary driver in decision-making.

Para. 5.16

The Authority will continue to develop Memoranda of Understanding (as discussed in paras 5.8, 5.9 and 5.10), where appropriate, with other government departments/agencies as it has done in the past. Some examples of Memoranda of Understanding partners that have been established include VicRoads, CSIRO, Landata, Victorian WorkCover Authority, Melbourne Water, Bureau of Meteorology, UNEP, local government in regards to Neighbourhood Environment Improvement Plans and the Commonwealth Government re the National Pollutant Inventory.

ENCOURAGING IMPROVED AIR QUALITY OUTCOMES THROUGH REGULATORY AND OTHER TOOLS

5.17 Environment protection agencies across the world are increasingly using a broader mix of tools to encourage environmental improvement, including:

- regulatory instruments, e.g. standards, licences, permits, regulations, restrictions etc.;
- economic instruments, e.g. imposition of taxes, charges and fees, introduction of tradeable permits and removal of environmentally damaging subsidies, monetary incentives to change behaviours;
- voluntary approaches, e.g. negotiated agreements, unilateral agreements, voluntary public commitments;
- incentives for technological development and diffusion, e.g. support for research and development, investment attraction and facilitation;
- information dissemination, e.g. eco-labelling, data collection and dissemination, information provision, education and training; and
- arrangements across areas of government responsibility to improve co-ordination and shared goals, e.g. land-use planning, infrastructure development, public transport.

5.18 Since its establishment in 1971, the Authority has increasingly supplemented its licensing and inspection of industry and enforcement regime with a range of policy tools encompassing collaboration and partnering with industry and the community as a whole. We found that this approach is consistent with the international trend.

5.19 Table 5B gives an overview of key initiatives introduced by the Authority at the State level over the past 30 years, which impact on air quality. These initiatives are additional to the core arrangements in place prior to and/or introduced at the establishment of the Authority. For example, prior to 1971 the regulations under the *Clean Air Act* 1958 were in place to control specific emissions to air. Since then, amendments to the *Environment Protection Act* 1970 and its regulations have introduced the current array of policy and regulatory tools which form the basis of the Authority's approach to air quality management. The Authority has also been instrumental in the development of many national air quality and motor vehicle initiatives. Its activities in this regard are discussed elsewhere in this report.

5.20 The *Environment Protection Act* 1970 and the State Environment Protection Policies for Ambient Air Quality and Air Quality Management identify a number of tools and policy instruments available for use by the Authority. Table 5C provides a summary of the tools currently available to the Authority to achieve its desired air quality outcomes, and the context in which they are provided. Appendix B provides information regarding policy tools used in other jurisdictions, focusing on economic instruments and approaches to motor vehicles.

TABLE 5B
ENVIRONMENT PROTECTION AUTHORITY, MAJOR AIR QUALITY INITIATIVES OVER TIME

Initiative	*Date*	*Activity and results*
Urban Haze and Smog Study	Mid-1970s	Public concern over general air pollution. The Authority investigates the causes and properties of Melbourne's visibility and smog problems, especially motor vehicle lead and hydrocarbon emissions.
Study of lead compound emissions from motor vehicles	1972	Public concern over lead in air. Hydrocarbon emissions inventory established. Ambient lead levels increasing at an alarming rate.
Regulation controls for lead	1976	Regulations derived from conclusions of National Health and Medical Research Council.
Telephone complaints service	1977	24 hour service to identify community concerns established. Information used to help design programs to address pollution.
Vehicle emission station established at Altona	1978	Response to increased pollution from motor vehicles and introduction of motor vehicle emission controls in 1976. The station was closed in 1999 as the emissions of new vehicles are now tested by car manufacturers.
Ozone monitoring stations	Late 1970s	Stations located at Westmeadows and Point Cook in response to emerging understanding of Melbourne's natural airflow systems (e.g. the Spillane Eddy).
Unleaded petrol	1980	The Authority instrumental in the decision by Australian Transport Ministers to introduce unleaded petrol from 1985.
Melbourne and Latrobe Valley airshed studies	1980	Investigated impact of Newport and proposed Latrobe Valley power stations on air quality. Basis for the first comprehensive understanding of an airshed in Australia. Largest air monitoring network in Australia. Development of leading-edge air quality models. Increase in airshed modelling skills in Environment Protection Authority, Commonwealth Scientific and Industrial Research Organisation and State Electricity Commission. Ten year State Electricity Commission-funded study into planning for the Latrobe Valley.
Costs and benefits of environment protection	Oct. 1980	Study for incorporating economic aspects into the development of policies. Two day conference addressing the antagonism perceived between industry and the Authority.
Industry specific schedules introduced	1981	Focus on pollution prevention through design of site and plant plans for environmental outcomes and "clean industries" and avoidance of pollution to the "maximum extent achievable by technology". Building strong, constructive links with Australian industry groups, including codifying best practice.
Draft Industrial Waste Strategy	1984	Waste hierarchy: avoid, reduce, reuse, recycle, treat and dispose. Commitment to waste elimination, or at least minimisation.
Scheduled Premises	1986	Introduction of "site licence" (Scheduled Premises).
Pollution abatement notices	1986	Pollution abatement notices introduced to reduce or prevent pollution from unlicensed or non-scheduled premises.
Pilot Study into cleaner production options	1986	Small pilot to identify cleaner production or waste minimisation options. Cleaner Production and Waste Minimisation options found with payback within 2.5 years.
Environment Improvement Plans	1989	Act amended to include Environment Improvement Plans, accredited environmental auditors. Plans based on companies consulting with local communities, continuous environmental improvement and satisfying the community's "right-to-know".
Environmental audits	1989	Environmental audits. Major facilities audits. Cleaner Production Grants.
Australia Centre for Cleaner Production	1993	Centre established to undertake a range of consultancies to assist industry. To encourage and facilitate adoption of cleaner production practices and technologies by industry. Privatised mid-1990s.
Accredited Licences	1994	Accredited Licensee Scheme introduced. Encourage companies to adopt Environment Management Systems, environmental audits and Environment Improvement Plans. Reduction in the Environment Protection Authority's regulatory burden.
Policy Impact Assessments	Early 1990s	Formal statements of policy impacts. Policy, impact and costs must be outlined. Strategy for public input.

TABLE 5C
TOOLS FOR MANAGING AIR QUALITY OUTCOMES

		Source of pollutant			
		Industry		*Motor vehicles*	
Tools	*Details*	*Major (a)*	*Small-to-medium (b)*	*(c)*	*Other (d)*
REGULATORY					
Works approvals	The works approval process enables the Authority, industry and third-parties to prevent potential pollution problems and to finalise waste discharge, storage and handling requirements before construction, alterations or operations commence. Works approvals for new industrial sites are identified through referrals made by local government to the Authority under the *Planning and Environment Act* 1987, and through processes required under the *Environment Protection Act* 1970 and the Environment Protection (Scheduled Premises and Exemptions) Regulations 1996 for matters such as alterations of and developments in existing scheduled premises.	✔	n.a.	n.a.	n.a.
Licences	The *Environment Protection Act* 1970 and regulations require premises that emit certain types or volumes of waste to have a licence that specifies limits on the volume and types of waste that may be discharged to the environment, and other conditions designed to minimise the environmental effects of operations. Discharging pollution to the atmosphere without a licence in Victoria is an indictable offence with a maximum penalty of $240 000 and a further daily penalty of $120 000 for a continuing offence. Licence fees include a "load-based" component which is dependent on the type and quantity of pollutant being emitted. The highest fees are levied on premises that emit air pollutants that are extremely hazardous and may be carcinogenic, mutagenic, highly toxic or have highly persistent characteristics. The maximum licence fee that can be levied is $420 000. The Authority requires reductions in industry air emissions on a continuous improvement process but have practically limited this to company plans to change operations, re-equip or upgrade their plant and equipment (however, a licence can be amended at any time to require reduction in emissions if considered necessary to prevent or deal with air quality problems). Most small-to-medium sized enterprises are not required to be licensed or to obtain works approvals as the volume of their emissions is small. However, those that emit large enough volumes or prescribed types of chemical pollutants as per the Environment Protection (Scheduled Premises and Exemptions) Regulations 1996 are required to obtain a works approval. The Victorian Civil and Administrative Tribunal mediates and settles applicant and third party hearings for licensing and work approvals.	✔	n.a.	n.a.	n.a.

TABLE 5C
TOOLS FOR MANAGING AIR QUALITY OUTCOMES - *continued*

		Source of pollutant			
		Industry		*Motor vehicles (c)*	
Tools	*Details*	*Major (a)*	*Small-to-medium (b)*		*Other (d)*
REGULATORY - *continued*					
Accredited licences	Accredited licences were introduced in 1994 to reward companies with a record of good environmental performance and with sound systems. Under the *Environment Protection Act* 1970 an "accredited licensee" must have an environmental management system, an environmental audit program and an environment improvement plan in place. Accredited licences attract up to a 25 per cent reduction in licence fees in recognition that the environment management activities undertaken by the licensee reduce the Authority's involvement in compliance activities. Other benefits include: a streamlined licence that specifies emissions from a site rather than emissions from each emission point on the site; the ability to manage its own affairs without detailed regulatory prescription; and no requirement for works approval except where there will be substantial changes to a process, or a major change to a discharge or emission. Accredited licences are subject to review at a predetermined frequency not greater than 5 years. Continuation of accreditation is assessed on the basis of actual environmental performance, judged against factors such as licence compliance, implementation of environment improvement plans, and level of legal action (e.g. prosecutions).	✔	n.a.	n.a.	n.a.
Inspections	Industry inspections are conducted to ensure compliance with licence conditions and other regulatory tools such as pollution abatement notices. They are also undertaken at the pre-licensing stage to ensure that works approval requirements have been complied with prior to a licence being issued. For motor vehicles, the Environment Protection (Vehicle Emission) Regulations 1992 sets emission standards for motor vehicles and penalties for owners of smoky vehicles and for tampering with emission control equipment. Roadside inspections of motor vehicles are conducted in conjunction with Victoria Police and VicRoads, by prior arrangement. The Authority also inspects car yard vehicles for signs of tampering with pollution control equipment and conducts pre-publicised "smoky vehicle" blitzes. These activities can result in the immediate issue of penalty infringement notices and vehicle registration suspensions.	✔	✔	✔	✔
Pollution abatement notices	A Pollution Abatement Notice may be issued to major industry, small-to-medium enterprises and government agencies, including all departments, local councils, Melbourne Water, catchment management authorities, non-metropolitan urban water authorities, gas and water retailers, hospitals and VicRoads to improve practices and reduce emissions to the SEPP requirements, e.g. a notice issued to a small-to-medium sized enterprise could require the occupier of a premises to develop and implement an Environment Improvement Plan.	✔	✔	n.a.	✔

TABLE 5C
TOOLS FOR MANAGING AIR QUALITY OUTCOMES – *continued*

		Source of pollutant			
		Industry		*Motor*	
Tools	*Details*	*Major (a)*	*Small-to-medium (b)*	*vehicles(c)*	*Other (d)*
REGULATORY – *continued*					
Penalty infringement notices	Penalty Infringement Notices may be issued to licensed facilities for minor or accidental emissions that are against licence conditions, and to non-licensed facilities for matters such as non-compliance with a Pollution Abatement Notice. Owners of offending motor vehicles may receive penalty infringement notices for breaches of the Environment Protection (Vehicle Emissions) Regulations 1992, e.g. for smoky vehicles or tampering with pollution control equipment. The Authority or Victoria Police may suspend the registration of the vehicle if it has not been repaired, prohibiting the use of the vehicle.	✔	✔	✔	✔
Prosecutions	The *Environment Protection Act* 1970 gives the Authority powers to take action through the courts for offences. This power is usually used for serious offences, repeat offenders, offenders who fail to pay a fine or offenders who indicate they want the matter heard in court.	✔	✔	✔	✔
Research, development and demonstration approvals	These are approvals issued for research, development and demonstration projects, which would otherwise require works approvals. Approval conditions include a time limit for the length of time the project can operate.	✔	n.a.	n.a.	n.a.
Industrial Waste Management Plans	Industrial Waste Management Policies apply mainly to industry processes that generate considerable waste, to improve waste management (e.g. recycling). Industrial Waste Management Plans, developed under the Policies, are used to better manage the waste, e.g. from landfills and composting facilities.	✔	✔	n.a.	✔
Environment Improvement Plans	An Environment Improvement Plan identifies activities and targets to continuously improve a company's environmental performance and is usually negotiated with the local community, local government, the Authority and other relevant government authorities. They can be imposed on a company by the Authority or adopted voluntarily by a company interested in improving community relations and environmental performance.	✔	✔	n.a.	✔

TABLE 5C
TOOLS FOR MANAGING AIR QUALITY OUTCOMES – *continued*

		Source of pollutant			
		Industry		Motor vehicles (c)	Other (d)
Tools	*Details*	*Major (a)*	*Small-to-medium (b)*		
ECONOMIC INSTRUMENTS					
Tradeable permits and offset policy	Tradeable permits and offset policy are provided in the *Environment Protection (Liveable Neighbourhoods) Act* 2001. Tradeable permits may be introduced if caps are placed on total air emission levels. Companies may then trade permits to either increase or decrease their waste emissions, e.g. companies that develop cleaner production or cease business can sell their emissions permit, while others wishing to expand production can purchase emissions permits. The Authority is yet to develop tradeable permits and there are limited opportunities to use this tool for diffuse source air emissions such as motor vehicle emissions.	✔	✔	n.a.	n.a.
CO-OPERATIVE OR PARTNERSHIP-BASED PROGRAMS					
Cleaner production partnerships program	This program is aimed at industry, to encourage and facilitate the reduction of emissions at every stage in the production process. The Authority publishes the results from a number of the cleaner production partnerships as case studies, to assist similar industries to improve their environmental performance.	✔	✔	n.a.	n.a.
Environment Improvement Plans - voluntary	As discussed above, companies wishing to improve their environmental performance may voluntarily enter into Environment Improvement Plans.	✔	✔	n.a.	✔
Neighbourhood Environment Improvement Plans	Neighbourhood Environment Improvement Plans are a recent Victorian initiative, for addressing environmental issues in local areas, based on the Environment Improvement Plan concept. They will involve a range of stakeholders including local government, community, government agencies and business organisations in their development. They may involve various sized companies and a range of non-industrial activities. The Authority is currently planning to pilot Neighbourhood Environment Improvement Plans in 3 locations across Victoria. Although the focus of the initial Plans will not be on air quality, in the future it is probable that some will focus on air quality, or include some air quality related component.	✔	✔	n.a.	✔

TABLE 5C
TOOLS FOR MANAGING AIR QUALITY OUTCOMES – *continued*

		Source of pollutant			
		Industry		*Motor vehicles*	
Tools	*Details*	*Major (a)*	*Small-to-medium (b)*	*(c)*	*Other (d)*
GUIDELINES/CODES OF PRACTICE					
Best Practice Environmental Management Guidelines	Best Practice Environmental Management Guidelines may be developed in consultation with industries that have significant emissions, to improve their environmental performance. The Guidelines aim to achieve environmental performance equal to the best achieved by other enterprises in the same field of operation.	✔	✔	n.a.	✔
Protocols for Environmental Management	The SEPP (Air Quality Management) provides for the development of Protocols for Environmental Management. The protocols are specific to an industry or activity, providing information on how to comply with the policy. There are 2 Protocols for Environmental Management currently in place: for Greenhouse gas emissions and Energy Efficiency in Industry; and for Minimum Control Requirements for Stationary Sources. Additional Protocols for Environmental Management are currently being planned for the mining and extractive industries, risk assessment, and for assessing and managing new roads.	✔	✔	n.a.	✔
Codes of Practice	A Code of Practice for a particular industry can provide a licence template, which may be tailored to the site-specific requirements for each licence. Codes of Practice can also be applied to unlicensed premises through industry associations, to require association members to use environmentally friendly practices.	✔	✔	n.a.	✔
FUNDING					
Sponsorships	The Authority sponsors a number of activities that promote better environmental practices.	✔	✔	✔	✔
INFORMATION AND EDUCATION					
Publications and reports	The Authority has a statutory obligation to provide the Victorian public with information that facilitates a good understanding of the environment. It publishes numerous reports and information regarding the state of Victoria's air environment. In addition it publishes a range of material to promote improved air quality. These reports range from technical data reported to national environmental bodies as well as general information for wider public use. Details of the Authority's publications can be found on its website.	✔	✔	✔	✔
Information provision	The Authority operates an information centre (the Front Line Services area), a 24 hour Pollution Watch line and a 24 hour Smoky Vehicle reporting line and maintains a website. The website provides air quality monitoring data collected through the Authority's fixed-site monitoring network, on an hourly basis, daily forecasts of air quality and information on the Authority's activities and all areas of the environment including air quality.	✔	✔	✔	✔

TABLE 5C
TOOLS FOR MANAGING AIR QUALITY OUTCOMES – *continued*

		Source of pollutant			
		Industry			
Tools	*Details*	*Major (a)*	*Small-to-medium (b)*	*Motor vehicles (c)*	*Other (d)*
INFORMATION AND EDUCATION – *continued*					
Community education	The Authority has a range of public information programs and media campaigns aimed at improving air quality.	✔	✔	✔	✔
UNEP Finance Initiatives program	The Authority is the Australasian facilitator of the program under a Memorandum of Understanding with the United Nations. The program aims to engage a broad range of financial institutions in a constructive dialogue on economic development, environmental protection, and sustainable development. It promotes the integration of environmental considerations into all aspects of the financial sector's operations and services.	n.a.	n.a.	n.a.	✔

(a) Licensed industry premises, i.e. high emitting industries.
(b) Non-licensed manufacturing industry, such as bakeries, i.e. low emitting industries.
(c) Registered motor vehicles.
(d) Domestic, commercial and rural activities such as lawn mowing and prescribed burning.

Legend:
✔ tool available and used
X tool available but not used
n.a. tool not applicable to this source

Overview of the Authority's approach to using the available tools

Major industry

5.21 As Table 5C shows, the Authority has a wide range of tools with which to carryout its role as the State's environmental watchdog. It uses the broadest array of tools for its activities related to major industry, i.e. high emitting industries. These industries, if not well managed, have the potential to emit massive amounts of pollutants into the air. The Authority's approach is to work with these industries in partnership, codes of practice and programs to encourage responsible environmental behaviour. This is done with the understanding that, if performance is poor, the Authority's enforcement tools may be used. It is widely recognised that the Authority has been largely successful in reducing the level of emissions from major industry sources by using this approach.

RESPONSE *by Deputy Chairman, Environment Protection Authority Victoria*

The Authority notes the audit findings that its management of major pollutant sources is effective, and based on the risk to the environment of these major sources.

Small-to-medium enterprises

5.22 Australian Bureau of Statistics data shows that in 1998-99 there were 143 100 small businesses in Victoria and of these businesses 98.9 per cent had less than 100 employees, falling into the Authority's definition of the size of a small-to-medium enterprise. In relation to these small business there were 225 400 business establishments, across a broad range of activities including recreation, retail, wholesale, tourism and business services. Realistically, many of these would not be emitters of large volumes of pollutants or hazardous substances. Expert advice indicated that small-to-medium enterprises with air emissions are many and varied and include: printers, concrete batching, panel beaters, hot bread shops, laundromats, dry cleaners, coffee roasters, commercial kitchens (hospitals, take away food shops, restaurants, canteens), food processors etc. The numbers are largely unknown. However, an indication of the size of the total population of enterprises is the 38 200 business establishments relating to the manufacturing, transport/storage and mining sectors, each of which could potentially emit pollution to the air.

5.23 For small-to-medium enterprises, the Authority uses a smaller range of tools. In 1987, regulatory changes removed licensing requirements for most small-to-medium enterprises. This action was taken largely to remove the costly regulatory burden that had developed under the previous arrangements, and recognising that the aggregate air emissions of small-to-medium enterprises are relatively small. The Authority advised that they account for around 5.6 per cent of the total air emissions from all scheduled premises. Most of the impacts of small-to-medium enterprises are local.

RESPONSE *by Deputy Chairman, Environment Protection Authority Victoria*

The audit report makes comment about the Environment Protection Authority's handling of the small-to-medium enterprises sector. It is important to note that this is not a distinction made within the Authority. The regulations which govern the Authority's activities are based specifically and directly on environmental risk, not on the size of the organisation. In developing the regulations the Authority prepares Regulatory Impact Statements which assess environmental risk, and identify which industries need to continue to be closely regulated by the Authority.

Motor vehicles

5.24 Emissions from motor vehicles are one of the greatest challenges to the Authority's achievement of its desired air quality outcomes.

5.25 According to the Australian Bureau of Statistics *Year Book Australia 2001*, in 1999 Victoria had around 27 per cent of the nation's motor vehicles. Table 5D shows the number of registered cars and trucks from 1996 to 2000.

TABLE 5D
REGISTERED CARS AND TRUCKS IN VICTORIA *(a)*
(number)

	1996	*1997*	*1998*	*1999*	*2000*
Registrations	3 044 179	3 127 245	3 206 344	3 243 326	3 290 838

(a) Registration figures are maintained on a calendar year basis. The figures presented relate to registrations at the end of December in each year.

Source: VicRoads.

5.26 Information provided by VicRoads indicated that at May 2002, 48 per cent (1.7 million) of the cars and trucks registered in Victoria were greater than 10 years old. The Draft Air Quality Monitoring Plan notes that *"... the high proportion of older vehicles in the fleet and continuing slow penetration of new technology are major factors influencing the level of emissions"*.

5.27 Certain responsibilities rest at the national level, reflecting jurisdictional boundaries and global economic drivers and therefore the ability to control motor vehicle emissions rests largely with the national bodies responsible for setting standards for technology and fuel. As previously stated, the Authority has played an active role in the national framework.

5.28 The Authority's approach at the State level focuses predominantly on the use of inspections, penalty infringement notices, information and education and, to a lesser extent, prosecutions. Examples of tools used in other jurisdictions to reduce air emissions from motor vehicles are discussed later in this Part. The range of activities undertaken by the Authority to address the problem of motor vehicle emissions is shown in the box below.

MOTOR VEHICLES

In dealing with motor vehicle air emissions, the Authority's aim is to protect the health of Victorians through influencing: development of new technology and standards; increased driving efficiency; well maintained vehicles; changed behaviours; and improved transport infrastructure. It seeks to do this in a number of ways, including:

- Ongoing involvement in the development of national vehicle and fuel standards and regulations;
- Undertaking roadside vehicle inspections (in conjunction with the Victoria Police and VicRoads) and car yard inspections for emission control tampering, conducting smoky vehicle "blitzes", and using a video camera to capture smoky emissions. The Authority advised that the 2001-02 budget for its motor vehicle enforcement program is $330 000 ($270 000, 2000-01);
- Conducting the "Smoky Vehicle Program", designed to reduce motor vehicle emissions by encouraging reporting of smoky vehicles to the Authority for follow-up enforcement activity;
- Working with the community to find ways to reduce the impact of proposed development through, for example, redesigning of the road network. Neighbourhood Environment Improvement Plans can be used to involve the community in this process;
- Providing input into development of the Department of Infrastructure's Melbourne Metropolitan Strategy, which includes integrated public transport and business hubs and urban villages designed to reduce motor vehicle use and, therefore, motor vehicle emission levels;
- Encouraging the Department of Infrastructure to undertake a Travel Demand Study for metropolitan Melbourne;
- Funding the development of the "Eco-maintenance" guide and seminars presented through TAFE colleges and run across Victoria for mechanics and apprentices. Environmental competency standards were created and accepted by the Australian National Training Authority;
- Sponsoring the annual "Ride to Work Day" which encourages the use of bicycles as an alternative transport option to motor vehicles; and
- Distributing information to the public about how to reduce the impact of your car on the environment, to encourage changed behaviour. The "Car Ecometer" software developed in conjunction with the Royal Automobile Club Victoria, and information brochures addressing the importance of good vehicle maintenance and how to report smoky vehicles are examples of this activity.

RESPONSE *by Deputy Chairman, Environment Protection Authority Victoria*

Motor vehicles are a key contributor to air quality problems, and the audit recognises the broad range of tools used to manage their emissions. The Commonwealth has been particularly active in the last few years, with new fuel and motor vehicle standards, and a number of national and Commonwealth programs being developed. The Authority has been concentrating on contributing to these activities recently. However, the Authority is currently reviewing its motor vehicle regulations, and is grateful for the commentary that the audit report provides to assist this process.

Other sources of emissions

5.29 Emissions from other sources are much harder to identify, estimate and manage and are another challenge to the Authority. As emissions from major industry and transport sources are addressed, these sources become increasingly important. Regulatory tools such as penalty infringement notices and pollution abatement notices are used to address pollution from diverse domestic, commercial and rural activities. However, the activities of the general community are largely dealt with through guidelines, codes of practice with peak bodies, provision of funding for community activities, and public education and information.

Recently introduced tools

5.30 While Table 5C shows the tools currently available to the Authority:

- tradeable permits have yet to be used;
- Neighbourhood Environment Improvement Plans have only recently been introduced; and
- industrial waste management plans are rarely used specifically for air emissions because these largely relate to integrated industrial processes.

5.31 We were advised that the Authority does not specify a total atmospheric emissions target to limit the total volume of pollutants emitted under industry licences. Therefore the use of tradeable permits for the air environment is not an immediate priority for Victoria. If a total emissions target was to be established for any individual pollutant, tradeable permits could then be used, enabling companies the flexibility to cost-effectively manage their emissions. Tradeable permit systems also have a high administrative burden to police correctly.

5.32 Tradeable permits also require a sufficient number of emitting companies for trading to occur for a particular pollutant. Expert advice provided indicated that there are not sufficient producers of some pollutants for a viable tradeable permit system for them in Victoria. Tradeable permits are not considered to be a useful tool for controlling diffuse source emissions.

5.33 Offset policies were formally introduced in July 2001 under amendments to the *Environment Protection Act* 1970. Prior to this offsets were used in the 1980s, by agreement and negotiation for the Spencer Street power station. They are used in the United States of America in regions where air quality standards are not met. Under an offset policy, emissions from new sources must be the lowest achievable, and be less than emission reductions (offsets) acquired from other plant in the region. The offset policies permit growth in non-attainment by some polluters or parts of companies without leading to deterioration in overall air quality in the region.[1]

How the Authority has used the available tools

Regulatory tools

Works approvals

5.34 The Authority issues up to 100 works approvals each year to operators seeking to build or alter premises Around 30 of these relate to air emissions. Works approvals are designed to resolve potential pollution problems and to finalise waste discharge, storage and handling requirements before construction, alterations or operations commence. They apply to works planned on licensed premises or, in the case of small-to-medium enterprises, if the level of emissions exceeds a specified amount or certain pollutants are to be emitted from the proposed premises.

5.35 We are satisfied that the Authority has appropriate controls over the processing of works approvals, ensuring that industry complies with the works approval requirement and that the approved works are completed prior to licences being issued. Over the period from 1997 to 2001, the Authority identified 8 cases (3.8 per cent) of all works approval cases where the operators had not applied for works approvals prior to completing or substantially completing construction works. In such cases, operators are required to submit a works approval application in accordance with the *Environment Protection Act* 1970 and are constrained from commencing operations or using altered premises until the application and inspection processes are completed.

5.36 We found that adequate controls were in place to ensure that the necessary referrals of works approvals to local government, as well as other authorities with an interest in the proposed works were made and responses received prior to the approvals being issued.

5.37 Table 5E shows that over the past 5 years, most works approvals were issued by the Authority within the 4-month statutory timeframe.

[1] The offsets policy has been applied by the Authority via licence conditions in the past for water pollutants, e.g. in Gippsland, Gippsland Water reduced all of its pollutants to the maximum extent achievable then wanted to expand its business and, therefore, its volume of water pollutants. The offsets mechanism allowed the company to reduce pollution in its other operations and the effects of water pollution on the environment in exchange for increasing the size of its operations in the Latrobe–Thompson system.

TABLE 5E
WORKS APPROVALS ISSUED WITHIN STATUTORY TIME LIMITS
(number)

Year	Total issued (a)	Air-related issued (b)	Outside timeline (b)
1996-97	104	31	1
1997-98	105	37	5
1998-99	91	42	2
1999-00	95	32	0
2000-01	75	30	2

(a) Includes works approvals for all environmental aspects, e.g. land, water, air, waste and noise.

(b) Figures relate to calendar years 1997, 1998, 1999, 2000 and 2001 as the Authority does not maintain these data on a financial year basis.

Source: Environment Protection Authority.

Licences

5.38 Under the *Environment Protection Act* 1970, premises that emit certain types or volumes of waste are required to have a licence that specifies limits on the waste that may be discharged to the environment, and other conditions designed to minimise the environmental effects of operations. There are around 1 300 licences in place, 292 of which relate to emissions to air. These licences to emit to air cover around 95 per cent of Victoria's industry air emissions.

5.39 Through our examinations we found that:

- Licensing decisions were made with consideration of the impact of the premises on air quality within the region where applicable, and on the air quality in the immediate vicinity of proposed sites. Works approvals that require premises to establish controls to minimise emissions are used to lessen the impact in the immediate vicinity;
- Ninety-five per cent of works approvals and licences issued by the Authority between 1997 and 2001 were issued within their statutory time limits; and
- The methods used by the Authority to identify premises operating without a licence that should be licensed, provide an adequate level of assurance that premises requiring a licence will be detected.

5.40 The Authority reviews annual reports of performance and monitoring submitted by licensees (both accredited and other licensees) and checks that the reporting requirements were met. However, the reports are not routinely audited by the Authority, i.e. reports of independent auditors are not routinely checked and reports of emissions are not always compared to licences to ensure licence conditions are still being met. To address this, the Authority's audit team is developing a framework for a "user-pays" system that will require licensees to have an external audit of their annual monitoring and performance reports. The Authority anticipates that this will provide an additional level of assurance over the information and will reduce the level of the Authority's involvement in checking the information.

5.41 The industry licensing system has the capacity to impose practical maximum limits on emission levels. The licensing provisions allow for the control of aggregated wastes, where one or more licensed companies, although complying with their respective licence limits, when taken together emit pollution above safe environmental levels. One or more of the premises owners may be directed to eliminate or reduce emissions to control the overall impact. The Authority advised that this control option has not been used to date mainly due to the fact that the licensing system has ensured that air quality goals are met in Victoria.

RESPONSE *by Deputy Chairman, Environment Protection Authority Victoria*

Audit appears confused regarding licensees' performance monitoring (para. 5.40). Reports of emission monitoring and performance audits undertaken by licensees or individual auditors are checked by the Authority for licence compliance. The Authority is currently developing a system of requiring licensees to have an environmental auditor, appointed under the Environment Protection Act 1970, to endorse such reports prior to these being submitted to the Authority. While such a system is not yet in place, it is an additional tool to ensure that the cost of managing the environment falls on those who use it for waste disposal, rather than this burden falling on the taxpayer.

Accredited licences

5.42 Accredited licences were introduced in 1994 to reward companies with a record of good environmental performance and with sound systems. Under the Environment Protection Act an "accredited licensee" must have an environmental management system, an environmental audit program and an environment improvement plan in place.

5.43 We found that by the end of 2001 only 17 of the 1 300 companies licensed by the Authority (for all areas of the environment) had achieved accreditation since the scheme's introduction in 1994. Sixteen of the 17 accredited licences include an air emissions component and there are no applications for accreditation currently before the Authority. This suggests that only a small number of companies in Victoria are ready to take on the extra responsibilities of accreditation. We understand that the requirement for a certified Environmental Management System is a major block to seeking accreditation. We found that decisions to accredit premises were made with due regard to the legislative requirements.

5.44 We observed one case where an accredited licensee had emitted wastes to air above its licence limits between 1997 and 2000 and had been prosecuted by the Authority in 2000 following the issue of several penalty infringement notices. The licence was not revoked by the Authority. Instead, the Authority conducted a review of the accredited licensee and required the company to undertake a number of commitments to improve its environmental performance.

5.45 Our evidence indicated that most accredited licensees were operating within the spirit of the concept, especially in relation to their commitments to continuous improvement via their Environment Improvement Plans.

Inspections

Licensed premises

5.46 The Authority's licence data management system analyses by risk category each of the licensed premises, including the 292 premises licensed to emit to air, taking into account assessments of complaint history, track record including Penalty Infringement Notices and prosecutions, and environmental management systems in place. Table 5F shows the current overall rating for those premises.

TABLE 5F
ASSESSMENT OF RISK,
PREMISES LICENSED TO EMIT TO AIR

Rating		*Number*
1	Good performance, full compliance	94
2	Acceptable performance, very minor technical non-compliance	168
3	Below acceptable performance, minor non-compliance	26
4	Poor performance, substantive non-compliance	4
	Total	**292**

Source: Environment Protection Authority.

5.47 The Authority's risk-based assessment of all licensed sites was used to target its inspection activity towards poor environmental performers. As a result, not all premises licensed to emit to air are required to be inspected each year.

5.48 Table 5G provides data on the number of inspections of licensed premises undertaken by the Authority's staff for each of the past 5 years.

TABLE 5G
FIELD INSPECTIONS OF PREMISES LICENSED TO EMIT TO AIR
(number)*(a)*

	1997	*1998*	*1999*	*2000*	*2001*
Field inspections	268	296	288	297	305
Total air licences	296	298	294	293	292

(a) Due to the integrated nature of licences, these figures have been estimated by the Authority based on about a quarter of all licensees being licensed to emit or discharge waste to air.

Source: Environment Protection Authority.

5.49 Given that inspections are targeted to poorly performing premises, the number of inspections throughout the period suggests a reasonable coverage of licensed premises.

Small-to-medium enterprises

5.50 Most small-to-medium enterprises are unlicensed and it is not known how many of these enterprises within the State emit or discharge pollutants to the air. However, the Authority's air emissions inventory for 1995-96 for the Port Phillip region shows that small-to-medium enterprises contribute about 5.6 per cent of total industry emissions.[2] The Authority uses its Cleaner Production Partnerships Program to drive improved performance by this sector and hopes that the introduction of Neighbourhood Environment Improvement Plans will also be effective in reducing the level of emissions to air.

5.51 The Authority relies largely on complaints to drive its inspection activity for such enterprises, but has not evaluated the effectiveness of its approach to this sector of industry. In 2000-01, the Authority received around 5 000 complaints about air pollution[3], of which a proportion related to licensed premises. We were unable to determine how many of these complaints related to small-to-medium enterprises. However, the Authority advised that most complaints received concern one-off pollution incidents at small-to-medium enterprises.

5.52 In the absence of data, we were unable to determine whether the Authority's inspection coverage of small-to-medium enterprises was adequate. We confirmed that once logged on the Authority's database, 85 per cent of complaints are responded to within 3 days. However, we were advised that depending upon the seriousness and nature of the complaint, field visits may not be undertaken unless a history of complaints for a particular problem exists or subsequently develops. For example, the number of odour complaints about a particular premises is usually monitored by the relevant regional office before inspection resources are fully committed to an investigation.

[2] Environment Protection Authority, *Air Emissions Inventory for Port Phillip Region*, Publication No, 632, December 1998. The air quality data is for 1995-96.

[3] About 40 per cent of air pollution complaints relate to odour emissions.

Pollution Abatement and Penalty Infringement Notices

5.53 In substantiating a pollution incident report, the Authority has several options under the regulatory framework for environmental protection, including:

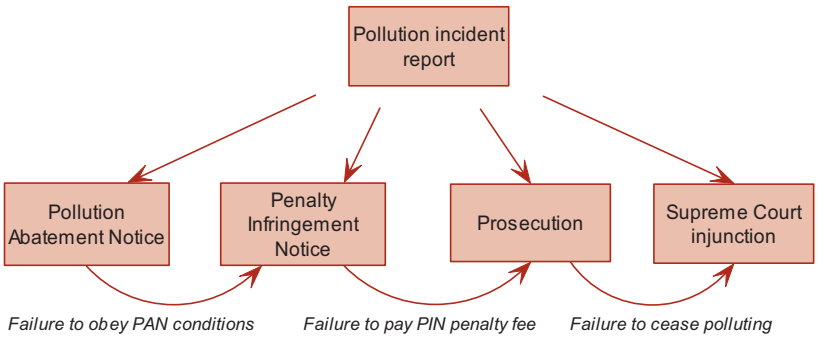
- issue a Pollution Abatement Notice;
- issue a Penalty Infringement Notice;
- prosecute the offender; or
- apply to the Supreme Court for an injunction restraining any person from contravening the *Environment Protection Act* 1970.

5.54 The option taken generally depends on the seriousness of the incident and/or the history with the offender.

5.55 Pollution Abatement Notices include conditions that may require the occupier of any premises to cease, control, monitor and comply with standards or policies, including compliance with, or the establishment of, an environment improvement plan. Failure to obey a pollution abatement notice within the time permitted may result in a Penalty Infringement Notice being issued or prosecution.[4]

5.56 Chart 5H shows the relationship between the notices issued by the Authority for pollution offences.

CHART 5H
ENFORCEMENT TOOLS USED FOR POLLUTION OFFENCES, FOR NON-LICENSED PREMISES



Source: Environment Protection Act *1970*.

[4] A Penalty Infringement Notice amounting to $5 000 for a body corporate or $1 200 in any other case. The maximum fine allowed is $240 000 and in the case of a continuing offence, a further $120 000 per day after conviction or service by the Authority of a notice of contravention.

5.57 The Authority advised that Pollution Abatement Notices are mostly issued to resolve or prevent problems at non-licensed premises, i.e. small-to-medium enterprises, while Penalty Infringement Notices may be issued to both licensed and non-licensed premises. However, the Authority advised that it amends licence conditions to manage air pollution incidents relating to licensed premises. Table 5I shows the number of Pollution Abatement Notices and Penalty Infringement Notices issued by the Authority for air-related matters over the past 5 years.

TABLE 5I
AIR-RELATED POLLUTION ABATEMENT AND PENALTY INFRINGEMENT NOTICES ISSUED
(number)

	1997	*1998*	*1999*	*2000*	*2001*
Pollution Abatement Notices	28	34	27	24	51
Penalty Infringement Notices *(a)*	19	30	39	25	31

(a) Penalty Infringement Notices for licensed premises (air) only. Penalty Infringement Notices served against non-licensed facilities for air-related matters cannot be identified on the Authority's licensing database.

Source: Environment Protection Authority.

RESPONSE *by Deputy Chairman, Environment Protection Authority Victoria*

Given the small contribution to overall air emissions made by this sector, the focus is targeted to dealing with specific sites that, on occasion, cause localised problems. There is a very wide range of activities represented in the small-to-medium enterprises sector, and it is not considered as effective to establish complex monitoring systems at the expense of resources being targeted to resolve problems. If, however, a pattern of environmental problems emerges, guidelines are developed and systematic reviews of small-to-medium enterprises industry sectors are undertaken during development of industry sector environmental guidelines and in the Authority's Cleaner Production Programs.

Motor vehicle-related enforcement activity

5.58 The Authority's 2 main avenues for enforcing motor vehicle emissions control are through inspecting vehicles for tampering and smoky vehicle reporting. There is no regular in-service motor vehicle emissions inspection and maintenance program conducted by the Authority.

5.59 Under the Smoky Vehicle Program, members of the public are encouraged to report smoky vehicles to the Authority via mail, telephone or the Authority's website, for follow-up. Where possible, details of reported vehicles are confirmed with the VicRoads database by Authority staff, and letters sent to owners informing them that their vehicle has been reported and indicating that repairs or servicing may be required. Additional action is not undertaken due to lack of "hard" evidence.

5.60 Written smoky vehicle reports are also received from trained sources such as the Authority's staff, Victoria Police and VicRoads officers. These are referred to as "official reports". Warning letters are also sent in response to these reports. For these vehicles, a penalty notice is usually issued in the event of a second such report. If, in the interim, the owner has provided to the Authority proof of any repairs, this will be taken into consideration in determining whether an infringement notice is sent.

5.61 Table 5J shows that while the number of public reports of smoky vehicles has grown over the past 5 years, official reports have reduced. The Authority suggested that the decline in official reporting reflects fewer of its staff submitting reports as a result of stretched resources.

Motor vehicles make the single biggest contribution to air pollution in the Port Phillip region.
(Photograph courtesy of Environment Protection Authority.)

TABLE 5J
MOTOR VEHICLES,
REPORT AND ENFORCEMENT STATISTICS
(number)

Action	*1996-97*	*1997-98*	*1998-99*	*1999-2000*	*2000-01*
Publicly reported smoky vehicles *(a)*	3 334	2 197	5 359	6 319	8 985
Officially reported smoky vehicles	7 572	6 824	7 592	6 191	4 480
Officially reported tampered vehicles	280	327	320	239	360
Roadside operations undertaken	57	90	169	73	67
Car yards inspected	30	43	22	11	11
Vehicles inspected	n.a.	3 214	5 199	3 878	5 874
Penalty Infringement Notices issued	1 079	1 010	758	937	860
Court prosecutions	10	5	9	13	44

(a) These figures are for reports that resulted in letters being sent. The Authority advised that about 30 per cent of public reports do not result in a letter due to missing or incorrect data, and misidentified vehicles.

Note: n.a. – not available.

Source: Environment Protection Authority.

5.62 The table also shows that although the numbers of roadside operations and car yards inspected have reduced during the period particularly over the past 2 years, the number of vehicles inspected has increased, suggesting a more efficient use of inspection resources. The Authority has identified the need to recruit a minor prosecutions officer to supplement its motor vehicle enforcement activities.

5.63 In comparison with the above data, in 2000-01 the New South Wales Environment Protection Authority, under a similar program, issued approximately 2 800 warning letters, 2 334 penalty infringement notices, and 24 defective vehicle notices mainly for tampering. Prosecutions (at 36 for the year) for motor vehicle air emission offences were lower than in Victoria (44 for the year).[5] The inspection of 5 874 vehicles in Victoria in 2000-01 has also to be contrasted with a fleet of around 1.7 million cars greater than 10 years old.

5.64 The Authority views the major benefits of the Smoky Vehicle Program to be deterrence and public education, but has not undertaken an evaluation of the program's effectiveness. We recognise that regulation is not the only way in which the Authority acts to reduce the level of emissions from motor vehicles. As shown earlier, the Authority uses a range of different tools, including influence at the national level and public education and information activities. However, the effectiveness of these activities may be undermined by the Authority's relatively poor responsiveness to public complaints and the low visibility of roadside operations and car yard inspections.

5.65 The success of the Authority's activities cannot be determined given the absence of up-to-date information on total motor vehicle emissions, targets and evaluations by the Authority. The Authority advised that it is planning to evaluate its motor vehicle-related activities.

5.66 The Authority's 1998 Emissions Inventory[6] indicated that vehicle kilometres travelled increased by 16 per cent between 1990 and 1995-96, at the same time as the levels of emissions from all major pollutants decreased. The inventory reported that this decrease was due directly to the introduction of catalytic converters and unleaded petrol. As previously mentioned, the Authority had a significant role in the introduction of both of these initiatives by the responsible national bodies.

5.67 Appendix B to this report shows some of the more rigorous approaches used in other jurisdictions to address motor vehicle emissions. However, many of these approaches are currently outside the ambit of the Authority's direct powers.

[5] According to the Australian Bureau of Statistics, *Year Book Australia 2001*, Commonwealth of Australia, in 1999 New South Wales had around 30 per cent of the nation's motor vehicles and Victoria around 27 per cent.

[6] The *Air Emissions Inventory, Port Phillip Region, December 1998* provides emissions data for 1995-96.

RESPONSE *by Deputy Chairman, Environment Protection Authority Victoria*

While the number of roadside inspections has decreased over the past few years (para. 5.62), the number of vehicles inspected has increased. In achieving this outcome the Authority has tried to use its inspection resources more efficiently. The number of cars detected has nearly doubled over the past 5 years and every roadside activity is followed-up by press releases on the number and type of offences.

The Authority would like to comment on the use of the term "poor responsiveness" in regard to follow-up of public reports in the Public Smoky Vehicle Program (para. 5.64). Table 5J notes that the responses not followed-up relate to 30 per cent of public reports that are unable to be pursued due to unintelligible, missing or incorrect information.

Environment Improvement Plans

5.68 When introduced in 1989, Environment Improvement Plans represented a new approach to environmental regulation, both nationally and internationally.[7] They encourage companies to adopt a more responsive and self-regulatory approach, particularly in relation to making public commitments to improve relations with local communities through environmental protection measures.

5.69 Currently, there are 51 Environment Improvement Plans agreed by local consultative groups, with 3 or 4 Environment Improvement Plans voluntarily entered into by companies each year. Around half of the 51 Plans have been voluntarily adopted, while the remainder were required under conditions of licences issued.

5.70 An independent evaluation of the Plans in 2002 indicated they have resulted in significant improvements in environmental outcomes for particular sites, such as halving emissions of volatile organic compounds at Altona between 1989 and 1998.[8] The evaluation also showed that the Plans have been successful in:

- directly empowering local communities;
- increasing pressure on companies to improve their environmental performance;
- greatly improving relationships between communities, private enterprises and the Authority;
- improving environmental outcomes on issues of community concern;
- increasing the level of trust between communities and companies; and
- creating a more predictable investment environment.[9]

[7] See Environment Protection Authority, *Information Bulletin: Environment Improvement Plans*, Publication No. 394, October 1993.

[8] From Gunningham, N. and D. Sinclair, *Leaders and Laggards: Next Generation Environmental Regulation*, Greenleaf Press, U.K., (draft 2002).

[9] From Gunningham, N. and D. Sinclair, *op cit.*

5.71 An example of a successful partnership between industry and the community is the Altona Chemical Complex. In the 1990s, 7 companies from the Complex voluntarily agreed with the local community to halve the amount of volatile organic compounds being emitted to air over a 5-year period. This target was subsequently achieved. Since that initial period, an Environment Improvement Plan has been voluntarily agreed between the Complex, local community and the Authority, leading to further environmental successes in reducing odour and fugitive emissions.[10]

Co-operative or partnership programs

5.72 The Cleaner Production Partnerships Program is another means by which the Authority has worked to build relationships within and across industries to achieve better air quality outcomes.

CLEANER PRODUCTION PARTNERSHIPS PROGRAM

An early initiative of the Environment Protection Authority was to offer grants under the Cleaner Production Partnership Program and loans to companies to assist with reducing their emissions through the use of cleaner production techniques. Where the cleaner production techniques showed innovation and significant reductions in emissions, the techniques were promoted to others. These examples are now available through Environment Australia's website along with similar case studies from other States.

A strategic audit of the environmental management and renewable energies industries in 2001 reported that the Program has supported over 100 industry demonstration projects and these have shown an average payback period of 1.4 years.[11]

The Cleaner Production Partnerships Program is currently under review.

5.73 Table 5K shows the value of grants provided by the Authority for cleaner production initiatives between 1996-97 and 2000-01.

TABLE 5K
CLEANER PRODUCTION PARTNERSHIPS GRANTS

Year	*($)*
1996-1997	312 850
1997-1998	415 400
1998-1999	450 000
1999-2000	285 550
2000-2001	380 000
Total	**1 843 800**

Source: Environment Protection Authority.

[10] Fugitive emissions occur following breakdowns or failure of internal controls or company management, e.g. during an industrial manufacturing process. In inventories such as the National Pollutant Inventory, fugitive emissions are the least monitored sources as the pollutants escape into the atmosphere, are dispersed and are usually totally undetected by fixed-site monitoring networks or by local area monitoring.

[11] *Strategic Audit of Victorian Industry: A Report on Victoria's Environmental Management and Renewable Energy Industries*, State Government Victoria, October 2001.

5.74 The following case study shows how the Cleaner Production Partnerships Program has assisted improved environmental outcomes.

PROMOTING PERFORMANCE AMONG SUPPLIERS[12]

The Toyota Motor Corporation Australia is an ISO 14001 certified company and considers this as an important strategic tool in improving environmental performance. A commitment to certification means everyone at Toyota, not just the "Environment Group", is responsible for the environment, and it forces individual production areas to be responsible for day-to-day compliance and continuous improvement. Toyota first achieved certification at its Altona Plant in January 1998, followed by the Port Melbourne Plant in March 1999.

As part of its commitment to improved environmental performance, the company encourages its suppliers to become certified. Through a process of consultation, the company found that many of its suppliers, particularly small-to-medium enterprises, viewed certification as a daunting task. In response, and with the assistance of a Cleaner Production Grant from the Environment Protection Authority, Toyota produced a supplier manual to promote the concept of ISO 14001 certification and the implementation of environmental management systems to small-to-medium enterprises. The Grant also enabled Toyota to work directly with one particular supplier to assist it in achieving certification. This approach will be used as a model by the company to encourage other small-to-medium enterprises to aim for certification.

Guidelines and codes of practice

Best practice environmental management guidelines

5.75 Best Practice Environmental Management Guidelines are developed by the Environment Protection Authority, in consultation with industries. They are designed to improve environmental performance in industries that have significant emissions. Guidelines have been developed so far for the following:

- concrete batching industry;
- textile dyeing and finishing industry;
- fired clay building products industry;
- landfill and wastewater treatment facilities;
- major construction sites;
- dairy processing industry; and
- composting and other organic recycling facilities.

5.76 All of the above include processes that emit waste to air. The Authority advised that according to the Victoria's textile dyeing and finishing industry, the Best Practice Environmental Management Guidelines have helped in reducing waste and energy usage, and have increased the re-use and recycling of "waste" materials.

[12] Deni Greene Consulting Services, *A Capital Idea: Realising value from environmental and social performance*, for Standards Australia and Ethical Investment Services, August 2001. Actual details of the case study are available the Business Council of Australia's draft report: *Towards Sustainable Development*, 2000.

Codes of practice

5.77 Licences issued by the Authority may incorporate conditions that provide for adherence to codes of practice. For example, in the early 1990s it was recognised from the emissions inventory that the volatile organic compounds from the flexographic engraving industry (printing industry) should be reduced. A Code of Practice was developed by the printing industry, which was adopted by the Authority and incorporated into the licence conditions for the 8 licensed printing companies in Victoria. The Code became the template from which each licence was tailored according to site-specific requirements.

5.78 The Authority has worked through industry associations to encourage them to require their members to abide by the environmental codes developed by the Authority. Examples of this include engine maintenance (Victorian Automobile Chamber of Commerce and the Royal Automobile Club of Victoria) and efficient, clean wood heaters (Wood Heaters' Association and Plumbers' and Gasfitters' Association). Codes of practice with peak bodies can be a way of harnessing small-to-medium enterprises to take up more environmentally friendly practice.

Funding

5.79 The Authority provides funding to support activities aimed at encouraging improved air quality outcomes, for example to Bicycle Victoria's annual "Ride to Work Day", the Waste Management Association of Australia, and an odour control seminar for the broiler industry. The Authority also provides sponsorship to the Clean Air Society of Australia and New Zealand to hold monthly seminars "free of charge" in its theatrette.

Domestic wood heaters are major contributors to air pollution in winter.
(Photograph courtesy of Environment Protection Authority.)

5.80 Table 5L shows the level of sponsorships provided by the Authority for 2001-02 to date.

TABLE 5L
SPONSORSHIPS PROVIDED

Date	*Organisation*	*Event*	*Cost*
			($)
July 2001	Environment Business Australia	ENVIRO 2002 Conference – Victorian Government sponsorship package.	25 000
July 2001	University of Melbourne	Industry Night 2001 for Young Engineers.	435
August 2001	Australian Conservation Foundation	National Environment Conference – broadcast costs.	5 000
August 2001	Bicycle Victoria	"Ride to Work Day".	5 000
September 2001	Sustainability Energy Foundation	Sustainability Week Fair.	5 000
September 2001	Shire of Yarra Ranges	Sustainability conference to assist in the start up for a Yarra Valley sustainability network.	5 000
January 2002	Greenfleet	Insight into the 2002 Sunrace.	2 000
March 2002	Victorian Farmers Federation (joint project with the Environment Protection Authority)	Seminar and Environment Management Policy development associated with the implementation of the Victorian Code for Broiler Farms.	1 268
		Total	**48 703**

Source: Environment Protection Authority.

Information and education

5.81 Relatively few funds are allocated by the Authority to information and education activities. For example, the 2001-02 operating budget for the Authority's Communications Unit is $1.55 million, of which only a portion is used for producing public information and education relating to air quality. The budget covers public information, media and some education campaigns for Victoria's environment and may be supplemented with allocations from other business units of the Authority to cover the cost of developing publications material.

5.82 Given the small budget available, it is essential that the activities undertaken are well focused and appropriately prioritised to ensure the benefits are maximised. However, we found that the Authority does not yet have a formal strategy to provide a clear focus for its marketing, media and public relations activities. Information from the Authority's Front Line Services area (information centre), website transaction reports and market research is, however, used to guide activities. The Authority is currently developing such a strategy.

5.83 The Authority's information and education activities include:

- publications and reports;
- information provision; and
- community education.

5.84 The Authority encourages arrangements with private sector sponsors or partners to assist it to communicate its messages. Examples of these arrangements include the TXU AirWatch program for schools sponsored by Channel 7, and the financial and corporate support of the RACV for the AirCare Campaign and the Greenhouse Calculator.

GREENHOUSE CALCULATOR

The Greenhouse Calculator was developed over a 4 year period at a cost of $185 785 to the Authority. The aim of the Greenhouse Calculator is to inform people of the effect their homes and lifestyles have on greenhouse gas emissions. This tool calculates a person's yearly greenhouse gas emission based on the information he or she provides. It then compares the results of those of an "average" house with those of a "green" house.

This product was designed with a broad audience in mind with value to be gained both in the classroom and the energy efficiency industry. A CD version of the Calculator was sold to schools for around $50 each with a reduced version available free on the website. While not intended to run at a profit, the Authority hopes that sales will cover the cost of production.

Both New Zealand and New South Wales have recognised the value of this tool and are planning to adapt it for use in their own environments. While not charging these jurisdictions for the use of its Greenhouse Calculator model, the Environment Protection Authority retains copyright and has enacted a "goodwill" agreement.

Having also realised the value of this tool, the RACV has paid for it to be adapted so that it may show how people can reduce the impact of their car on the environment as well as save on fuel costs. This reduced "car" version of the tool is now also available on the Authority's website and is an example of how further value may be leveraged off an existing tool.

5.85 Apart from traditional public education and information activities, the Authority has also established Community Access to Air Monitoring Groups aimed at raising awareness and community involvement in monitoring air quality. An operating budget of $24 000 per year and one staff member is allocated to assisting these groups.

5.86 The Authority is involved in the United Nations Environment Finance Programme Initiative designed to promote better environmental outcomes.

UNITED NATIONS ENVIRONMENT FINANCE PROGRAMME INITIATIVE

In 2001, the Environment Protection Authority signed a Memorandum of Understanding to co-ordinate and promote the United Nations Environment Programme Finance Initiative in Australasia. The Initiative aims to engage a broad range of financial institutions in a constructive dialogue on economic development, environmental protection, and sustainable development. It promotes the integration of environmental considerations into all aspects of the financial sector 's operations and services.

Activities include holding meetings, seminars and conferences in Australasia, establishing and chairing Australasian advisory committees on environmental issues in the financial services sector and publishing regular UNEP newsletters. Its advisory committees include representatives of financial institutions and cover several topics: Socially Responsible Investment, Environmental Credit Risk and Internal Operational Management of Companies.

Financial institutions (banks, pension funds) are motivated in protecting the environment with the aim of safeguarding their commercial interests and to identify areas of corporate social responsibility. Financial institutions can manage these aims in 4 main ways, i.e. through:

- green investment: private equity in projects/companies that benefit the environment;
- lending: many European banks identify major environmental credit risk and business loans are based on environmental risk assessment and the terms of a loan may require companies to reduce their environmental risk, e.g. to instal bunding to minimise the risks of hazardous incidents;
- insurance: the insurance industry faces challenges from global warming and environmentally contaminated sites, therefore, it has a strong interest in environmental issues; and
- their own environmental performance, e.g. amount of paper and energy consumed.

The cost of the Authority's involvement is around $200 000 per year, with one full-time staff member plus other Authority staff contributing to related activities. The potential impacts and reach of the Initiative are very large. The Commonwealth Government, for example, changed its superannuation and investment fund rules to require institutions to disclose their social, environmental and ethical issues. This is an especially important incentive for the superannuation funds which hold billions of dollars in investments.

Victoria's Government superannuation fund VicSuper recently announced its commitment to invest superannuation funds in sustainable industries.[13] This has the potential to create environmental leaders across all public companies and associated industries, large and small.

[13]Australasian UNEP Finance Initiatives Newsletter "*VicSuper leads Australian superannuation funds in sustainability investing*", Issue 2 January 2002, Environment Protection Authority Victoria.

Evaluating effectiveness

5.87 We found that the Authority has formally evaluated only some of its activities. It is therefore not in a good position to assess the relative effectiveness of the various regulatory and non-regulatory tools it currently uses to manage Victoria's air quality.

5.88 The Authority regards the improved air quality over time as evidence of success, or focuses on activity measures to determine the success of individual programs or activities. For example, the Communications Unit uses website data to assess the effectiveness of its individual activities, and other quantitative measures gained through the tracking of a small number of performance measures, including reports of smoky vehicles, information and media inquiries and the number of calls logged by the Authority's information centre. While it undertakes market research into public opinion of the Authority, and evaluations of a limited number of individual activities, most public information and education programs, such as the Smoky Vehicle Program, have not been evaluated to determine their effectiveness.

5.89 A number of key staff advised us that the level of resources available to the Authority do not justify moneys being spent on evaluation. However, we consider that where resources are scarce, it is important to gauge whether the best use is being made of those resources.

RESPONSE *by Deputy Chairman, Environment Protection Authority Victoria*

The Environment Protection Authority employs a mix of tools that varies from situation to situation and it seldom relies upon a single tool to achieve a given outcome or desired outcome. Several projects may contribute to achieving a single outcome, and a single project may support several environment protection goals. We recognise that this integrated approach makes it inconvenient for audit purposes. However, the synergies created by an integrated approach are a key reason for the Authority's effectiveness in managing the significant reduction in air pollution over the last 30 years.

Note that the Authority has a requirement to report annually on its effectiveness to the Government's Expenditure Review Committee as part of normal budget processes. This reporting involves a wide range of measures of effectiveness ranging from measures of long-term effectiveness (e.g. numbers of breaches of SEPP ambient environmental objectives) through to performance against statutory requirements for processing works approvals etc.

Conclusion

5.90 The Authority uses a mix of tools to encourage industry, motor vehicle users and the community in general, to take responsibility for their environmental behaviour. The improvements in air quality over the past 30 years are evidence that this has been successful. We noted there are some constraints to the Authority's use of tools available in other jurisdictions, for example with economic incentives such as taxes. While tradeable permits are available for use by the Authority, they are not used at this time for the Victorian air environment.

5.91 While we found the Authority's regulatory tools have encouraged compliant behaviour by major industry, their effectiveness for small-to-medium enterprises and motor vehicles is difficult to determine given the absence of data to enable assessment.

5.92 We believe that there is room for improvement in regard to the Authority's use of its regulatory tools. For example, in relation to licences, both accredited and normal, there is a need to ensure that audit and reporting practices are complied with by licensees and that adequate attention is paid by the Authority to monitoring the information received to ensure licence conditions are met. For motor vehicles, follow-up action needs to be taken to ensure necessary repairs of vehicles identified by official smoky vehicle reporting are undertaken.

5.93 Other tools used, i.e. co-operative or partnership programs, guides and codes of practice and information and education, are examples of successful initiatives that have resulted in industries taking responsibility for their environmental behaviour. We believe the Authority will continue to encourage the take-up of such initiatives.

5.94 However, the Authority needs to evaluate major initiatives and marketing activities to determine their effectiveness. For example, the impact of the Authority's regulatory regime on small-to-medium enterprises through the use of pollution abatement and penalty infringement notices, the Cleaner Production Partnerships Program and information activities is mostly unknown. Evaluation of such activities is essential to inform the Authority of which policy instruments are working most efficiently and effectively.

Recommendations

5.95 We recommend that the Authority should ensure that information provided by accredited licensees and other licensees about emissions to air be properly assessed, i.e. reports of independent auditors checked and reports of emissions compared with licence requirements, to ensure licence conditions are still being met.

5.96 We recommend that management information maintained by the Authority, such as data in relation to complaints, inspections, Penalty Infringement Notices and Pollution Abatement Notices, be categorised according to pollution source, to assist monitoring of performance, development of strategies to improve performance in those sectors, and assessment of the Authority's performance and to enhance accountability.

5.97 For its motor vehicle-related activities, we recommend that the Authority should:

- follow-up smoky vehicle reports to ensure that appropriate action to repair the vehicles is undertaken;
- collect data and establish measurable targets to enable assessment of the Authority's effectiveness in addressing the level of emissions from motor vehicles; and
- evaluate the effectiveness of the Smoky Vehicle Program.

5.98 We recommend that the Authority should complete development of its marketing strategy as soon as possible.

5.99 We recommend that the Authority should evaluate its practices and activities to enable assessment of its effectiveness and the appropriateness of the mix of policy tools used.

RESPONSE *by Deputy Chairman, Environment Protection Authority Victoria*

Para. 5.95

Reports of emission monitoring and performance audits undertaken by licensees or individual auditors are checked by the Environment Protection Authority for licence compliance. The Authority is currently developing a system of requiring licensees to have an environmental auditor, appointed under the Environment Protection Act 1970, to endorse such reports prior to these being submitted to the Authority. While such a system is not yet in place, it is an additional tool to ensure that the cost of managing the environment falls on those who use it for waste disposal, rather than this burden falling on the taxpayer (refer to para. 5.40).

Para. 5.96

Given the small contribution to overall air emissions made by the small-to-medium enterprise sector, the focus is targeted to dealing with specific sites that, on occasion, cause localised problems. There is a very wide range of activities represented in the small-to-medium enterprise sector, and it is not considered as effective to establish complex monitoring systems at the expense of resources being targeted to resolve problems. If, however, a pattern of environmental problems emerges, guidelines are developed and systematic reviews of small-to-medium enterprise industry sectors are undertaken during development of industry sector environmental guidelines and in the Authority's Cleaner Production Programs.

Para. 5.97

The breadth of this program and the number of vehicles in the fleet represent a significant resourcing challenge to the Environment Protection Authority. Various options regarding the Smoky Vehicle Program are being examined during the current Motor Vehicle Emissions regulation review. The Authority will examine the legislative restrictions that limit its powers with respect to public reporting and the evidentiary requirements of courts in pursuing prosecutions.

Para. 5.98

The Authority accepts the recommendation that its marketing strategy be completed as soon as possible. As reported the Authority is currently developing a marketing strategy.

Para. 5.99

The Authority accepts the recommendation that it evaluate its practices and activities, in the context that the Authority employs a mix of tools that varies from situation to situation and it seldom relies upon a single tool to achieve a given or desired outcome. Several projects may contribute to achieving a single outcome, and a single project may support several environment protection goals. We recognise that this integrated approach makes it inconvenient for audit purposes. However, the synergies created by an integrated approach are a key reason for the Authority's effectiveness in managing the significant reduction in air pollution over the last 30 years. Ultimately, the effectiveness of the mix of tools employed by the Authority is reflected in monitored improvements in ambient environmental quality.

Part 6

Monitoring Victoria's air quality

INTRODUCTION

6.1 Monitoring air quality provides information on the concentrations of pollutants in the air; provides an indication of the quality of the air relative to national standards and State objectives; informs the development of air quality management strategies; and allows the evaluation of the effectiveness of air quality management activities.

6.2 Monitoring can also be used to verify sources of air emissions, investigate potential reasons for complaints, identify potential threats to air quality and validate modelling of pollutants as they are emitted to, and dispersed in, the atmosphere.

6.3 In Victoria, the Environment Protection Authority is required to undertake a variety of air quality monitoring activities to meet national and State legislative obligations. These obligations are expanded upon below.

6.4 In our examination of the Authority's air quality monitoring activities, we were particularly interested in how it achieves a balance in its air quality monitoring programs to address these different legislative requirements and information needs.

National requirements

6.5 Ambient air quality standards for the 6 indicator pollutants, i.e. carbon monoxide, nitrogen dioxide, sulfur dioxide, lead, ozone and particles, have been established by the *National Environment Protection (Ambient Air Quality) Measure* (the Air NEPM), which also sets out 10 year goals to be met by the participating jurisdictions by 2008. The standards and 10-year goals are included as Appendix C to this report.

6.6 The Air NEPM also includes a monitoring and reporting protocol, which specifies how each State and Territory is to measure and report progress towards complying with the goals. The aims of the protocol are to ensure that sufficient monitoring is undertaken by the States and Territories to allow an adequate assessment of exposure of the population to air pollutants, and to ensure that data reported by them are comparable.

6.7 The Air NEPM requires each jurisdiction to prepare a monitoring plan that is consistent with the protocol, and to submit it to the National Environment Protection Council for endorsement. A Peer Review Committee has been established by the Council to advise the States and Territories on the preparation of their monitoring plans, and to advise the Council on the adequacy of the plans submitted.

6.8 States and Territories are also required to report annually to the National Environment Protection Council on progress made towards meeting the Air NEPM goals. To comply with the Air NEPM, governments are required to adopt the standards and the monitoring protocol as the means for assessing air quality against the goal.

State Environment Protection Policy requirements

6.9 The *State Environment Protection Policy (Ambient Air Quality)* incorporates the Air NEPM standards and the monitoring and reporting protocol, as well as an additional objective relating to visibility reducing particles to reflect the importance the Victorian community places on the level of visual air pollution.

6.10 The *State Environment Protection Policy (Air Quality Management)* sets out the Authority's principles, intent and program for meeting its air quality objectives and requires the Authority to:

- monitor in accordance with the SEPP (Ambient Air Quality) to determine whether the air quality objectives are met; and
- undertake additional monitoring and investigations to enhance its understanding of the nature, causes and mechanisms of air pollution, and the feasibility and potential effectiveness of air quality management options.

6.11 The SEPP (Air Quality Management) also sets objectives or intervention levels for a number of pollutants which are used to assess local or neighbourhood air quality.

Overview of air quality monitoring in Victoria

6.12 The Authority undertakes a variety of air quality monitoring activities, which focus on:

- The sources of pollutants, such as industrial premises and roads, which are monitored in factory chimneys or in local areas, using mobile instruments; and
- The exposure of the population to the pollutants, which is generally monitored at fixed sites across a region, depending on the distribution of the population and on the way pollutants are dispersed in the atmosphere. This is referred to as "ambient air quality monitoring".

6.13 Table 6A provides an overview of the Authority's approach to air quality monitoring.

TABLE 6A
OVERVIEW OF MONITORING ACTIVITIES IN VICTORIA

Focus	*Monitoring activities*	*Type of monitoring*	*Range covered*
Sources of pollutants	Monitoring emissions from chimneys at industrial premises	Short-term, manual sampling	In stack
	Mobile monitoring in suspected "hot spots"	Short-term, mobile	Local air quality
	Surveillance of emission sources	Long-term, fixed-site (industry operated)	
Exposure of the population	Campaign monitoring (i.e. preliminary monitoring for 1 to 2 years) to determine the need for ongoing ambient monitoring	Long-term, fixed-site	Ambient air quality (in urban centres with populations of 25 000 or more)
	Monitoring the exposure of the population to air pollution		
	Monitoring peak levels of pollutants		

Source: Environment Protection Authority.

6.14 Ambient air quality in the Port Phillip region (which covers Greater Melbourne and Geelong) and the Latrobe Valley region, is monitored by the Authority's fixed-site monitoring network. The Authority also operates a network of meteorological stations to assist in the interpretation of air quality monitoring results and in the tracking and modelling of emissions (or "plumes") from specific sources or locations. Monitoring by industry also occurs in Geelong, Portland, and the Latrobe Valley.

6.15 Table 6B provides information on the number of monitoring stations and instruments that comprise the Authority's fixed-site monitoring network, while Chart 6C indicates the locations of the monitoring stations within the Port Phillip region.

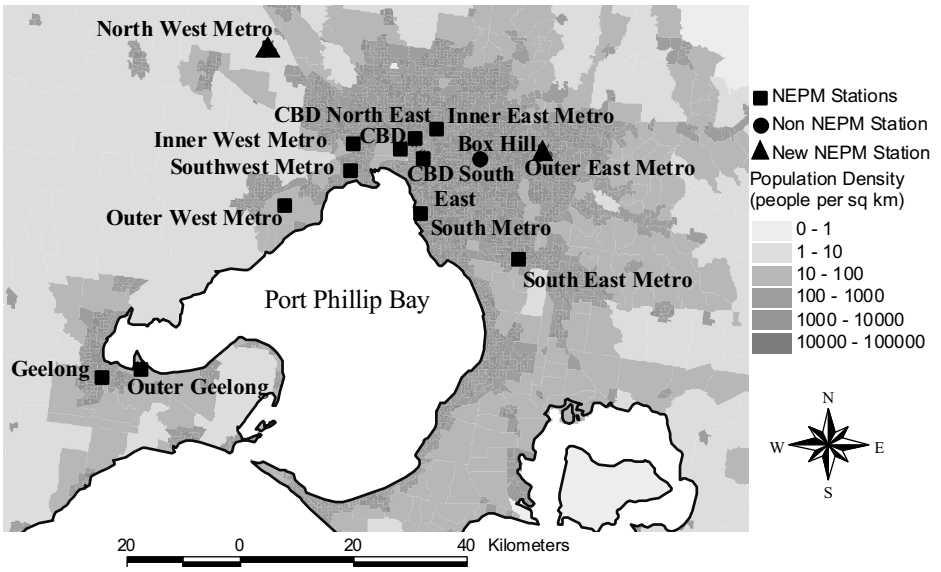
TABLE 6B
FIXED-SITE MONITORING STATIONS AND INSTRUMENTS
(number)

Air Quality Control Region	*Monitoring stations*	*Monitoring instruments*
Port Phillip	12	63
Latrobe Valley[1]	2	10

Source: Environment Protection Authority.

[1] The conditions of certain air emission licences issued within the Latrobe Valley require the licensed premises to operate monitoring stations and report the data collected to the Authority. There are 6 such licences and as a result the Authority can collect data from 6 stations over and above the number presented in the table.

CHART 6C
AIR QUALITY MONITORING STATIONS, PORT PHILLIP REGION



Source: Environment Protection Authority.

6.16 The 2 Latrobe Valley stations are located in Moe and Traralgon.

6.17 In addition to monitoring within the Port Phillip and Latrobe Valley regions, the Authority's Air NEPM Monitoring Plan identified the need for it to commence preliminary monitoring in Victoria's other urban centres with populations of 25 000 or more, which are:

- Ballarat;
- Bendigo;
- Shepparton-Mooroopna;
- Warrnambool;
- Wodonga (as part of Albury-Wodonga); and
- Mildura (including Redcliffs).

6.18 The Authority also conducts ambient and local monitoring for special purposes, either within the existing regions or in other urban, regional or rural areas.

Emissions inventories and models

6.19 The Authority uses emissions inventories and modelling in addition to monitoring, to further identify and examine the sources of pollutants and their dispersal in the atmosphere. The inventories are developed to identify sources and to assist estimation of levels of emissions, ranging from industrial facilities and traffic, to natural sources such as vegetation. The inventory data informs the Authority's air quality monitoring, modelling and management activities. The Authority has emissions inventories for the Port Phillip and Latrobe Valley regions and the Bendigo area.[2]

6.20 Models can be used to support monitoring and management in a number of ways, such as investigating the dispersal of pollutants in the atmosphere, the potential impacts of management activities and the need for monitoring in different locations. The Authority uses models for:

- assessing works approvals and licence requirements and compliance;
- modelling larger-scale case studies;
- locating sources giving rise to complaints;
- modelling the dispersion of hazardous and toxic chemicals, to assist emergency response management;
- modelling case studies involving highways and arterial roads;
- modelling smog events, to improve understanding of smog formation;
- modelling scenarios to assess regional/urban scale air quality management options; and
- forecasting air quality.

6.21 In the late 1990s, the Authority considered using models to provide "virtual monitoring" of air quality and to reduce the need for fixed-site monitoring. However, at that time the Authority concluded that the models were not yet reliable enough to be used as a substitute for monitoring.

AUDIT EXPECTATIONS

6.22 As the principal body in Victoria charged with the responsibility for monitoring and managing air quality, we would expect that the Authority should:

- monitor air quality across the State in accordance with agreed national standards and State Environment Protection Policies;
- ensure that monitoring data collected are accurate, complete and provided on a timely basis; and

[2] Inventories were developed by the Authority for Port Phillip Region in 1980, 1990 and 1996, the Latrobe Valley in 1987 and 2000 and Bendigo in 2001.

- periodically review its air quality monitoring approach and practices, to ensure that they are conducted efficiently and effectively, and remain relevant to legislative requirements and emerging priorities.

MONITORING AIR QUALITY ACROSS THE STATE

Monitoring ambient air quality

6.23 The fixed-site monitoring network is designed and managed to measure achievement of SEPP (Ambient Air Quality) objectives, in accordance with Victoria's Air NEPM Monitoring Plan, and to monitor for additional information needs as required by the SEPP (Air Quality Management). Victoria was the first State to develop an Air NEPM Monitoring Plan.

6.24 The majority of the instruments in the fixed-site network (58 out of a total of 73 instruments, or 79 per cent) are used to resource the SEPP (Ambient Air Quality) monitoring requirements. The remaining 21 per cent of instruments are used to meet the Authority's additional information needs under the SEPP (Air Quality Management).

Monitoring in the Port Phillip and Latrobe Valley regions

SEPP (Ambient Air Quality)

6.25 We found that monitoring of air quality in the Port Phillip and Latrobe Valley regions is undertaken in accordance with the requirements of the SEPP (Ambient Air Quality) and the Air NEPM Monitoring Plan. Specifically we found that:

- The location of some monitoring stations and instruments was modified to meet, as far as possible, the siting guidelines; and
- The number of monitoring stations exceeds the minimum requirements. Based on the population formula established, the minimum number of stations necessary for the Port Phillip and the Latrobe Valley regions would be 6 and 1, respectively. The Authority currently has 12 stations in the Port Phillip region and 8 stations in the Latrobe Valley region (including 6 stations operated at licensed premises as a condition of licensing).

6.26 The Air NEPM Monitoring Protocol, which sets the formula for determining how many stations are required, provides some flexibility for jurisdictions to modify the number of stations based on their knowledge of the area[3] (e.g. to account for local topography, meteorology or sources), and enables fewer monitoring stations to be used where pollutant levels are consistently below the standards. The decisions the Authority has made in this regard have been endorsed by the National Environment Protection Council.

6.27 Table 6D shows the fixed-site monitoring the Authority conducts in accordance with its Air NEPM Monitoring Plan and to meet SEPP (Ambient Air Quality) objectives.

TABLE 6D
FIXED-SITE MONITORING OF
SEPP (AMBIENT AIR QUALITY) OBJECTIVES

Control region	*Carbon monoxide*	*Nitrogen dioxide*	*Sulfur dioxide*	*Lead*	*Ozone*	*Particles (a)*	*Visibility reducing particles*
Port Phillip	4	6	4	1	7	17	9
Latrobe Valley	not required	2	2	not required	2	2	2

(a) The Authority monitors particles in several different ways to measure trends and to meet Air NEPM requirements.

Source: Environment Protection Authority.

6.28 In addition, the Authority is planning the following changes to the fixed-site monitoring network, which it advised will be in place by July 2002:

- 2 new stations are being added in the Port Phillip region, at Melton and Mooroolbark;
- 2 instruments are being relocated between stations in the Port Phillip region; and
- 2 new instruments for monitoring particles will be added in both the Port Phillip and Latrobe Valley regions.

SEPP (Air Quality Management)

6.29 The Authority is required to conduct special purpose monitoring under the SEPP (Air Quality Management). We found that the Authority conducts special purpose fixed-site monitoring of ambient air quality within the Port Phillip region, as circumstances require and resources permit, to supplement the information collected for the SEPP (Ambient Air Quality) and to provide the coverage it needs to support the health studies and investigations conducted. This special purpose ambient air quality monitoring contributes to the Authority's modelling and management of the region.

6.30 In the Latrobe Valley region, the Authority's needs for additional ambient air quality information are met through industry self-monitoring of ambient air quality, which occurs at 6 locations in the region.

[3] While exceeding the minimum requirements calculated purely on the basis of population, to some extent the "additional" stations are required under the SEPP (Ambient Air Quality) to monitor ozone and particles given the particular characteristics of the pollutants and their importance in the regions.

Monitoring in regional Victoria

6.31 Prior to 2000, when the Authority commenced development of its Air NEPM Monitoring Plan, no ambient air quality monitoring had been undertaken outside of the Port Phillip and the Latrobe Valley regions.

6.32 The Authority advised that this was because in the early 1980s, air quality science and community concern were focused on photochemical smog as the big air quality issue. The level of motor vehicle usage and industry activity in other areas was not great enough to contribute to the production of smog. The Authority's monitoring was therefore focused on the Port Phillip and Latrobe Valley regions. However, now that the smog issue has been reduced through unleaded petrol and catalytic converters, industry licensing, and better management of backyard and fuel reduction burning, the Authority is in a position to focus on other priorities and issues based on new knowledge about air quality issues.

6.33 Through the Air NEPM Monitoring Plan, the Authority has now committed to preliminary ambient monitoring in regional centres for periods of one to 2 years (i.e. campaign monitoring), to assess compliance with the SEPP (Ambient Air Quality) objectives and as part of its strategic approach to obtain data to guide its future activities and resource allocation.

6.34 Preliminary monitoring of particles was undertaken in Bendigo in 2000-01. The monitoring results indicated that ongoing ambient monitoring of particles should be conducted. The Authority advised that it is identifying funding options and timelines for this work.

6.35 Monitoring of particles commenced in Ballarat in March 2002, and the Authority plans to commence monitoring in Shepparton-Mooroopna later in 2002. We were advised that particle monitoring in other regional centres will commence as monitoring instruments become available. Given the Authority's stated concerns regarding its equipment, it is unclear when this will occur.

6.36 In addition to monitoring particles, the Authority is working with the Commonwealth Scientific and Industrial Research Organisation (CSIRO) to investigate using models to assess the potential for regional areas to exceed the SEPP (Ambient Air Quality) objectives for carbon monoxide, nitrogen dioxide, sulfur dioxide, lead and ozone, and therefore require ongoing monitoring.

Monitoring local air quality

6.37 As the name implies, the fixed-site monitoring network can only assess pollutant levels at fixed locations. As discussed earlier, there are hot spots within local areas where pollution levels are higher than those indicated by the network as a whole.

6.38 The Authority undertakes some monitoring in local areas, in response to complaints, emergencies, enforcement activities or potential issues. This includes monitoring around roads and industrial facilities, monitoring specific emissions from factory chimneys and investigating the impacts of events such as the King Island and Coode Island fires. VicRoads also undertakes some monitoring near major roads, and the Authority has access to this data as well.

6.39 Table 6E shows the Authority's estimated operating and capital costs for both fixed-site and local air monitoring for the 1999-2000 and 2000-01 years and the budgeted costs for 2001-02.

TABLE 6E
FIXED-SITE AND LOCAL AIR MONITORING COSTS *(a)*
($)

Year		*Fixed-site (b)*	*Local*
1999-2000	Operating	735 000	192 000
	Capital	234 000	*(c)* 250 000
2000-2001	Operating	779 000	123 000
	Capital	365 000	0
2001-2002	Operating	939 000	255 000
	Capital	465 000	15 000

(a) The figures are estimated only and exclude corporate overheads.
(b) The costs of the air monitoring database and data validation are included in the fixed-site network costs.
(c) Relates to the purchase of the mobile monitoring laboratory.

Source: Environment Protection Authority.

6.40 The Authority advised that local area monitoring has traditionally been time-consuming and costly, requiring the use of hand held instruments and laboratory analyses. However, in 1999-2000, the Environment Protection Authority purchased a mobile monitoring laboratory at a cost of $250 000, which enables more efficient monitoring and expands the Authority's capacity to investigate local air quality issues. The mobile laboratory is used where other monitoring information is not available, and between 2000 and 2002 it was used primarily to investigate traffic pollution issues in metropolitan Melbourne, as indicated in Table 6F.

TABLE 6F
AIR QUALITY MONITORING IN LOCAL AREAS, 2000-01 TO 2001-02

Date	*Monitoring site*	*Purpose*
Aug.–Sept. 2000	Grant St, Southbank	Verify air monitoring being conducted by the tunnel operator at the base of the CityLink Domain tunnel vent stack.
Oct. 2000	n.a.	Mobile laboratory unavailable for monitoring due to servicing, post-commissioning modifications and installations of new equipment.
Nov. 2000	Terminals Pty Ltd, Coode Island	Supporting a monitoring program for volatile organic compounds.
Dec. 2000-March 2001	Rooney St, Burnley	Investigating air quality at the base of the CityLink Burnley tunnel vent stack and any possible downwash from stack to ground level.
April–May 2001	Bright Hospital	Monitoring of air quality during burning activities.
June 2001	Collingwood College, Hoddle St, Collingwood	Backdrop for World Environment Day event and preparation for a collaborative study on children's health.
June–July 2001	Francis St, Yarraville	Initial study of traffic issues, including pollution, near an urban state highway.
Aug.–Oct. 2001	Collingwood College, Hoddle St, Collingwood	Further monitoring for the health effects study.
Nov. 2001–Feb. 2002	Moonee Ponds	Investigating pollution levels from the Tullamarine Freeway.
March 2002 onwards	Francis St, Yarraville	A follow-up of the initial study, to investigate the impact of the intervention strategies that were put in place to control traffic.

Source: Environment Protection Authority.

The Environment Protection Authority's mobile air monitoring laboratory.
(Photograph courtesy of Environment Protection Authority.)

6.41 The following case study shows how local area monitoring can assist identification of problems in hot spots, development of strategies to mitigate the problem and follow-up assessment to determine whether strategies have been effective.

Francis St, Yarraville

A special monitoring program was undertaken by the Environment Protection Authority in Francis Street, Yarraville in June and July 2001, as part of a broader investigation into community complaints about traffic levels in the street. The program used the Authority's mobile monitoring laboratory to measure a range of pollutants, including particles.

The program revealed that particle levels exceeded both the SEPP (Ambient Air Quality) objective and the SEPP (Air Quality Management) intervention levels. Particle levels measured at Francis Street were higher than for the same period at 2 fixed-site monitoring stations nearby, and higher than data from an earlier roadside monitoring project in Hoddle Street, Collingwood in 2000. The data showed that diesel exhaust emissions were the probable cause.

As a result, a number of intervention strategies to control traffic were put in place by the Hobson's Bay City Council, Melbourne Ports Authority and VicRoads. The Environment Protection Authority is now using the mobile laboratory to monitor local air quality in Francis St again, to see if it has improved.

6.42 Another relevant monitoring activity has been the "in-traffic" sampling in moving peak traffic in the Melbourne Central Business District. The studies were undertaken by the CSIRO with the 1997 study being funded by the Authority. Table 6G provides results of studies undertaken over time. It shows the effectiveness of motor vehicle emission controls.

TABLE 6G
RESULTS OF "IN-TRAFFIC" SAMPLING
(parts per million)

Pollutant	*1983-84*	*1990*	*1997*
Carbon monoxide	10.3	6.9	4.5
Oxides of nitrogen	0.36	0.34	0.30
Volatile organic compounds *(a)*	2.52	1.39	0.98
Methane *(b)*	2.08	1.98	1.98

(a) Non-methanic volatile organic compounds.
(b) A greenhouse gas.
Source: Environment Protection Authority, Publication 652, p.11.

6.43 To date, most monitoring of local areas, using both the mobile laboratory and other mobile means, has occurred in metropolitan Melbourne, although the Authority has advised that the mobile laboratory will next be located in Geelong, and has previously been deployed in Bright.

6.44 The mobile laboratory has been used to assist research, to respond to public concern and to support public information activities. We did not observe a clear process for assessing relative priorities to guide these uses. We found that the Authority has not conducted a broad scale assessment of its local monitoring priorities.

6.45 While there can be a very high demand for local monitoring, its expense limits the capacity of the Authority to respond to the high demand for its services. We believe it is important that the Authority have a local monitoring strategy which clearly states its criteria for prioritising activities in the short-term, and its longer-term plans for use of the facility, to ensure the most efficient use of this resource.

Emissions inventories and modelling

6.46 The Authority manages the annual collection of emissions data from industry for the National Pollutant Inventory. We were advised that the Authority developed most of the National Pollutant Inventory methodology used throughout Australia and trialled the methodology, using Commonwealth funds.

6.47 In addition, the Environment Protection Authority maintains and updates its own emissions inventories in response to advances in scientific knowledge or major information needs, such as the development of the *Draft Air Quality Improvement Plan for the Port Phillip Region*. The emissions inventory for the Port Phillip region was updated in 1980, 1990 and 1996 and the Latrobe Valley inventory in 1987 and 2000. The Authority developed the Bendigo emissions inventory in 2001, for reporting to the National Pollutant Inventory, and advised that it plans to complete inventories for Mildura and Ballarat by the end of the financial year.

6.48 A 1999 review of the Authority's modelling and monitoring programs recommended regular updates of the inventories to support more effective modelling.[4] We found that the Authority has not yet addressed this recommendation, although it advised that it is considering such an approach, consistent with the mix of monitoring and modelling now undertaken.

6.49 The Authority's development of air quality models has relied on an effective, ongoing working relationship with the CSIRO. We found that the Authority has in the past led Australia in the modelling of industry emissions and larger-scale case studies. These models are continually being upgraded, to include advances in scientific knowledge and input from stakeholders such as industry and the Clean Air Society of Australia and New Zealand.

[4] Ministry of Environment and Energy, Ontario, Canada, *Review of EPA Victoria's air quality modelling and monitoring program*, May 1999.

Conclusion

6.50 The Authority is monitoring ambient air quality in the Port Phillip and Latrobe Valley regions and has commenced preliminary ambient monitoring in some of the other large regional centres across the State. It also conducts additional ambient air quality monitoring in the Port Phillip region to provide supplementary information for modelling and management needs. The ambient monitoring is conducted in accordance with SEPP (Ambient Air Quality) objectives and the Air NEPM Monitoring Plan. However, the Authority does not have a plan that links its priorities with funding needs to ensure its new commitments to monitoring in regional Victoria are implemented on a timely basis.

6.51 The Authority also conducts a variety of special purpose monitoring activities in local areas, predominantly in metropolitan Melbourne, under the SEPP (Air Quality Management). However, we were not able to see how the Authority prioritises the specific local area monitoring activities it undertakes.

Recommendation

6.52 We recommend that the Authority should:

- develop as a high priority, a plan to resource and implement its commitments for ambient air monitoring in regional centres;
- develop a local monitoring strategy to guide its program of mobile and special purpose local area air quality monitoring and ensure that its process for prioritising these activities is transparent; and
- have a plan in place for regular updates of its emissions inventories.

RESPONSE *by Deputy Chairman, Environment Protection Authority Victoria*

The audit report focuses on the mobile laboratory (MoLab) as a local monitoring tool. Deployment of the MoLab is guided by a steering committee, as noted in the body of the report. The Authority accepts that its priority-setting process for the new tool could be improved through more explicit attention to criteria for its use. It is noted that audit has not disagreed with the priorities to date, only the process to ensure the most effective allocation of this resource.

MoLab is only one of the tools that can be applied to evaluate local air quality. The Authority also has a range of techniques for determining the identity and level of air-borne contaminants at emergency incidents. Some of these provide results immediately, while others are more time consuming.

There are 4 main techniques that the Authority uses at emergency incidents. They are chemical indicator tubes, hand-held analysers, portable gas chromatographs and collection devices for off-site analysis. These methods have also been employed to generate data in project-based studies of local air quality.

MoLab contains instruments that measure the concentrations of various pollutants commonly found in urban areas. These pollutants include carbon dioxide, ozone, oxides of nitrogen, sulfur dioxide and fine particles.

***RESPONSE** by Deputy Chairman, Environment Protection Authority Victoria - continued*

It is designed to monitor the effects of pollution "hot spots" often created by smaller, more local emission sources, such as small industrial premises or congested roads. The information collected by MoLab is used to supplement the data collected by the Authority's network of 13 air monitoring stations located in Melbourne, Geelong and the Latrobe Valley.

Para. 6.52

Extension of existing monitoring in provincial cities and regional hot spots is already provided for in the Authority's Corporate Plan. The timing of specific project activities will be dependent on resource availability and specific priorities assessed on annual basis and will be determined in the context of the equipment plan (see para. 4.37).

The Authority agrees with the second recommendation, to the extent that criteria for local monitoring should be explicit rather than implicit as at present. Of its nature monitoring of local "hot spots" often has a short-term horizon.

The Authority agrees in part that it should have a plan in place for regular updates of its emissions inventories. The Authority pursued the National Pollutant Inventory to maintain annual updates of information and needs to take into account national projects, e.g. National In Service Emission II program which will update information on motor vehicle performance. In the absence of updated and current base information, regular updates are ineffective and wasteful of resources. Updates will be undertaken in response to management needs.

ENSURING THE QUALITY OF DATA

6.53 The Authority reports data collated from its monitoring activities to the National Environment Protection Council, in its own publications and on its website. Our expectation was that the data are accurate, complete and provided on a timely basis, not only because it conveys whether air quality standards are being met, and therefore enables assessment of the Authority's performance, but also because it provides an important source of information for people who suffer from chronic health problems that can be exacerbated by poor air quality.

6.54 We assessed the Authority's quality controls over its air quality monitoring data and the influence of these on the accuracy and completeness of the data and the timeliness of its reporting.

Accuracy

6.55 The National Environment Protection Council does not validate the reports provided to it from the States and Territories under the Air NEPM monitoring and reporting protocol. However, under the Air NEPM protocol, quality control and quality assurance procedures for data collection and validation must comply with requirements of the National Association of Testing Authorities, or similar a body, for accreditation of laboratories.

6.56 We found that the Authority has a series of quality assurance and control procedures in place covering instrumentation, calibration, data validation and staff training to meet the accreditation requirements of the National Association of Testing Authorities. These quality assurance and control procedures apply to the Authority's air quality monitoring activities, with the exception of the mobile laboratory. The Authority has not yet applied for accreditation for the mobile laboratory, purchased in 2000, but advised that procedures for accreditation are currently being established, and that it intends to apply for accreditation with the National Association of Testing Authorities once they have been established.

6.57 Operation of the monitoring stations in the Latrobe Valley is outsourced. However, the Authority requires the operators to be accredited by the National Association of Testing Authorities, and implements additional checks on the data as they become available.

6.58 The Authority also works to ensure continuous improvement through internal audits and quality checks. Examination of assessment reports from the National Association of Testing Authorities showed that the Association had identified significant improvement in the Authority's quality systems and performance in recent years.

Completeness

6.59 The Air NEPM technical guidelines require that to demonstrate compliance with Air NEPM standards, a minimum of 75 per cent of each annual dataset must conform to specified data requirements. In its 2000-01 report to the National Environment Protection Council on Victoria's 2000 dataset, the Authority reported that it did not have sufficient data to demonstrate compliance with the Air NEPM standards for 3 pollutants across 9 stations. However, this covered the period prior to endorsement of the Air NEPM Monitoring Plan. The non-compliance occurred largely due to the need to relocate air monitoring stations and the use of alternate monitoring equipment.

6.60 The Authority advised that many of the issues with availability of conforming data will be removed for the 2001 dataset, as a result of further implementation of its Air NEPM Monitoring Plan. For example, the Authority has worked to ensure its monitoring methods are comparable with those required by the Air NEPM and acceptable to the National Environment Protection Council.

6.61 Some of the 2000 data were also not available due to equipment failures. Validated data capture is affected by such factors as instrument and power failures, maintenance needs, and operational faults. The Authority has introduced internal targets to have a minimum of 95 per cent of compliant data available to measure achievement of most SEPP (Ambient Air Quality) objectives. The Authority advised that the targets are part of a continuous improvement process and are set high to ensure that the Authority meets the Air NEPM requirements for a minimum of 75 per cent compliant data.

6.62 The Authority advised that the maintenance needs of its ageing monitoring equipment will increasingly impact on the operation of the fixed-site network and that its first priority would be to ensure it continues to meet its commitments under the Air NEPM. These needs do not yet appear to have impacted on the collection of monitoring data, with the amount of validated data collected varying little between 1997 and 2000. However, we consider that the ageing equipment still represents a risk to the Authority's ability to meet its Air NEPM data requirements in the longer-term. The Authority should have an equipment strategy in place to manage these risks.

Timeliness

6.63 The Authority provides hourly updates of ambient air quality from its fixed-site monitoring network on its website, using unvalidated data. The timeliness of this reporting is impacted through incidences such as equipment and power failure. Downtime statistics are not available for the air quality page of the Authority's website but the Authority estimates that the web page is available over 90 per cent of the time.

6.64 The ambient air quality monitoring data are validated monthly using a series of documented procedures and the complete annual datasets are also audited, prior to annual reporting, to ensure that all data have been captured correctly. Annual Air Monitoring Reports of the validated datasets are then also provided on the website and as hard copy bulletins.

6.65 Table 6H shows that in the past the Authority has been slow to publicly release its annual Air Monitoring Reports which, among other things, report compliance against SEPP (Ambient Air Quality) objectives.

TABLE 6H

TIMELINESS OF ANNUAL AIR QUALITY MONITORING REPORTS

Monitoring report	*Publication date*
Air Monitoring Report 1997	February 2000
Air Monitoring Report 1998	March 2000
Air Monitoring Report 1999	December 2000
Air Monitoring Report 2000	September 2001

6.66 The Authority has improved the timeliness of these reports with the *Air Monitoring Report 2000,* which comprised data for the 2000 calendar year, being published in September 2001. However, as the Authority's annual reports to the National Environment Protection Council are required by the end of June the following year, it is reasonable to expect that the Authority's annual air monitoring reports to the Victorian public be reported within a similar timeframe. The Authority advised that, from 2002 onwards, it intends the reports on the calendar year monitoring data to be published prior to the June of the following year. The Authority also provides timely information on air quality in its Annual Report, tabled in the Parliament.

Conclusion

6.67 Based on our examinations of documentation associated with the Authority's operating procedures and assessments by the National Association of Testing Authorities, we believe the Authority has a sound system in place for assuring the validity and accuracy of the air quality data it collects. However, there is room for improvement in both completeness of the annual datasets and the timeliness of reporting.

Recommendation

6.68 We recommend that the Authority:

- develops an equipment replacement strategy to ensure that it has sufficient annual data available to meet the reporting requirements of the Air NEPM;
- sets a timeline to achieve accreditation with the National Association of Testing Authorities for its mobile laboratory, as a way of providing the community with assurance over the quality of the data it collects; and
- ensures that its annual Air Monitoring Reports to the public are published in a timely manner.

RESPONSE *by Deputy Chairman, Environment Protection Authority Victoria*

The Air Monitoring Reports referred to by audit (para. 6.64) service a specialised and highly limited market. In addition, the data on which these periodic reports are based are available free on request. The Authority's revised annual Air Monitoring Report, which provides a comprehensive annual survey of air quality trends and outcomes, is given priority for public reporting. In addition, it should be noted that the public has access through the Authority's website to hourly data on Melbourne's air quality year around.

Para. 6.68

The Authority agrees with the first recommendation, (see para. 4.37).

The Authority agrees with the second recommendation. This is planned before June 2003 subject to National Association of Testing Authorities' availability.

The Authority agrees with the third recommendation. This has already been effected with the 2001 report available in May 2002. Further improvements are planned.

REVIEWING AND EVALUATING MONITORING ACTIVITIES

6.69 The Environment Protection Authority's program for review and evaluation of its air quality monitoring activities has been sporadic. Reviews were undertaken in 1992, 1994 and again in 1999, when the Authority contracted representatives from the Ministry of Environment and Energy, Ontario, Canada to review its monitoring, emissions inventory and modelling activities.

6.70 The overall finding from that review was that *"... air quality in the state is quite good and the air programs and staff are for the most part knowledgeable, innovative, dynamic and on the leading edge in many areas"*.[5] The review also noted that the Authority's air monitoring program was fundamentally sound, and provided a series of recommendations for improvement. The review's recommendation for more regular updates of the Authority's emissions inventories has been discussed earlier in this report. Table 6I provides a list of additional recommendations made and indicates their status at the time of preparing this report.

TABLE 6I
REVIEW OF THE MONITORING AND MODELLING PROGRAM 1999, STATUS OF RECOMMENDATIONS

Recommendation		*Action*
(i)	Develop a coherent and consistent approach to monitoring common hazardous air pollutants.	Being addressed at the national level.
(ii)	Develop a supplementary mobile monitoring platform.	Addressed - mobile laboratory purchased and operational.
(iii)	Air quality reports need to be made more readable.	Addressed - reports now prepared to meet the needs of a wider audience.
(iv)	For air modelling the emissions inventories for volatile organic compounds from natural sources and for ammonia require further development.	Partially addressed, further development still required.
(v)	A number of improvements in monitoring air quality in the Latrobe Valley were recommended, including standardisation of Latrobe Valley data handling procedures (by contractor operator) and improved data availability (speed and flexibility).	Addressed - validated data are now available within one month of the end of each month. Investigating cost to obtain hourly data for the website.
(vi)	Instrument upgrades in the Latrobe Valley to reflect state-of-the-art.	Partially addressed, further upgrades planned to replace old instruments over the coming years.
(vii)	Succession planning is needed for some key positions – data validation and modelling.	Currently being addressed.

6.71 The fixed-site monitoring network was also reviewed against Air NEPM requirements in 2000-01, during development of the Air NEPM Monitoring Plan.

6.72 Through its annual business planning process, the Authority has identified the need to review the fixed-site monitoring program again, given the need to meet forthcoming additional National Environment Protection Measure requirements within the same budget and to address longer-term issues of risk and change. The Authority advised that this will be considered during its next corporate planning cycle. It does not yet have a plan or timeline in place for this review and the final form of the legal requirements of any additional National Environment Protection Measures are still to be agreed by Ministers of all jurisdictions.

[5] Ministry of Environment and Energy, Ontario, Canada, *Review of EPA Victoria's Air Quality Modelling and Monitoring Program*, May 1999.

Conclusion

6.73 The Authority has undertaken a number of reviews of its monitoring programs, although these have occurred on an *ad hoc* basis rather than as part of a regular program of review. The Authority has identified the need to review the fixed-site monitoring network soon in response to expanding monitoring needs and ageing equipment issues.

Recommendation

6.74 We recommend that the Authority:

- reviews its fixed-site network and mobile monitoring activities together, to identify an appropriate balance for meeting ambient and local air quality monitoring requirements and information needs from within the Authority's current budget allocation;
- establishes a program for regular review of its monitoring activities; and
- continues to address the recommendations of the 1999 review of its monitoring, emissions inventory and modelling activities.

RESPONSE *by Deputy Chairman, Environment Protection Authority Victoria*

The audit report refers to a recent review of the Environment Protection Authority's modelling and monitoring programs, which found them "fundamentally sound". It refers to a recommendation for "more regular update of emissions inventories" on which the Authority is "yet to act". The Authority was a strong driver of the National Pollutant Inventory for precisely this reason, as noted elsewhere in the audit report. This provides annual updates of emissions, at limited cost to the Authority and the Victorian taxpayer, rather than an internal and expensive process of updates. The Authority believes this is more efficient than the process recommended by the audit report. Inventories (additional to the National Pollutant Inventory) will continue to be updated in response to management and information needs, rather than for their own sake.

Para. 6.74

The Authority agrees with the first recommendation, noting that "balance" simply refers to budgetary aspects as outlined in para. 4.36.

The Authority agrees in part to the recommendation that it establish a program for regular review of its monitoring activities. The Authority believes "regular" updating is less efficient than reviews that are triggered by important changes in available technology, legislative requirements and community attitudes. Note that the Authority has had reviews in 1999 and more recently in the preparation of the NEPM Monitoring Plan. Future reviews are best undertaken in response to air quality management needs.

The Authority agrees with the need to address the recommendations of the 1999 review of monitoring, emissions inventory and modelling activities, noting that most recommendations have already been addressed.

Part 7

Reporting and accountability

AUDIT EXPECTATIONS

7.1 Our expectations for the Environment Protection Authority's reporting and accountability were that:

- as a minimum, reporting by the Authority should meet its legislated obligations and agreements with national bodies;
- information reported publicly by the Authority on air quality should be timely, relevant, appropriate and accurate;
- the Authority should report its performance in delivering outcomes (i.e. performance indicators) and outputs (i.e. performance measures); and
- the Authority's reports to Parliament should encompass best practice public environmental reporting.

7.2 The Authority's information and public education activities are mainly discussed in Part 5 of this report. This Part of the report largely focuses on the Authority's statutory reporting and accountability requirements. However, where considered appropriate some information and public education activities, such as the use of the Authority's website, are discussed.

REPORTING REQUIREMENTS

7.3 We undertook a review of the various legislative requirements for reporting by the Authority, as found in the:

- *Environment Protection Act* 1970;
- *State Environment Protection Policy (Ambient Air Quality)*;
- *State Environment Protection Policy (Air Quality Management)*; and
- *National Environment Protection Council (Victoria) Act* 1995.

7.4 These legislated reporting requirements include the provision of air quality information, information to be collected and/or managed by the Authority and reporting of progress towards achieving the objectives of the State Environment Protection Policies and the *National Environment Protection (Ambient Air Quality) Measure*. The intent of these requirements is to keep the public informed about air quality issues, and to make the Authority accountable to the community.

7.5 The majority of these requirements are met annually through:

- The Authority's Annual Report, tabled in Parliament;
- The Air Monitoring Report, published in hardcopy and on the Authority's website; and
- Reporting by the Minister for Conservation and Land Management to the National Environment Protection Council. This report is incorporated in that Council's Annual Report which is tabled in the Commonwealth Parliament.

7.6 The SEPP (Ambient Air Quality) and the recently introduced SEPP (Air Quality Management) require regular reporting on progress towards meeting policy objectives and intentions. The first requirement is partly met through the Minister's report to the National Environment Protection Council insofar as the objectives of the Air NEPM overlap with those of the SEPP (Ambient Air Quality). In addition, the Air Monitoring Report reports annually on ambient air quality and exceedences of objectives. However, as the SEPP (Air Quality Management) was introduced only in 2001, the Authority has not yet reported against the intentions established in that policy.

7.7 The SEPP (Air Quality Management) also requires that the Authority regularly disseminate information to the community about air quality and its implications. In this regard, the Authority issues a range of information and publications, including "one-off" publications, such as the *Hospital Admissions Report: Ambient Air Pollution and Daily Hospital Admissions in Melbourne 1994-97* and the *Air Emissions Inventory, Port Phillip Region, December 1998.* Newsletters and a collection of material found on the website also provide information to the public about air quality and health impacts. However, we found that no regular report currently links programs and air quality data to the health impacts of air emissions, the occurrence and impact of "hot spots", and the impact of motor vehicles, or less quantifiable policy objectives.

7.8 Long-term analysis on the Authority's progress on meeting emission levels and exceedences of the SEPP (Ambient Air Quality) objectives was missing from the most recent Annual Report. The Authority's *Air Quality Trend Report* provides a long-term analysis of air quality trends and related discussion of the main influences on trends data over the longer-term. This is published irregularly with the last such report covering the 15-year period ending in 1993.

TIMELY, RELEVANT, APPROPRIATE AND ACCURATE INFORMATION

Timely

7.9 As discussed earlier in this report, we found that there have been delays in the production of the annual Air Monitoring Report. While the turnaround time has improved in recent years, it is still considered slower than necessary.

7.10 The Authority advised that it has plans to improve the timeliness of production of the report and is aware of the potential for duplication of reporting material between its various reporting requirements. It intends to streamline the data provision process by using the same information and graphics and to supplement the common data with additional information in each report, as necessary.

Relevant and appropriate

7.11 It is important that the Authority provides relevant and appropriate information to the community about its activities and goals, and progress towards achieving those goals in order to keep interested parties informed about air quality issues and the Authority's performance.

7.12 We found that the information and reports issued by the Authority are relevant. The various annual reports, regular newsletters, on-line "Industry Update" and individual reports such as the Hospital Admissions Report are all examples of material relevant to air quality and, therefore, of interest to the community, industry and other stakeholders. However, as discussed earlier in this Part of the report we believe there are some gaps in the reporting.

Accurate

7.13 The Authority needs to ensure data reported are accurate in order to maintain its integrity with the community and other parties. As discussed earlier in this report, the Authority has processes in place to address air quality data validation and audit. However, daily air quality data that appears on its website is noted as not yet validated and acknowledged as subject to modification. In this instance, the need for timely information is given greater importance than accuracy.

PERFORMANCE REPORTING

7.14 Performance management is the means by which an organisation is able to monitor and assess its success in meeting its stated objectives and intentions. Performance reporting is the mechanism by which it provides accountability to the general public for its activities.

Performance indicators

7.15 The objectives of the SEPP (Ambient Air Quality), which identify emission and exceedence levels for the common indicator pollutants, are used as indicators of the Authority's performance in managing air quality. The results are reported in the annual Air Monitoring Report, the Minister's report to the National Environment Protection Council and, to some extent, in the Authority's Annual Report.

7.16 The State Environment Protection Policies for Ambient Air Quality and Air Quality Management establish the broad aims and objectives for the State's air quality as well as 10-year goals for the 7 indicator pollutants. However:

- The SEPP (Ambient Air Quality) does not provide incremental targets to enable measurement of progress, and by inference, to assess the effectiveness of the Authority's air quality management activities during the interim period, i.e. between 1998 and 2008; and

- The SEPP (Air Quality Management) does not provide any targets to enable monitoring or measurement of achievements against the policy intents identified. For example, for motor vehicles, the policy intent is that *"Motor vehicle emissions will be managed through the adoption of national emission control and fuel quality requirements, improving the in-service performance of motor vehicles, managing the overall level of motor vehicle use, facilitating the introduction of low-emission technologies and fuels, and encouraging less-polluting means of transport needs".*

7.17 The implementation of the State Environment Protection Policies is binding on all Victorians. The Authority considers that while it has responsibility for encouraging others to achieve the objectives and intents of those policies, it should not be held solely accountable for the outcomes achieved, particularly as the activities of many other government agencies impact on those outcomes. Nevertheless, we believe that the Authority needs to be accountable for its performance in implementing the established policies.

7.18 Expert advice provided to the audit team indicated that, as meteorological and other conditions can have significant impacts on air quality over the short-term, assessment of effectiveness, in terms of whether goals or objectives are achieved is best made based on analysis of long-term trends, over a 10-year period. While acknowledging the difficulty in developing measures of short-term performance, we consider it essential that the Authority determine performance indicators, measures and targets appropriate for measuring its success in managing air quality over the short and medium-term.

Reporting

7.19 The Authority reports on a number of performance measures over a 5 year period, in its Annual Report. These relate to licensing activities, pollution notices, information inquiries, enforcement and infringement notices, and smoky vehicles reported and prosecuted. We found that few of these performance measures are discussed in relation to the success or otherwise of particular initiatives and strategies in meeting the Authority's objectives.

RESPONSE *by Deputy Chairman, Environment Protection Authority Victoria*

The commentary in para. 7.16 suggests that targets for air quality should be set in State environment protection policy, as well as the 10-year goal. This is inconsistent with the acknowledgement in para. 7.18 that "it can take decades before an accurate assessment of the effectiveness of air quality management initiatives can be made", and the expert advice provided elsewhere in the audit report - "To determine a trend in levels of air pollutants, 10 or more years of data are generally required ...". The Authority agrees with this later statement, and sets goals on a 10-year basis.

Audit has misinterpreted the nature and purpose of the intent statement in statutory policies. These are not intended as the basis for specific qualitative targets, but to provide a clear understanding of the broad outcomes which the policy is framed to help achieve.

TRIPLE BOTTOM LINE REPORTING

7.20 Triple bottom line reporting is the provision of information relating to an organisation's performance in sustainable development, defined in terms of economic, environmental and social components. The Authority promotes triple bottom line reporting by industry. However, it does not currently report in this manner itself, nor is it currently required to do so.

7.21 The Authority is required to communicate its own environmental performance in its Annual Report and uses an environmental management system based on the ISO 14001 international standards to do this. This system identified 5 areas of environmental impact including reduction in paper consumption, travel kilometres and fuel efficiency. The Authority reports on each of these in its Annual Report and performance targets are being progressively established. However, we consider that current social and economic impact reporting by the Authority merits attention.

7.22 The Authority advised that it will commence triple bottom line reporting next year focusing on specific internal priority issues, and will consult with community and industry to determine their priorities. As this process is just commencing, we consider it will be some years before the Authority's triple bottom line reporting reaches better practice standards.

7.23 Guidance in the development of the Authority's triple bottom line reporting can be taken from the framework for Public Environmental Reporting[1] developed by Environment Australia. In addition, the Coalition for Environmentally Responsible Economies and the United Nations Environment Program, along with a number of international non-government organisations, have developed the Global Reporting Initiative program to provide a guideline for public reporting on both environmental and social performance.

RESPONSE *by Deputy Chairman, Environment Protection Authority Victoria*

The Authority will be employing a triple bottom line frame of reference in its next Annual Report to account for its own activities. It is impracticable for a single agency of government to comprehensively monitor social and economic outcomes across the entire sphere of environment.

However, as an indicator of the Authority's visionary pursuit of the 'triple bottom line' the reader should consider the benefits derived from Environment Improvement Plans promoted and facilitated by the Authority over the last 10 years (para. 5.68).

A recent independent evaluation showed that the Plans have been successful in:

- *directly empowering local communities;*
- *increasing pressure on companies to improve their environmental performance;*
- *greatly improving relationships between communities, private enterprises and the Authority;*
- *improving environmental outcomes on issues of community concern;*
- *increasing the level of trust between communities and companies; and*
- *creating a more predictable investment climate.*

[1] *A Framework for Public Environmental Reporting: An Australian Approach*, Environment Australia, Canberra, 2000.

CONCLUSION

7.24 The Authority reports in compliance with its legislative requirements. However, there remains room for improvement, particularly in relation to timeliness of reporting of air quality data, more regular reporting on long-term air quality trends, providing information on the health impacts of air quality, establishment of and reporting against performance indicators and measures, and adopting better practice environmental reporting.

Recommendations

7.25 We recommend that the Authority meets the reporting requirements of the recently introduced SEPP (Air Quality Management), particularly in relation to:

- progress towards meeting the policy's intentions; and
- impacts of air quality (including on matters such as health and the occurrence and impact of "hot spots").

7.26 We recommend that the Authority should supplement the indicators measuring the 10-year goals for air quality established under the Air NEPM and the SEPP (Ambient Air Quality) with a set of performance indicators or measures that enable:

- measurement and monitoring of progress in the short-term and effectiveness of activities in the medium-term; and
- measurement and monitoring of achievements against the policy intents identified in the SEPP (Air Quality Management).

7.27 We recommend that the Authority's Annual Report should:

- provide discussion in relation to the success or otherwise of particular initiatives and strategies in meeting the Authority's objectives; and
- reflect best practice triple bottom line principles.

***RESPONSE** by Deputy Chairman, Environment Protection Authority Victoria*

Para. 7.25

The SEPP provides the strategic and statutory anchor with a ten-year horizon, it is supported by longer-term planning out to 20 years, and implemented via more focused budget planning at a 3 and one-year time frame.

The Authority agrees that it would be useful to set progress targets for activities but recognises that the audit report states that setting interim air quality targets would be inappropriate.

Para. 7.26

The Authority disagrees with the first recommendation. This is not technically justified (as per expert advice to the audit). Annual reports will continue to note progress as appropriate.

The Authority agrees, in part, with the second recommendation. Audit has misinterpreted the nature and purpose of the intent statement in statutory policies. These are not intended as the basis for specific targets, but to provide a clear understanding of the broad outcomes which the policy is framed to help achieve.

Para. 7.27

The Authority agrees with the recommendations made.

Appendix A

Air quality data

In addition to the charts presented in Part 2 of this report, the following charts show the trends in Victoria's air quality and comparisons with other jurisdictions.

In these charts, the following abbreviations may appear:

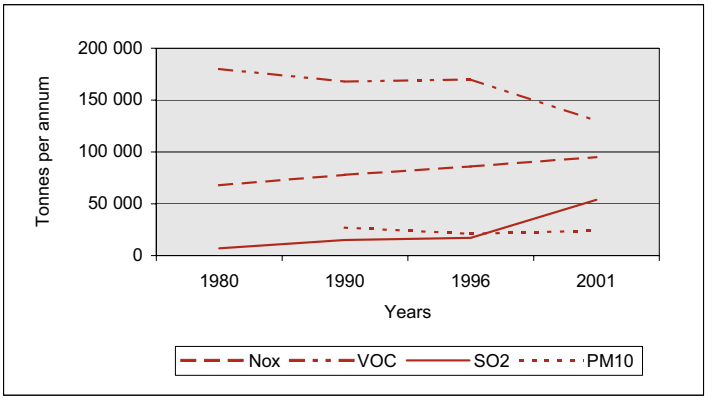
Abbreviation	*Term*
CO	Carbon monoxide
NO_2	Nitrogen dioxide
NO_x	Nitrogen oxides
SO_2	Sulfur dioxide
Pb	Lead
O_3	Ozone
PM_{10}	Particles less than 10 microns in size
$PM_{2.5}$	Visibility reducing particles (particles less than 2.5 microns in size)
VOC	Volatile organic compounds
API	Airborne particle index
tonnes/a	Tonnes per annum
$\mu g/m^3$	Micrograms per cubic metre
ppm	Parts per million
ppb	Parts per billion

VICTORIAN AIR QUALITY DATA

Emission trends

Emission trends are shown in Chart A1. Emissions in different years need to be interpreted carefully due to the different methodologies used and regions surveyed. The "increase" in sulfur dioxide in 2001, for example, reflects the inclusion of a major source not previously covered by past pollution inventories.

CHART A1
TRENDS IN EMISSIONS IN THE PORT PHILLIP REGION



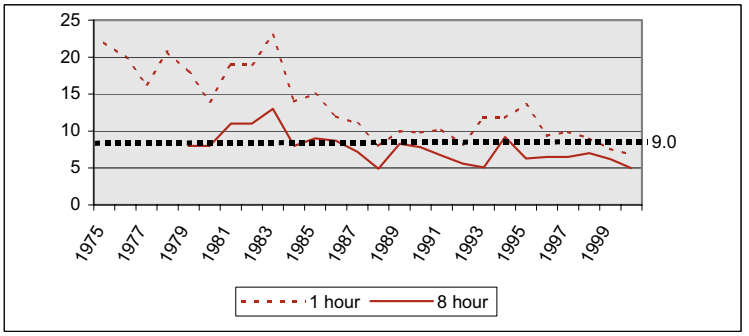
Source: Adapted from Environment Protection Authority Emissions Inventory Reports (1990, 1998), and National Pollutant Inventory Database.

There is a clear downward trend in volatile organic compounds over the past 20 years while nitrogen oxides have shown a steady increase. There has been little change in the volume of PM_{10} emissions over the past decade.

Carbon monoxide

Chart A2 shows the trend in peak ambient one hour and 8 hour average carbon monoxide levels in the Port Phillip region. The flat trend over the past 10 years is consistent with the static nature of motor vehicle emission standards for carbon monoxide emissions over this period. The ambient air quality objective for carbon monoxide of 9 ppm, 8 hour average, has been met in Victoria since the mid-1980s.

CHART A2
TRENDS IN PEAK CARBON MONOXIDE LEVELS, PORT PHILLIP REGION
(ppm)

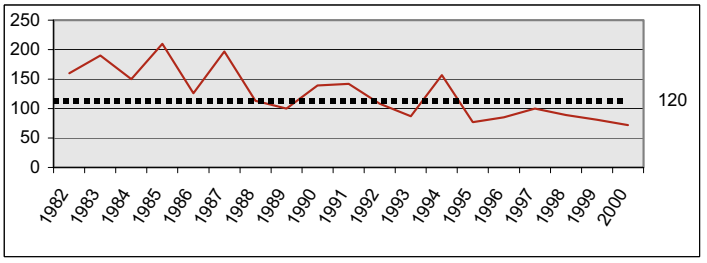


Note: The current standard under the SEPP (Ambient Air Quality) is 9 parts per million for 8 hours.
Source: Environment Protection Authority.

Nitrogen dioxide

Chart A3 shows the trend in peak nitrogen dioxide levels in the Port Phillip region. Levels of nitrogen dioxide have decreased over the past 20 years. The ambient objective for nitrogen dioxide of 0.12 ppm, one hour average (120 ppb) has been met since the mid-1990s.

CHART A3
TRENDS IN PEAK ONE HOUR NITROGEN DIOXIDE LEVELS, PORT PHILLIP REGION
(ppb)

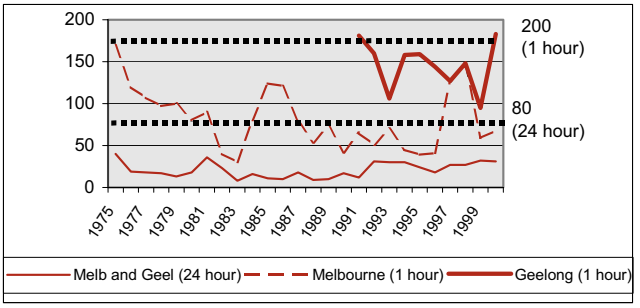


Note: The current standard under the SEPP (Ambient Air Quality) is 120 parts per billion for one hour.
Source: Environment Protection Authority.

Sulfur dioxide

Chart A4 shows the trend in peak ambient one hour and 24 hour average sulfur dioxide levels in the Port Phillip region. There are no apparent trends in the 24 hour average levels. The year-to-year variations in peak one hour average levels reflect the impact of local sources such as the major oil refineries at Altona and Geelong and ships. The ambient one hour and 24 hour objectives for sulfur dioxide of 0.2 ppm (200 ppb) and 0.08 ppm (80 ppb), respectively, are being met.

CHART A4
TRENDS IN PEAK SULFUR DIOXIDE LEVELS, PORT PHILLIP REGION
(ppb)

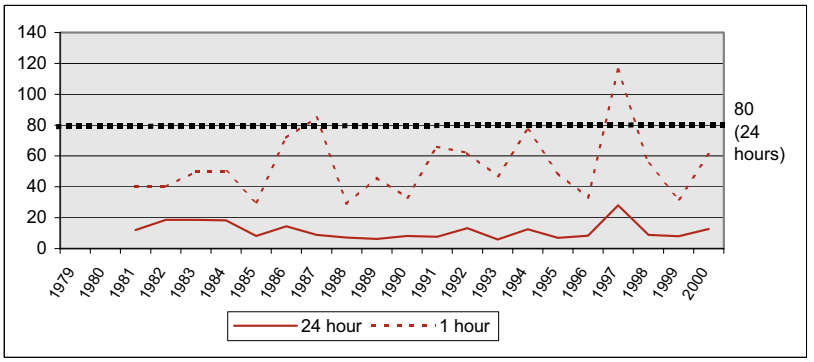


Note: The current standard under the SEPP (Ambient Air Quality) is 80 parts per billion for 24 hours and 200 parts per billion for one hour.

Source: Environment Protection Authority.

Chart A5 shows trends in the Latrobe Valley.

CHART A5
TRENDS IN ONE HOUR AND 24 HOUR AVERAGE SULFUR DIOXIDE LEVELS, LATROBE VALLEY
(ppb)



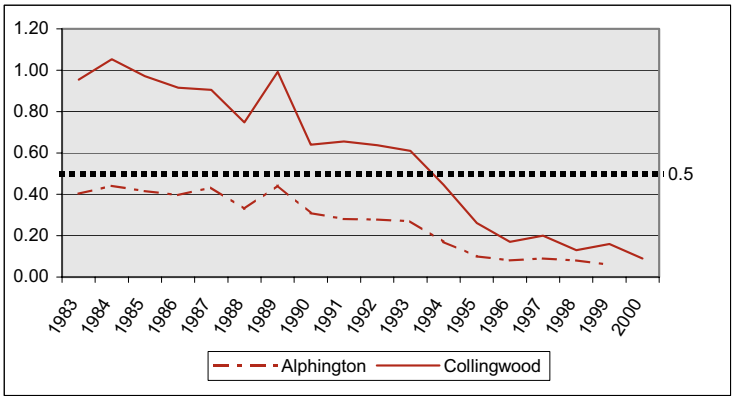
Note: The current standard under the SEPP (Ambient Air Quality) is 200 parts per billion for one hour and 80 parts per billion for 24 hours.

Source: Environment Protection Authority.

Lead

Chart A6 shows the trend in ambient lead levels (µg/m^3) in the Port Phillip region. The downward trend is a result of progressive reductions in the lead content of petrol. The ambient objective for lead of 0.5µg/m^3 annual average has been met. New fuel quality standards require all petrol to be lead-free from 1 January 2002.

CHART A6
TRENDS IN ANNUAL LEAD CONCENTRATIONS, PORT PHILLIP REGION
(µg/m^3)

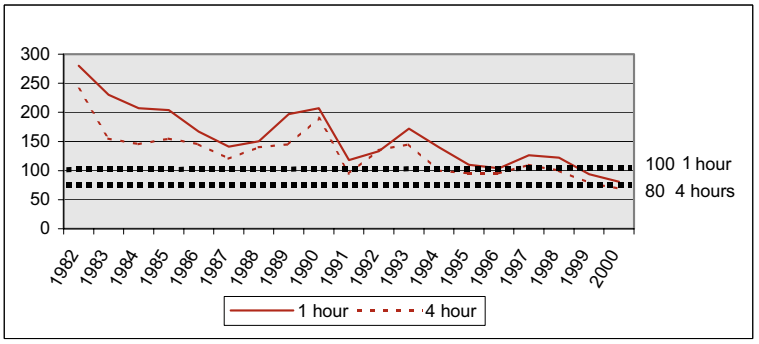


Note: The current standard under the SEPP (Ambient Air Quality) is 0.5 µg/m^3 average per year.
Source: Environment Protection Authority.

Ozone

Chart A7 shows the trend in peak one hour and 4 hour ozone levels in the Port Phillip region.

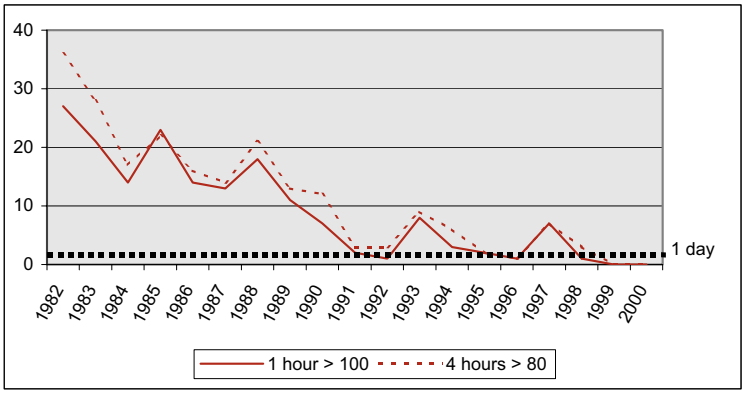
CHART A7
TRENDS IN MAXIMUM OZONE LEVELS, PORT PHILLIP REGION
(ppb)



Note: The current standard under the SEPP (Ambient Air Quality) is 80 parts per billion for 4 hours and 100 parts per billion for one hour.
Source: Environment Protection Authority.

Chart A8 shows the trend in the frequency with which the ambient objectives for ozone are exceeded. The one hour and 4 hour objectives for ozone are 0.10 ppm (100 ppb) and 0.08 ppm (80 ppb), respectively.

CHART A8
FREQUENCY OF OZONE EXCEEDENCES, PORT PHILLIP REGION
(days)



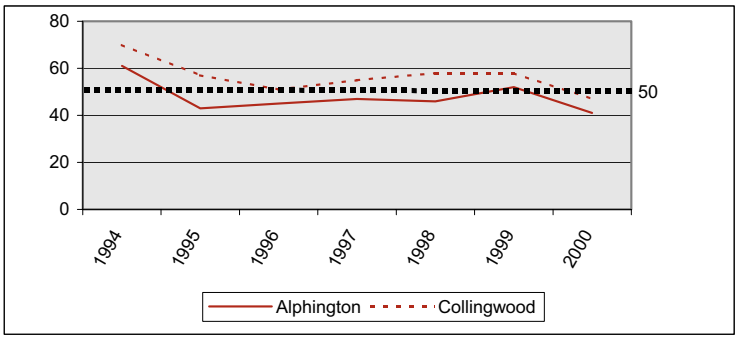
Note: The current standard under the SEPP (Ambient Air Quality) is one day per year.
Source: Environment Protection Authority.

Both objectives are exceeded in the region. However, peak levels and frequency of exceedences have progressively fallen. The falling levels reflect the reductions in volatile organic compounds emissions over the same period.

Particles as PM_{10}

Chart A9 shows the trend in peak 24 hour average PM_{10} concentrations in the Port Phillip region. Alphington is a suburban site away from heavy traffic whereas the Collingwood site is close to heavy traffic routes. The data record is too short to determine trends. Peak levels have exceeded or are close to the ambient air quality objective for PM_{10} of 50 $\mu g/m^3$ 24 hour average.

CHART A9
TRENDS IN MAXIMUM 24 HOUR AVERAGE PM_{10} LEVELS, PORT PHILLIP REGION
($\mu g/m^3$)



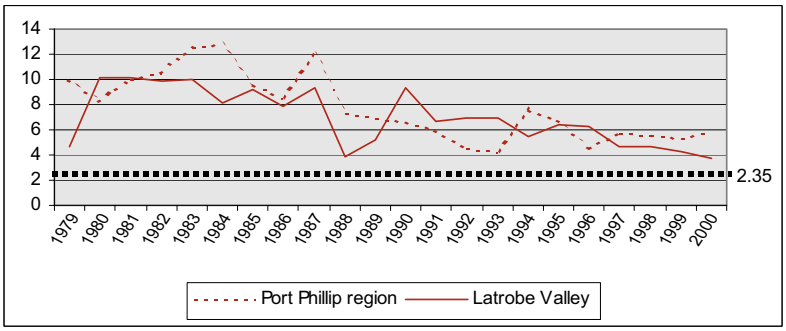
Note: The current standard for PM_{10} under the SEPP (Ambient Air Quality) is 50 $\mu g/m^3$ for one day.
Source: Environment Protection Authority.

Visibility reducing particles

Fine particles scatter light and are responsible for reduced visibility. Particles of around 0.1 micron give maximum scatter. The nephelometer is an instrument that measures the amount of light scattered in a sample of air and records this as an airborne particle index (API). An API of 2.35 corresponds to a visibility of 20 kilometres, which is the ambient one hour average air quality objective for visibility reducing particles in Victoria. For any site, API can be used as an indicator of concentration of particles less than 2.5 microns ($PM_{2.5}$) provided a calibration for the site is carried out.

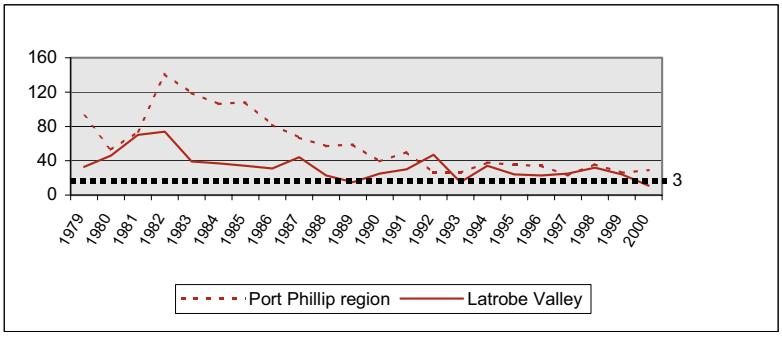
Charts A10 and A11 show trends in peak API levels and how often the visibility objective of 20 km (one hour API of 2.35) is exceeded the Port Phillip and Latrobe Valley regions. The downward trends have levelled off in 2000. Peak levels are now approximately half the levels in the mid-1980s and exceedences have fallen by around two-thirds. The SEPP objective for visibility, however, is still regularly exceeded.

CHART A10
TRENDS IN MAXIMUM ONE HOUR AVERAGE VISIBILITY, PORT PHILLIP REGION AND LATROBE VALLEY
(API index)



Note: The current standard under the SEPP (Ambient Air Quality) is to see over a distance of 20 kilometres for one hour. This is equivalent to the API of 2.35.
Source: Environment Protection Authority.

CHART A11
TRENDS IN EXCEEDENCES OF THE VISIBILITY OBJECTIVE, PORT PHILLIP REGION AND LATROBE VALLEY
(days)



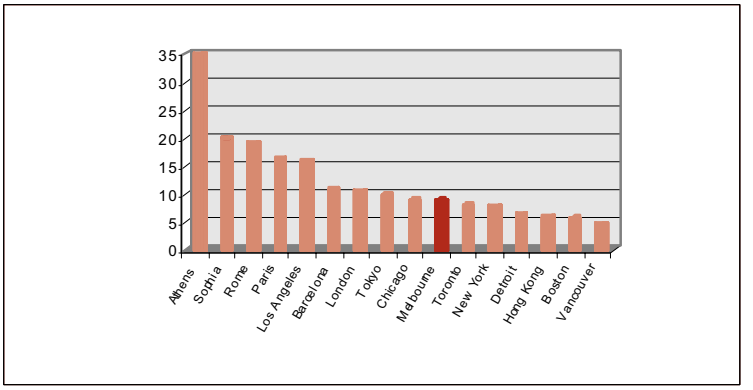
Note: The current standard under the SEPP (Ambient Air Quality) is exceedences of the visibility objective for a maximum of 3 days per year.
Source: Environment Protection Authority.

INTERSTATE AND INTERNATIONAL COMPARISONS

The size, extent and length of records, meteorology, and monitoring and reporting procedures are different in different jurisdictions, therefore comparisons of air quality data are not a perfect benchmark of air quality between jurisdictions.

Chart A12 shows that carbon monoxide levels in Melbourne are near the levels recorded for New York, Toronto and Chicago. These cities all share high traffic densities and large suburban sprawls.

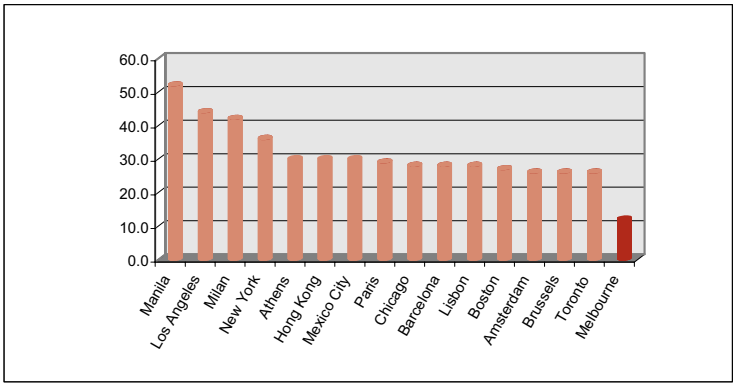
CHART A12
MAXIMUM 8 HOUR CARBON MONOXIDE LEVELS, SELECTED CITIES, 1994
(ppb)



Source: Adapted from Draft Air Quality Improvement Plan, Environment Protection Authority, 2000.

Chart A13 shows that Melbourne has the lowest nitrogen dioxide levels of the cities in the comparison. Nitrogen dioxide levels are mainly influenced by topography, weather and climate. Melbourne's location and climate reduces the potential for nitrogen dioxide to form in the atmosphere in comparison with other major cities in the world.

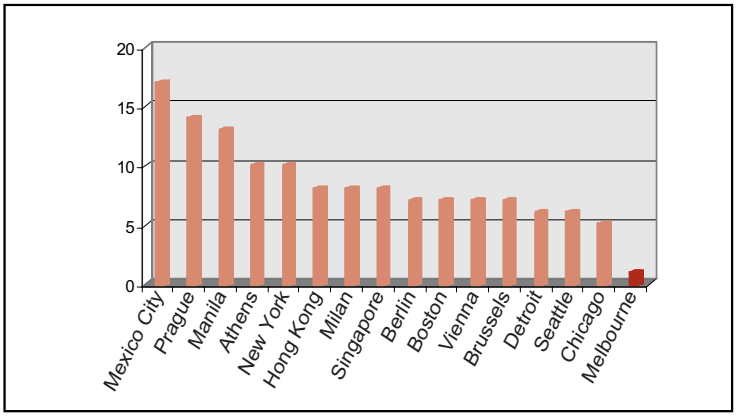
CHART A13
ANNUAL MEAN NITROGEN DIOXODE, SELECTED CITIES, 1995
(ppb)



Source: Adapted from Draft Air Quality Improvement Plan, Environment Protection Authority, 2000.

Chart A14 shows that the level of sulfur dioxide in Melbourne is lower than for most of the other major cities in the comparison. Melbourne's oil and coal have a lower sulfur content than the fuels used in other countries.

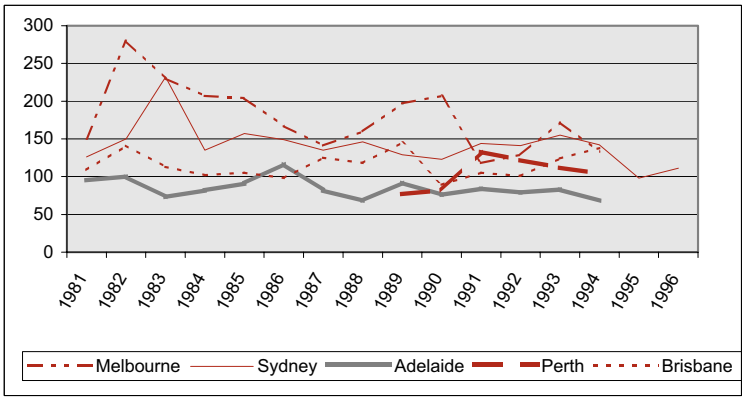
CHART A14
ANNUAL MEAN SULFUR DIOXIDE, SELECTED CITIES, 1995
(ppb)



Source: Adapted from Draft Air Quality Improvement Plan, Environment Protection Authority, 2000.

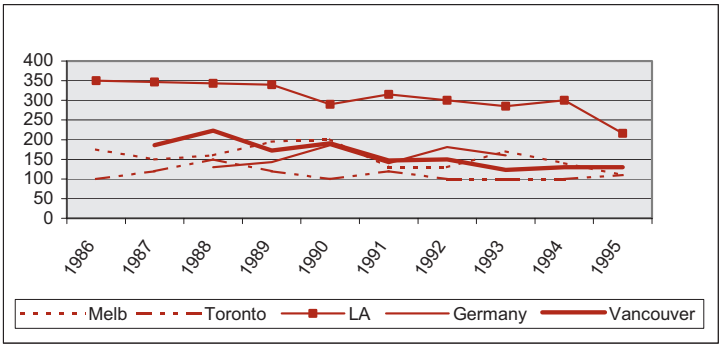
Charts A15 and A16 show the trends in ozone levels in Australian capital cities and selected overseas cities.

CHART A15
TRENDS IN PEAK ONE HOUR OZONE LEVELS, AUSTRALIAN CAPITAL CITIES (ppb)



Source: Environment Protection Authority.

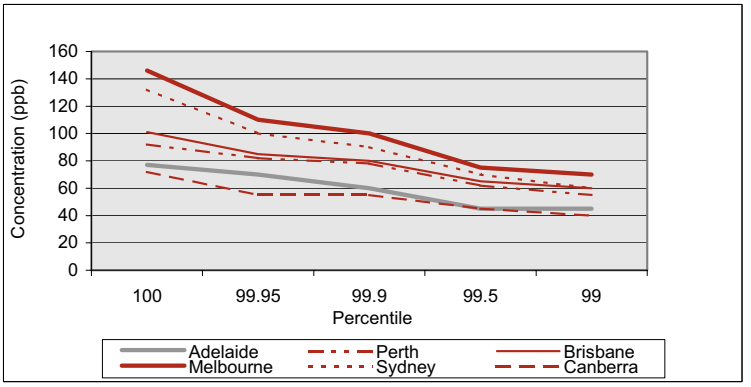
CHART A16
TRENDS IN PEAK OZONE LEVELS, OVERSEAS CITIES
(ppb)



Source: Adapted from the Draft Air Quality Improvement Plan, Environment Protection Authority, 2000.

Chart A17 shows how 4 hour average ozone levels were distributed during the 3 years 1993, 1994, and 1995 in each of the Australian capital cities.

CHART A17
FREQUENCY DISTRIBUTION OF 4 HOUR AVERAGE OZONE LEVEL, AUSTRALIAN CITIES, 1993 TO 1995
(ppb)

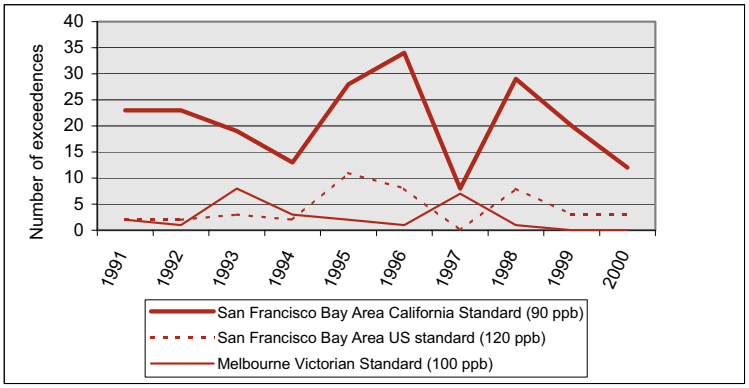


Source: NEPC Revised Impact Statement for the Ambient Air Quality NEPM, 1998.

Chart A17 shows that the ambient objective for ozone of 0.08 ppm (80 ppb) was breached in Melbourne, Sydney, Brisbane and Perth. Such exceedences are rare in the smaller cities and infrequent in Sydney and Melbourne. For Melbourne, the objective was exceeded less than 0.4 per cent of the time during those years.

Chart A18 compares compliance with ambient ozone standards in the San Francisco Bay area of the United States, and in Melbourne. In Australia, the National Ambient Air Quality Standard has been adopted by all jurisdictions, including Victoria. For ozone this is 0.1 ppm (100 ppb). In the USA, California has adopted a standard of 90 ppb for ozone, which is stricter than the US national standard of 120 ppb. There are large year-to-year variations in the level of compliance in each jurisdiction. Since large variations in ozone emissions are unlikely these variations are almost certainly due to annual variations in meteorology.

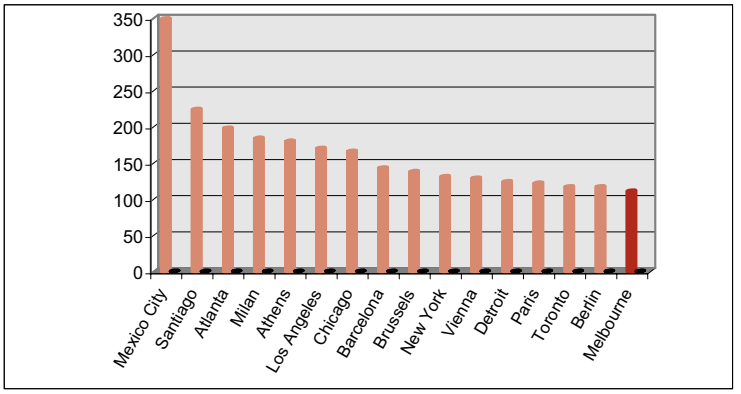
CHART A18
TRENDS IN COMPLIANCE WITH AIR QUALITY STANDARDS/OBJECTIVES, MELBOURNE AND SAN FRANCISCO
(number of exceedences)



Sources: Environment Protection Authority and *10 year Bay Area Air Quality Summary* 2000.

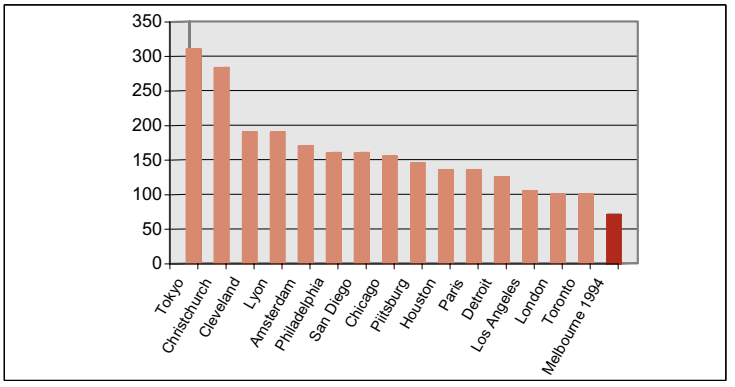
Chart A19 to A20 compare peak ambient pollutant levels in Melbourne with peak pollutant levels selected overseas cities for 1993, 1994 or 1995. In general, Melbourne's air quality is better than most of the selected cities.

CHART A19
MAXIMUM ONE HOUR OZONE LEVELS,
SELECTED CITIES, 1995
(ppb)



Source: Adapted from Draft Air Quality Improvement Plan, Environment Protection Authority, 2000.

CHART A20
MAXIMUM 24 HOUR PM_{10} LEVELS,
SELECTED CITIES, 1993
($\mu g/m^3$)



Source: Adapted from Draft Air Quality Improvement Plan, Environment Protection Authority, 2000 (Melbourne value is for the 1994 year).

Appendix B

Approaches used in other jurisdictions

ECONOMIC TOOLS USED IN OTHER JURISDICTIONS

Increasingly, environment protection agencies in OECD countries are using economic instruments to introduce a financial incentive to reduce pollution. Economic instruments can take a range of forms including taxes, fees, charges, incentives and subsidies. The main advantages of economic instruments are cited as being:

- the potential to achieve larger reductions in pollution than would occur using regulation;
- lower costs in controlling pollution than can be achieved using regulation; and
- the potential to stimulate technological improvements and innovation.[1]

Taxes

In some international jurisdictions, taxes are used widely to encourage improved environmental performance, as summarised in Table B1. Taxes may be placed on the generator of air emissions, which can be either the consumer, the producer of the output, or supplier of the inputs. Usually, the generator is required to pay a designated fee for each unit of pollution. The key criticisms of this approach are the potential to reduce international competitiveness and that the rates are usually set too low to adequately compensate for the damage caused by pollution, or to force the generator to alter its behaviour.

According to a recent report by the OECD[2], the introduction of environmental taxes has not reduced international competitiveness. However, exemptions have often been used to protect local industry or the taxes have been applied on the consumer rather than on the generator. In Australia, for example, the Victorian Environment Protection Authority led negotiations to ensure oil companies did not charge more for unleaded petrol when it was introduced in 1986. A price differential for leaded petrol was introduced in 1994, and in 1999 a *Measures For A Better Environment* package was announced, including some measures specifically concerning fuel taxation.[3]

[1] For example, see Gunningham, N. and P. Grabosky, *Smart Regulation: Designing Environmental Policy*, Oxford, U.K.: Oxford University Press, 1998.

[2] Organisation for Economic Cooperation and Development, *Environmentally related taxes in OECD countries – issues and strategies*, 2001.

[3] These include an excise differential for low sulfur diesel (to be introduced 1 January 2003), the Product Stewardship (Oil) Scheme, the Energy Grants (Credits) Scheme which is intended to replace the Diesel and Alternative Fuels Grants Scheme and the Diesel Fuel Rebate Scheme from July 2002.

Taxes on motor vehicle sales or registrations can affect whether a vehicle is purchased and also the type of vehicle purchased. In Germany, over a 2½-year period (1997-2000), motor vehicle registration taxes which differentiated between high or low fuel consumption led to a decrease in the number of high consuming vehicles from 6.9 million to 3 million. Over the same period, the number of vehicles that complied with Euro emission standards increased from 6.2 million to 16 million (of a total car fleet of 42.4 million). In Sweden, following the introduction of rebates for vehicle registration, sales tax concessions and diesel taxes, the number of cleaner cars rose from 16 per cent to 75 per cent over the 3 year period from 1993 to 1996. The Swedish Government, however, attributed this change to advertising rather than vehicle costs.

TABLE B1
ENVIRONMENTAL TAXES ON INDUSTRY IN OECD COUNTRIES

Country	*Tax*
Denmark	Differing tax rates on petrol stations depending on the vapour recovery system used.
Norway, Denmark	Tax on tetrachloroethylene use.
Sweden	Taxes volatile organic compounds.
Sweden, Denmark, Finland, Norway	Taxes on carbon dioxide emissions.
Austria	Taxes on electricity usage.
Italy	Carbon monoxide tax on mineral fuels.
The Netherlands	General fuel tax.
Belgium	Tax on some energy products.
Germany	Taxes to promote energy efficiency, industrial reform and to fund renewable energy.

Sources: The United States Experience with Economic Incentives for Protecting the Environment, U.S. Environmental Protection Agency, EPA-240-R-01-001, January 2001 and *Environmentally related taxes in OECD countries – issues and strategies*, OECD, 2001.

International jurisdictions report significant reductions in emissions of indicator pollutants due to environmental taxes, including:

- reductions in carbon dioxide emissions due to emission taxes (OECD report), e.g. a 21 per cent reduction from stationary combustion plant over a 4 year period in Norway; and
- an estimated reduction in sulfur emissions of 80 per cent below 1980 levels by 1999 since the introduction of the sulfur tax in Sweden in 1991.

Taxes may also be applied to vehicles or fuel to encourage reduced emissions, as shown in Table B2.

TABLE B2
ENVIRONMENTAL TAXES ON TRANSPORT IN OECD COUNTRIES

Country	*Tax*
Austria, Finland, Denmark, Norway, Sweden, United Kingdom	Diesel taxes.
Austria, Germany, Norway, Denmark	Differentiated vehicle taxes - adjusted according to the emissions of the vehicle.
United States of America	Tax on sale of new vehicles with a fuel efficiency less than 22.5 miles per gallons - introduced in 1978 - tax ranges from $US1 000 to $US7 700 per automobile. Minivans, trucks and sport utility vehicles are exempt.
Japan	Differentiated annual vehicle registration fees - older vehicles (with higher emissions) pay more.
Austria, Ontario (Canada)	Environmental taxes on motor vehicles.
Austria	Tax on registration, depending on fuel efficiency. The tax is higher for diesel vehicles.
Japan, Ireland, United States of America, Canada	Tax on aviation fuel for domestic flights.
Norway	Tax on aircraft passenger seats, includes international flights.

Sources: The United States Experience with Economic Incentives for Protecting the Environment, U.S. Environmental Protection Agency, EPA-240-R-01-001, January 2001 and *Environmentally related taxes in OECD countries – issues and strategies*, OECD, 2001.

We were unable to find any examples of taxes applied by other Australian States for environmental purposes. In many cases within Australia, National Competition Policy may preclude the introduction of such mechanisms.

TABLE B3
APPROACHES TO
CONTROLLING MOTOR VEHICLE EMISSIONS

Jurisdiction	*Details*
New South Wales	Action for Transport 2010: An Integrated Transport Plan for Sydney initiated by the New South Wales Department of Transport in 1998 which has targets for: • halting growth in per capita vehicle kilometres travelled by 2011; • buying 150 low-emission compressed natural gas buses by 2000; and • expanding the off-road bike network by 300 kms by 2010. In 1998, the New South Wales State Government trialled 2 hybrid electric buses in Sydney, and in 2001 Brisbane City Council purchased 5 Compressed Natural Gas buses as the start of a 3 year program to purchase 120 gas buses.
Western Australia	The *Transperth* bus fleet of 868 buses is being completely replaced with air-conditioned, low floor, easy access, low emission buses, over a 12 year period starting 2003-04. Decisions already taken have resulted in Western Australia leading the nation in adopting cleaner transport fuels. These fuels, combined with effective emission reduction technologies being applied to Australian vehicles on an accelerated timetable to improve Perth's air quality over the next 10 years.
Canada	The Canadian Government has passed regulations to reduce air pollution resulting from motor vehicle tailpipe emissions. These include regulations to reduce the level of sulfur in diesel fuel and petrol and the level of benzene in petrol. In May 2000, Environment Canada announced a national program with immediate and long-term actions to reduce pollutants that contribute to smog and declared particulate matter toxic under the *Canadian Environmental Protection Act* 1999. In February 2001, Environment Canada announced a 10 year regulatory road map for cleaner vehicles and fuels.
California	Targets for increasing the number of in-service zero emission vehicles have been introduced.
Singapore	Use of motor vehicles is limited on certain days of the week.
Japan	Increased registration fees introduced for older vehicles.
United Kingdom	Annual vehicle inspections introduced requiring a significant investment in strategically located testing facilities either by government or private operators plus a cost for the motor vehicle owner when their vehicle is tested.
United States of America	In January 2002, the United States Government announced a multi-million dollar research project aimed at developing fuel-cell technology for motor cars in partnership with domestic car manufacturers. Several automakers, including Daimler Chrysler AG, Ford Motor Company and General Motors Corporation, expect to have fuel-cell vehicles in showrooms within the next 4 or 5 years, although wide availability of such cars is probably a decade or more away.
London	In 2001, 3 hydrogen powered fuel-cell buses were trialled and it was announced that some of the capital's 20 000 black taxi cabs were being fitted with pollution cutting catalytic converters. Other cabs in the fleet are converting from diesel to the much cleaner liquefied petroleum gas.

Appendix C

Standards

10-YEAR GOALS FOR VICTORIA'S AIR QUALITY

The *State Environment Protection Policy for Ambient Air Quality* is to achieve the Air NEPM objectives by 2008. The objectives were introduced in 1999 and all States and Territories participating in the Air NEPM have agreed to meet the same standards. Previous standards were less stringent.

The Table C1 below shows the objectives for the indicator pollutants and the 10-year policy goals for air quality.

TABLE C1
SEPP (AMBIENT AIR QUALITY)
ENVIRONMENTAL QUALITY OBJECTIVES AND 10-YEAR GOALS

Indicator pollutant	*Averaging period*	*Objective*	*Goal within 10 years maximum allowable exceedences*
Carbon monoxide (maximum concentration)	8 hours	9.0 ppm	1 day a year
Nitrogen dioxide (maximum concentration)	1 hour 1 year	0.12 ppm 0.03 ppm	1 day a year none
Photochemical oxidants (as ozone) (maximum concentration)	1 hour 4 hours	0.10 ppm 0.08 ppm	1 day a year 1 day a year
Sulphur dioxide (maximum concentration)	1 hour 1 day 1 year	0.20 ppm 0.08 ppm 0.02 ppm	1 day a year 1 day a year none
Lead (maximum concentration)	1 year	0.05 µg/m^3	none
Particles as PM_{10} (maximum concentration)	1 day	50 µg/m^3	5 days a year
Visibility reducing particles (minimum visual distance)	1 hour	20 km	3 days a year

Note: ppm = parts per million.
µg/m^3 = micrograms per cubic metre.
Source: SEPP(Ambient Air Quality) *Victorian Government Gazette*, S19, 9/2/1999.

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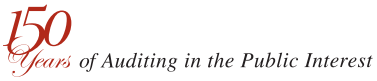

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