

*National Environment Protection
(Ambient Air Quality) Measure*

*Report of the
Risk Assessment Taskforce*

Appendix 5

Ambient Air Monitoring
Programs Around Australia

CONTENTS

1. Introduction.....	1
1.1 Victoria	1
1.2 Tasmania	2
1.3 Western Australia	2
1.4 New South Wales.....	3
1.5 Queensland.....	3
1.6 South Australia	3
1.7 ACT.....	4
2. Particles (PM₁₀, PM₁₀(Lead), PM_{2.5}, TSP, Nephelometry data (BSP)).....	4
2.1 Victoria	4
2.2 Tasmania	6
2.3 Western Australia	7
2.4 New South Wales.....	9
2.5 South Australia	11
2.6 Queensland.....	12
3. Nitrogen Dioxide (NO₂) and Oxides of Nitrogen (NO_x).....	13
3.1 Victoria	13
3.2 Western Australia	14
3.3 New South Wales.....	14
3.4 South Australia	15
3.5 Queensland.....	16
4. Sulfur Dioxide (SO₂).....	16
4.1 Victoria	16
4.2 Western Australia	17
4.3 New South Wales.....	17
4.4 South Australia	17
4.5 Queensland.....	18
5. Carbon Monoxide (CO).....	18
5.1 Victoria	18
5.2 Western Australia	19
5.3 New South Wales.....	19
5.4 South Australia	20
5.5 Queensland.....	20
6. Ozone (O₃)	21
6.1 Victoria	21
6.2 Western Australia	21
6.3 New South Wales.....	22
6.4 South Australia	23
6.5 Queensland.....	23
Appendix 1 - Periods of Operation of Air Quality Monitoring Stations 1974-1999 (VIC)	24
Appendix 2 - Periods of Operation of Lead Sampling Sites 1974-1999 (VIC).....	26
Appendix 3 - Summary of Pollutants Monitored by Existing Air Monitoring Networks in Australia.....	28

1. INTRODUCTION

Air quality monitoring in Australia is conducted by each of the States and Territories. Each jurisdiction is responsible for maintaining and reporting on their monitoring network. This report aims to compile information regarding the number of stations in each network, the pollutant monitored at each station, and the period of operation. This information will be used to assess the current level of data available from jurisdictional air monitoring stations to perform health risk assessment or conduct epidemiological studies for each of the criteria pollutants and further identify any data gaps that are necessary to undertake these studies.

1.1 Victoria

The State Environment Protection Policies (Ambient Air Quality and Air Quality Management) defines the following three regions in Victoria; the Port Phillip Control Region (PPCR), encompassing the major urban centres of Melbourne and Geelong; the Latrobe Valley Control Region (LVCR); and the rest of Victoria.

The establishment of an air quality network in Victoria over these regions has developed over several stages. In 1974, air monitoring commenced in Melbourne at the CBD site at the Science Museum. Short-term sampling with mobile instrumentation was carried out for the next few years, until in 1979 an ambient air monitoring network was first established. The monitoring network comprised four stations - Museum, Alphington, Westmeadows and Parliament House.

By the end of 1984 there were 12 stations in the network. Hourly concentrations of pollutants such as oxides of nitrogen, ozone, visibility reducing particles as API (airborne particle index), carbon monoxide, non-methane hydrocarbons and sulfur dioxide, were measured at various stations in the network. In addition, lead, total suspended particles (TSP) were measured at various sites using high volume sampling. Limited PM₁₀ sampling commenced in 1984. The first fixed site for PM₁₀ monitoring was set up at Parliament Place (CBD) in 1988. The network was expanded in 1992 to 5 sites that are still in operation. The Parliament Place site was relocated to RMIT (CBD) in 1995.

After 1986, the monitoring network in Melbourne was restructured and some resources diverted to Geelong. At the end of 1991, there were 9 stations in operation in the Melbourne area, and 2 stations in Geelong - Geelong South and Point Henry (an industry self monitoring site).

From 1994 to 1999 the EPA air monitoring network consisted of 12 fixed site monitoring stations in the PPCR and two stations in the LVCR. There were a number of monitoring station relocations during this time that are noteworthy:

- The CBD site was moved from Parliament Place to RMIT in late 1995, with the result that the data from the two stations cannot be combined to give continuous data over the entire period, - instead, each data set must be considered independently.
- The RMIT station was also moved from Building 3 to Building 9, approximately 170m north, during November 1998, - the new location of the station is approximately 5m higher than the previous location.
- The Geelong South station was relocated in January 1998, from the Council Depot to the Geelong Racecourse, approximately 800m south. There was very little change in the height of the instrument between the locations. During the movement of this station there was a

break in the monitoring data. Monitoring of some of the compounds began within a few months of the station relocation, but it was not until November 1998 that the station was fully operational for all of the compounds.

Appendix 1 shows the periods of operation of each of the air quality monitoring stations in Victoria up to 1999. Of the sites operational in the current network there are three residential sites, two light industrial/residential sites, two industrial/residential sites, five rural sites, one CBD site and one industrial/rural site.

Station Name	Station Type
Alphington	Residential/light industrial
Dandenong	Residential/light industrial
Footscray	Industrial/residential
Mt Cottrell	Rural
Pt Cook	Rural
Paisley	Residential/industrial
Brighton	Residential
Pt Henry	Industrial/rural
Geelong South	Rural
Grovedale	Rural
Box Hill	Rural
RMIT	CBD
Traralgon	Residential
Moe	Residential

1.2 Tasmania

The Department of Environment and Land Management has been monitoring levels of particulate matter in the ambient air in Hobart and Launceston for a number of years. The first station was located in the suburb of Moonah, approximately 5km to the north west of the Hobart GPO, and was operational from 1981 until 1993. In 1989, a second site in Moonah commenced monitoring, located approximately 500m from the original site.

Monitoring in Launceston began in 1991 as part of the Launceston Air Pollution Study (1996). PM₁₀ sampling was undertaken using high volume samplers at five sites during the peak of the study in 1992-1993, and has continued at two sites since the completion of the study in 1994. Monitoring for other pollutants has not been conducted on a routine basis in Tasmania.

1.3 Western Australia

Air pollution monitoring has been conducted in Western Australia since 1978. The air monitoring network currently in place in Western Australia was established following the 1996 Perth Photochemical Smog and Perth Haze Studies. Monitoring is conducted in the Perth metropolitan area including the Kwinana heavy industrial zone. Additional monitoring stations are located in the south-west of the State, in the regional centres of Bunbury and Busselton and the Pilbara region at Dampier. Industry monitoring is also conducted for the Collie area and the Goldfields region, particularly in Kalgoorlie.

The Department of Environmental Protection (DEP) currently has a network of 15 ambient air quality monitoring stations which monitor Class-1 indicators, or criteria pollutants, such as ozone (O₃), nitrogen dioxide (NO₂), sulphur dioxide (SO₂), carbon monoxide (CO), and visibility reducing particles in the Perth metropolitan area. In addition to this network, three

air monitoring sites maintained by the Kwinana Industries Council (KIC) measure sulphur dioxide and/or particulate matter (PM₁₀). Weather conditions such as local wind speed and direction, relative humidity and temperature are also recorded at the air monitoring sites as well as at various Bureau of Meteorology weather monitoring sites.

1.4 New South Wales

Monitoring of air pollutants in Sydney began in the 1960s. In the early 1980s air quality reports, which specifically targeted ozone and fine particle concentrations, began to be released on a daily basis. These reports used a simple Pollution Index to describe pollution levels as low, medium or high and focused on daytime visibility as a measure of air quality.

Up until the early 1990's, the air monitoring network in Sydney was mainly concentrated in the south-western areas of Liverpool/Campbelltown, where the largest proportion of Sydney's population resided. In 1991 the monitoring network was upgraded and expanded to provide information for reporting on a new set of Pollution Indexes (PIs) for eight regions:

- East, North West, and South West regions of Sydney
- Lower Hunter (Newcastle, Wallsend and Beresfield)
- Illawarra (Wollongong City and Albion Park).

Pollutants monitored by these networks are ozone, nitrogen dioxide, oxides of nitrogen, particulate matter (including bsp (light scattering coefficient measured by a nephelometer), TSP, PM₁₀ and PM_{2.5}), sulfur dioxide, carbon monoxide, lead and cadmium. Data presented in this report extends from 1985 to 1998.

1.5 Queensland

In 1999 there were 14 EPA stations in south-east Queensland (SEQ) monitoring air quality. An additional six monitoring stations are also located in the town centres of Gladstone, Mount Isa, Mackay, Cairns, Rockhampton and Townsville. Pollutants measured at all of the stations include one or more of the following: ozone, carbon monoxide, oxides of nitrogen, sulfur dioxide, benzene, toluene, p-xylene, visibility-reducing particles, PM₁₀, PM_{2.5}, total suspended particulate matter (TSP), and lead.

1.6 South Australia

The air monitoring program in South Australia is concentrated in two regions of the state; Metropolitan Adelaide stations and Northern Country stations. Monitoring first began in 1979 at two sites in the Central Business District (CBD) and one residential site in the northern suburbs (Hampstead Centre). The network has continued expand over the 1980s and 1990s and in 1999 there were 15 stations in the Adelaide conducting air monitoring on a routine basis. In the Northern Country region, high volume sampling of suspended particles and airborne lead was conducted at sites in Port Pirie, Whyalla and Port Augusta. The station operating time periods presented here do not indicate any periods where an instrument may not have been working properly. Hence they represent periods of time that the station was open, not the period of data retrieval.

An external contractor has been responsible for the measurement of photochemical smog (including oxides of nitrogen and ozone) at all of the stations in the network since 1996 to present. Validation of this data is currently underway and hence is not included in this discussion.

1.7 ACT

The ACT air monitoring network began in the early 1980s with two sites monitoring TSP and lead (located at Civic and Woden) and a further site (located at Civic) monitoring CO, NO_x and API. During the 1980s further TSP and lead sites began operation at Belconnen and Kambah, while some PM₁₀ data was also collected at Woden. In 1990 an additional site opened in Gowrie to monitor air quality (CO, NO_x and API), as well as TSP and lead. Ozone monitors were also added at each site during this time.

In late 1991 the Civic site monitoring air quality was temporarily closed down for relocation, and reopened during 1992. In 1995 PM₁₀ samplers were added to the Gowrie, Woden and Civic TSP and lead sites. At the end of 1995 the Gowrie site was closed down and in 1996 was relocated to Monash in conjunction with the Tuggeranong weather station. In the middle of 1996 the Belconnen and Kambah TSP and lead sites were closed down. During 1999 the Gowrie TSP, PM₁₀ and lead were relocated to Monash.

Currently there are two monitoring stations (located at Civic and Monash) each monitoring CO, NO_x, Ozone and the Airborne Particle Index (API). Some VOC monitoring is being performed at these sites as well. There are three lead and PM₁₀ monitoring sites (located at Civic, Woden and Monash) currently in operation.

2. PARTICLES (PM₁₀, PM₁₀(LEAD), PM_{2.5}, TSP, NEPHELOMETRY DATA (BSP))

Particle monitoring in Australia began using nephelometry for measuring visibility impairment. Monitoring networks were set up in Melbourne, Sydney and Brisbane in the late 1970s to early 1980s, and were introduced into the other major cities during the 1980s. PM₁₀ monitoring commenced in the late 1980s in Melbourne, Sydney, Adelaide and Brisbane using high-volume samplers with a size-selective inlet. These samplers run for 24 hours on a six-day cycle. Similar systems were set up in Perth in 1990. Very little particle monitoring has been conducted in Tasmania, with the bulk of the information being collected in Launceston during a study on health impacts of air pollution in the Tamar Valley (Lyons et al., 1996). PM₁₀ monitoring using high-volume samplers was conducted between May 1992 and December 1994. Dichotomous samplers have been used for specific studies in all States, but have not been used for routine monitoring due to the labour intensiveness and the expense involved.

In recent years, continuous particle monitoring using TEOM (Tapered Element Oscillating Microbalance) monitors, has been introduced in all States. Networks have been set up to measure both PM₁₀ and PM_{2.5}. However, most TEOM monitoring has been for PM₁₀.

2.1 Victoria

Monitoring for PM₁₀ began in Melbourne and the Latrobe Valley in the mid-1980s. Nephelometry data has been collected since the late 1970s. In the early years of the monitoring network, visibility reducing particles as API, measured by nephelometry, were measured at most stations. At the end of 1991 there were six stations (Alphington, Dandenong, Footscray, Mt. Cottrell, Pt. Cook, Paisley and Brighton) that had collected API data for more than 5 years with at least 75% annual data recovery rates. Currently there are nine sites in the PPCR that monitor using nephelometers. Table 1 displays the stations that have conducted API monitoring between 1985 and 1999, and the period for which data was collected.

Table 1 API monitoring stations in PPCR and LVCR

Monitoring Stations	API Monitoring Stations														
	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Port Phillip Control Region															
Museum															
Alphington															
Dandenong2															
Parliament Place															
RMIT															
Camberwell															
Footscray															
Westmeadows															
Seddon															
Mt Cottrell															
Pt Cook															
Sydenham															
Paisley															
Brighton															
Flemington															
Geelong Sth															
Box Hill															
Lalor Valley Control Region															
Traralgon															
Moe															

By the end of 1995, all high volume samples (HVS), which measure TSP, were fitted with size selective inlets (SSI) that measure PM₁₀. A Tapered Element Oscillating Microbalance (TEOM) instrument measuring PM₁₀ was introduced at Alphington in December 1994. TEOM instruments provide a continuous measure of particles - including PM₁₀, PM_{2.5} and PM₁. PM₁₀ TEOMs were introduced in the Footscray and Brighton air monitoring stations late 1996. At the same time PM_{2.5} monitors were introduced at Alphington, Brighton and Footscray. A PM₁ monitor was also installed at the Footscray site. In early 1998 PM₁₀ TEOMs were installed at the Dandenong and Box Hill air monitoring stations. Table 2 lists the stations that have been monitoring PM₁₀ using high volume sampling and TEOM instruments from 1992-1999. Table 3 indicates the history of TEOM monitoring for PM₁₀, PM_{2.5} and PM₁ at the relevant stations.

Table 2: Stations in PPCR conducting PM₁₀ monitoring

Station	1992-1994	1995	1996	1997	1998	1999
Alphington	HVS	HVS/TEOM	HVS/TEOM	HVS/TEOM	HVS/TEOM	HVS/TEOM
Paisley	HVS	HVS	HVS	HVS	HVS	HVS
Parliament Place	HVS	HVS				
RMIT			HVS	HVS	HVS	HVS
Collingwood	HVS	HVS	HVS	HVS	HVS	HVS
Richmond	HVS	HVS	HVS	HVS	HVS	HVS
Geelong Sth	HVS	HVS	HVS		HVS	HVS
Brighton			TEOM	TEOM	TEOM	TEOM
Footscray			TEOM	TEOM	TEOM	TEOM
Box Hill					TEOM	TEOM
Dandenong					TEOM	TEOM

HVS = High Volume Samplers
 TEOM = Tapered Element Oscillating Microbalance instruments

Table 3: TEOM particle monitoring history for each site in PPCR

PM10 Operating History						
Station Name	1994	1995	1996	1997	1998	1999
Alphington	Dec 94					
Footscray			Nov 96			
Brighton			Dec 96	Jun 97	Feb 98	
Dandenong					Apr 98	
Box Hill					Feb 98	
PM2.5 Operating History						
Station Name	1994	1995	1996	1997	1998	1999
Alphington			Aug 96			
Footscray			Nov 96			
Brighton			Dec 96	Jun 97	Feb 98	
PM1 Operating History						
Station Name	1994	1995	1996	1997	1998	1999
Footscray			Nov 96		Sept 98	

Appendix 2 lists the stations and the operating history for the monitoring of lead in Victoria from 1979 to 1999. From 1996 there have been five sites conducting lead monitoring, and four of these provide data for the last eight consecutive years. There has been no monitoring of lead undertaken in the Latrobe Valley since 1984.

2.2 Tasmania

Air monitoring in Tasmania is conducted by the Department of Primary Industries, Water and the Environment (DPIWE). The first air monitoring station in Hobart was established at Moonah and commenced monitoring of total suspended particles (TSP) in 1981. This monitoring continued until 1993. Twenty-four hour average TSP samples were collected on a 6-day cycle using a high volume sampler located on the premises of the Hydro Electric Corporation (HEC). A second site in Moonah was established in 1989 at Derwent Park Rd (DPR) approximately 3m from the side of the road, and monitored TSP on a 6-day cycle until the end of 1996.

In Launceston, PM₁₀ sampling, using high volume samplers fitted with size selective inlets, was undertaken at five sites during 1992-1994, and continued at two sites after 1994. At one of the sites (Ti Tree), TSP was monitored prior to 1994, and PM₁₀ from 1994 onwards. PM_{2.5} monitoring was also conducted at the Glen Dhu site between June and September 1992 and May to August 1993, using a dichotomous sampler to collect 72-hour averages.

Of the all of the sites in the Tasmanian air monitoring network, the Ti Tree site in Launceston complies with most of the guidelines set by Standards Australia (SA) for the location of a neighbourhood or background station. However, the location does not comply with the minimum-distance-from-trees criterion. Furthermore, the second Moonah station does not comply with the SA guidelines because of the possible interference from road-side dust, overhanging branches and vicinity to industry.

SA sampling standards may also have implications for the value of monitoring results collected at the sites. Field equipment used for particle collection was not calibrated as frequently as specified by SA, nor were blank filters routinely used as part of the monitoring protocol.

Table 4 presents the period of TSP monitoring for all sites in Hobart and Launceston, and Table 5 presents the sites in Launceston where PM₁₀ monitoring has been conducted. Significant data gaps are present in DPIWE monitoring records, which present problems in the calculation of annual averages. These data gaps generally were in excess of 25% for a particular year, which is greater than the level required for reporting annual averages.

Table 4: Stations in Tasmania conducting total suspended particle monitoring

	TSP monitoring															
	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Moonah, HEC	-															
Moonah, DPR																
Ti Tree										-	-					

Table 5: Stations in Launceston conducting PM₁₀ monitoring

	PM ₁₀ monitoring					
	1991	1992	1993	1994	1995	1996
East Launceston	-					
Glen Dhu	-	-	-			
Newstead		-	-			
Newnham	-	-	-	-		
Ti Tree				-	-	

Limited sampling of 24-hour PM_{2.5} and corresponding PM₁₀ concentrations was conducted at the Hobart HEC site in 1994, and Glen Dhu (Launceston) in 1992-1993. However, inspection of PM_{2.5}/PM₁₀ ratios and the relative 24-hour to 72-hour average concentrations revealed that there was a possibility of sampling/handling artefacts (remnants of previous samples) in the recorded data (Carnovale, 1998). Consequently the results of this monitoring have not been published.

2.3 Western Australia

Particle measurement in Western Australia is undertaken by several methods. Nephelometers have been used at a number of stations for over 10 years. High volume samplers have been used to measure PM₁₀ and TSP for a several years. TEOM monitoring was introduced into the network in 1994 for PM_{2.5} monitoring and in 1996 for PM₁₀ monitoring.

Fine particle monitoring using nephelometers began in the late 1980s with a total of three sites across the state. By 1999 there were nine stations in the network conducting this monitoring. Table 6 shows the stations that have been conducting nephelometer monitoring since 1988.

Table 6: Stations in WA conducting fine particle monitoring (bsp) using nephelometers

Station Name	BSP monitoring											
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Bunbury												
Busselton												
Caversham												
Cullacabardee												
Duncraig												
Hope Valley												
Kenwick												
Leeming												
Queens Buildings												
Quinns Rocks												
Swanbourne												

High volume samplers have been used to monitor TSP and PM₁₀ at a limited number of sites since 1990. Most notably the Queen’s Building site has been conducting monitoring of TSP and PM₁₀ for the last 10 years consecutively. TSP monitoring has been conducted at two other sites for a limited period of time. PM₁₀ monitoring has been undertaken a little more extensively with a further four sites beginning operation during 1993-1994 and all but one continuing to the end of 1999. Table 7 lists the stations that have undertaken TSP monitoring and Table 8 lists the stations that have undertaken PM₁₀ monitoring using high volume samplers.

Table 7: Stations in WA conducting high volume sampling of total suspended particles

	TSP HVS											
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Caversham												
Kenwick												
Queens Buildings												

Table 8: Stations in WA conducting high volume sampling of PM₁₀.

	PM ₁₀ HVS											
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Caversham												
Duncraig												
Kenwick												
Queens Buildings												
Swanbourne												

TEOM monitoring for PM_{2.5} began in 1994 at Caversham. Further sites became operational during the following year and in 1999 there were four sites conducting PM_{2.5} monitoring and three conducting PM₁₀ monitoring. Table 9 and Table 10 presents the stations that have conducted TEOM monitoring in WA since 1994.

Table 9: Stations in WA conducting TEOM monitoring of PM_{2.5}

Station Name	PM _{2.5} TEOM monitoring											
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Bunbury												
Caversham												
Duncraig												
Leeming												
Swanbourne												

Table 10: Stations in WA conducting TEOM monitoring of PM₁₀

Station Name	PM ₁₀ TEOM monitoring											
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Bunbury												
Dampier												
Duncraig												

2.4 New South Wales

NSW EPA has been monitoring airborne particles by nephelometry since the late 1970s. Currently there are eighteen permanent and three temporary sites monitoring fine particles using nephelometers.

Table 11 lists the sites that have conducted fine particle monitoring using nephelometers from 1985 to 1996.

Table 11: Stations in NSW conducting monitoring using nephelometers

Station Name	BSP monitoring											
	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Beresfield												
Newcastle												
Wallsend												
Wollongong												
Blacktown												
Bondi Junction												
Bringelly												
Kensington												
Liverpool												
Randwick												
Richmond												
Rozelle												
St Marys												
Vineyard												
Westmead												
Woolooware												
Albion Park												
KemblaGrange												

PM₁₀ sampling commenced in 1988 using high volume samplers with size selective inlets at two sites and by the end of 1996 this had expanded to fourteen sites. In 1993, PM₁₀ monitoring using TEOM monitors was introduced into the air monitoring network. In recent years the air

monitoring network in Sydney has expanded significantly with the Metropolitan Air Quality Study (MAQS). The sites undertaking HVS monitoring for PM₁₀, PM₁₀(Pb), TSP and TSP(Pb) are listed in Table 12 and Table 13. Note that these tables indicate station operating times (ie. the station was open), not continuous sampling periods.

Table 12: Stations in NSW conducting high volume sampling of PM₁₀ and PM₁₀(Pb)

Station Name	PM ₁₀ /PM ₁₀ (Pb) High Volume Sampling								
	1992	1993	1994	1995	1996	1997	1998	1999	
Rozelle									
Lindfield									
Blacktown									
Earlwood									
Wallsend									
Newcastle									
Beresfield									
Armidale									
Wollongong									
Warrawong									
Kembla Grange									
Nowra									
Richmond									
Lithgow									
Orange									
Albion Park Rail									
Albion Park (Swanvale)									
City (Gowings)									
Albion Park (Croom Rd)									

Table 13: Stations in NSW conducting high volume sampling of TSP and TSP(Pb)

Station Name	TSP/TSP(Pb) High Volume Sampling								
	1992	1993	1994	1995	1996	1997	1998	1999	
City (Grace Bros)	unknown								
Port Kembla (Fire Station)									
Port Kembla (Blaxland Rd)									
Port Kembla (Kembla St)									
Rozelle									
Wallsend									
City (Gowings)									

TEOM instrumentation was introduced to the NSW network in 1993 when it began operation at nine sites. Almost all of the sites have continued to operate since this time and in 1996 there were a total of 17 sites conducting monitoring of particles using the TEOM instruments. At the end of 1996, PM₁₀ was monitored using TEOM monitors at 17 sites within the Sydney air monitoring network. PM_{2.5} is measured using TEOM monitors at five sites.

Table 14: Stations in NSW conducting TEOM monitoring

Station Name	TEOM monitoring			
	1993	1994	1995	1996
Blacktown				
Bringelly				
Campbelltown	—		—	
Earlwood			—	
Lidcombe			—	
Lindfield		—	—	
Liverpool	—	—	—	
Randwick			—	
Richmond	—	—	—	
St Marys	—	—	—	—
Vineyard				—
Westmead	—	—	—	
Woolooware	—	—	—	
Warrawong	—	—	—	

2.5 South Australia

Monitoring for PM₁₀ has been conducted in Adelaide since 1988 and in Port Pirie since 1984. Sampling has been conducted with high volume samplers with size selective inlets. In 1994, four sites were operating in Adelaide, two in Port Pirie and one in Whyalla. Nephelometry data is currently collected at one site in Adelaide.

Table 15 and Table 16 list the stations that have conducted particle monitoring since 1985.

Table 15: Stations in Adelaide conducting monitoring using nephelometers

Station Name	Type	BSP monitoring														
		1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Campbelltown	Res	—														
Netley	CBD			—	—	—	—	—	—	—	—	—	—	—	—	—
Marryatville	Res			—	—	—	—	—	—	—	—	—	—	—	—	—

Res = Residential
 CBD = Central Business District

Table 16: Stations in South Australia conducting PM₁₀ monitoring

Station Name	Type	PM ₁₀ monitoring														
		1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Port Adelaide	CBD									—	—	—	—	—	—	—
Thebarton	rdside	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Gilles Plains	rdside									—	—	—	—	—	—	—
Black Forest	rdside									—	—	—	—	—	—	—
Port Pirie (Oliver St)	CBD	—	—	—	—											
Port Pirie (PBD/DHC)	CBD	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Port Pirie (Hospital)	Res					—	—	—	—	—	—	—	—	—	—	—
Port Pirie (Vera St)	CBD										—	—	—	—	—	—
Port Pirie (Beach Bridge)	CBD										—	—	—	—	—	—
Osborne	Ind					—	—	—	—	—	—	—	—	—	—	—
Whyalla (Hummock Hill)	Ind						—	—	—	—	—	—	—	—	—	—
Port Augusta	rdside										—	—	—	—	—	—

Res = Residential
 CBD = Central Business District
 rdside = Roadside
 Ind = Industrial

2.6 Queensland

Monitoring of particles has been conducted in Queensland for many years. Nephelometer monitoring began in 1978 at three sites, Eagle Farm, Fortitude Valley and Rocklea and with the exception of Fortitude Valley, which closed at the end of 1995, all of the sites are still in operation. Table 17 lists the sites that have conducted nephelometer monitoring for API.

Table 17: Stations in Queensland conducting monitoring using nephelometers

Station Name	BSP monitoring														
	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Eagle Farm															
Fortitude Valley															
Brisbane CBD															
Rocklea															
Flinders View															
Targinie															
Barney Point, Gladstone															
Mackay															

TSP and TSP (lead) monitoring began as early as 1977 at Woolloongabba and in 1979 Rocklea and Darra also began TSP (lead) monitoring. Table 18 and Table 19 list the sites that have conducted TSP monitoring.

Table 18: Stations in Queensland conducting total suspended particle monitoring

Station Name	TSP monitoring														
	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Fortitude Valley															
Woolloongabba															
Cairns															
Barney Point, Gladstone															
Garbutt, Townsville															

Table 19: Stations in Queensland conducting TSP (lead) and PM₁₀ (lead) monitoring

Station Name	TSP(Pb) or PM ₁₀ (Pb)	Pb HVS monitoring														
		1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Eagle Farm	PM ₁₀ (Pb)															
Fortitude Valley	TSP(Pb)															
Woolloongabba	TSP(Pb)															
Woolloongabba	PM ₁₀ (Pb)															
Rocklea	PM ₁₀ (Pb)															
Darra	PM ₁₀ (Pb)															
Barney Point, Gladstone	PM ₁₀ (Pb)															
Clinton, Gladstone	PM ₁₀ (Pb)															
Rockhampton	PM ₁₀ (Pb)															
South Townsville	PM ₁₀ (Pb)															
Garbutt, Townsville	PM ₁₀ (Pb)															

PM₁₀ and PM_{2.5} monitoring has been undertaken using high volume samplers as well as TEOM and ANSTO instruments. HVS monitoring began in 1986 and has continued over the last decade, with nine sites currently operational. The first TEOM monitoring commenced during 1992 for PM₁₀. PM_{2.5} monitoring using TEOMs, did not begin until 1998. ANSTO instruments have been operational since 1995 for PM_{2.5} monitoring. Table 20, Table 21 and Table 22 list the sites that have undertaken HVS, TEOM and ANSTO monitoring for PM₁₀ and PM_{2.5}.

Table 20: Stations in Queensland conducting high volume sampling of PM₁₀.

Station Name	PM ₁₀ HVS monitoring														
	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Eagle Farm															
Woolloongabba															
Rocklea															
Darra															
Barney Point, Gladstone															
Clinton, Gladstone															
Rockhampton															
South Townsville															
Garbutt, Townsville															

Table 21: Stations in Queensland conducting TEOM monitoring of PM₁₀

Station Name	PM ₁₀ TEOM monitoring								
	1992	1993	1994	1995	1996	1997	1998	1999	
Eagle Farm									
Wynnum									
Brisbane CBD									
Woolloongabba									
Rocklea									
Springwood									
Helensvale									
Finders View									
South Gladstone									
Mackay									
Townsville Port									

Table 22: Stations in Queensland conducting PM_{2.5} monitoring using TEOM and ANSTO instruments

Station Name	Instrument	PM _{2.5} monitoring using TEOM & ANSTO				
		1995	1996	1997	1998	1999
Brisbane CBD	ANSTO					
Rocklea	ANSTO					
Rocklea	TEOM					
Springwood	TEOM					

3. NITROGEN DIOXIDE (NO₂) AND OXIDES OF NITROGEN (NO_x)

3.1 Victoria

Monitoring for NO₂ began in 1979 with two stations. From 1994 to 1999 there were nine stations in the PPCR and two stations in the LVCR monitoring nitrogen dioxide levels (Table 23). Noteworthy events:

- There are six stations that have provided continuous monitoring of nitrogen dioxide for over 10 years, and five of these provide data as far back as 1983.
- Alphington provides monitoring data for NO₂ since the inception of the network in 1979.
- There is a data gap during 1997 to 1998 for the Geelong South station, at which time the station was relocated.

Table 23: Stations in Victoria that have conducted nitrogen dioxide monitoring

Monitoring Stations	NO ₂ Monitoring Stations														
	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Port Phillip Control Region															
Museum															
Alphington															
Dandenong2															
Parliament Place															
RMIT															
Camberwell															
Footscray															
Seddon															
Mt Cottrell															
Pt Cook															
Sydenham															
Paisley															
Brighton															
Flemington															
Geelong Sth															
Box Hill															
Latrobe Valley Control Region															
Traralgon															
Moe															

3.2 Western Australia

Oxides of nitrogen have been monitored in Western Australia since 1988. This monitoring commenced with a station at Hope Valley and continued for the next 12 years, although some data gaps occurred during this time. In 1999 there were ten sites that conducted NO_x monitoring, with four of those providing data for the past 6 consecutive years. Table 24 presents the stations that have conducted nitrogen oxide monitoring in WA from 1988 to 1999.

Table 24: Stations in WA conducting nitrogen oxide monitoring

	NO _x monitoring											
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Caversham												
Cullacabardee												
Dampier												
Duncraig												
Gingin												
Hope Valley												
Jandakot												
Kenwick												
Leeming												
Queens Buildings												
Quinns Rocks												
Rolling Green												
Rottnest Island												
Rockingham												
Swanbourne												
Two Rocks												

3.3 New South Wales

Nitrogen dioxide monitoring has been conducted in NSW since the early 1970s. During the mid 1980s there were four sites were in operation, and in the 1990s the number of sites increased dramatically to 23 sites. Table 25 lists these sites.

Table 25: Stations in NSW conducting nitrogen dioxide monitoring

Station Name	NO ₂ monitoring											
	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Beresfield									—	—	—	—
Newcastle								—	—	—	—	—
Wallsend								—	—	—	—	—
Wollongong								—	—	—	—	—
Blacktown								—	—	—	—	—
Bondi Junction	—	—	—									
Bringelly								—	—	—	—	—
Camden									—	—	—	—
Campbelltown						—	—	—	—	—	—	—
Earlwood	—	—	—	—	—	—	—	—	—	—	—	—
Kensington				—	—	—	—	—	—	—	—	—
Lidcombe	—	—	—	—	—	—	—	—	—	—	—	—
Lindfield									—	—	—	—
Liverpool								—	—	—	—	—
Randwick									—	—	—	—
Richmond								—	—	—	—	—
Rozelle	—	—	—	—	—	—	—	—	—	—	—	—
St Marys								—	—	—	—	—
Vineyard									—	—	—	—
Westmead								—	—	—	—	—
Woolooware								—	—	—	—	—
Albion Park								—	—	—	—	—
KemblaGrange									—	—	—	—
Warrawong									—	—	—	—

3.4 South Australia

Several stations in Adelaide have been performing monitoring of oxides of nitrogen since the mid 1980s. However, only one of these sites has continued to operate for a number of years – Hampstead Centre. This station has been operating from 1979 to 1996. Monitoring undertaken after 1996 is not presented here as it is under going validation. Table 26 lists all of the sites that have conducted this monitoring since 1985.

Table 26 Stations in Adelaide conducting nitrogen oxide monitoring

Station Name	Type	NO _x monitoring											
		1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	
Campbelltown	Res	—											
Hampstead Centre	Res	—	—	—	—	—	—	—	—	—	—	—	—
Hawthornedene	Res	—	—	—									
Gawler	Res		—	—	—								
Roseworthy Agric college	Rur				—	—							
North Adelaide	CBD	—											

Res = Residential
 CBD = Central Business District
 Rur = Rural

3.5 Queensland

Queensland has been undertaking nitrogen oxide monitoring since the late 1970s, and in 1999 there were 12 sites performing this monitoring. Of these, four sites have provided continuous data for the past six years.

Table 27 Stations in Queensland conducting oxides of nitrogen monitoring

Station Name	NO _x monitoring														
	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Deception Bay															
Eagle Farm															
Wynnum															
Fortitude Valley															
Brisbane CBD															
Rocklea															
Springwood															
Mount Warren Park															
North Maclean															
Helensvale															
Flinders View															
Mutdapilly															
Targinie															
Barney Point, Gladstone															
South Gladstone															

4. SULFUR DIOXIDE (SO₂)

4.1 Victoria

Monitoring of SO₂ began in 1979 at two stations, Museum and Alphington. Alphington has continued to provide data for the entire 20 year period, and in 1999 there were seven stations in the PPCR and two stations in the LVCR monitoring SO₂. Four stations in the PPCR provide data for nine consecutive years, with three of these stations providing data for over 16 years. Table 28 lists all of the sites that have undertaken this monitoring since 1985.

Table 28: Stations in Victoria that have conducted sulfur dioxide monitoring

Monitoring Stations	SO ₂ Monitoring Stations														
	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Port Phillip Control Region															
Museum															
Alphington															
Parliament Place															
RMIT															
Footscray															
Mt Cottrell															
Pt Cook															
Paisley															
Brighton															
Flemington															
Pt Henry															
Geelong Sth															
Box Hill															
Latrobe Valley Control Region															
Traralgon															
Moe															

4.2 Western Australia

A limited number of sites have undertaken sulfur dioxide monitoring in Western Australia. However, these sites have operated almost continuously since 1988, providing data for in excess of 10 consecutive years over three different sites. Table 29 presents a list of the stations that have conducted sulfur dioxide monitoring in WA.

Table 29: Stations in WA conducting sulfur dioxide monitoring

	SO ₂ monitoring											
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Hope Valley	-											
Rockingham												
Wattleup												

4.3 New South Wales

Monitoring of sulfur dioxide has been conducted in NSW at a limited number of sites. During 1987 to 1991 this monitoring was conducted at only one site, Albion Park. However, in 1992 more sites began sulfur dioxide monitoring, and in 1996 there were eight sites operating. Table 30 lists the stations that have been conducting SO₂ monitoring since 1985.

Table 30: Stations in NSW conducting sulfur dioxide monitoring

Station	SO ₂ monitoring											
	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Beresfield												
Newcastle												
Wallsend												
Wollongong												
Blacktown												
Lidcombe	-	-										
Richmond												
Vineyard												
Woolooware	-	-										
Albion Park	-											
Appin												
KemblaGrange												

Several of the sites shown in Table 30 sites set up in Newcastle and Wollongong to monitor the impact of local industry on the airshed.

4.4 South Australia

Sulfur dioxide monitoring has been conducted across the state for a period of more than 15 years. In particular the Leigh Creek site has been open for the past 10 years and the St John PS site has been open for the past 8 years consecutively. Table 31 lists the sites that have performed this monitoring since 1985.

Table 31: Stations in South Australia conducting sulfur dioxide monitoring.

Station Name	Type	SO ₂ monitoring														
		1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Campbelltown	Res	—														
Lonsdale Hts PS	Res		—	—												
Lonsdale Exchange	Res			—	—	—	—	—	—	—	—					
Port Augusta	Res	—	—	—	—											
Leigh Creek	Ind					—	—	—	—	—	—	—	—	—	—	—
Pt Adelaide Gillman	Ind					—	—									
St Johns PS	Res								—	—	—	—	—	—	—	—

Res = Residential
Rur = Rural
Ind = Industrial

4.5 Queensland

Monitoring of sulfur dioxide has been conducted for many years throughout Queensland. The first stations to begin monitoring were Eagle Farm and Fortitude Valley, in 1978. Eagle Farm has continued to monitor sulfur dioxide, while the Fortitude Valley site closed in 1995. In 1999 there were eight sites performing monitoring for SO₂.

Table 32: Stations in Queensland conducting sulfur dioxide monitoring

Station Name	SO ₂ monitoring														
	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Eagle Farm	—	—	—	—		—		—	—	—		—	—	—	—
Wynnum															—
Fortitude Valley	—	—	—	—	—	—		—	—	—	—				
Brisbane CBD											—	—	—	—	—
Springwood															—
Flinders View								—	—	—		—	—	—	—
Targinie							—	—	—	—	—	—	—	—	—
Barney Point, Gladstone	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mount Isa	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

5. CARBON MONOXIDE (CO)

5.1 Victoria

Monitoring of carbon monoxide began at two stations in 1979, and in 1999 there were five stations (4 in Melbourne, 1 in Geelong) providing data. Two of the stations have provided data for over 12 consecutive years, while four stations have provided data for the past four years. Table 33 lists all of the stations that have conducted carbon monoxide monitoring since 1985.

Table 33: Stations in Victoria that have conducted carbon monoxide monitoring

Monitoring Stations	CO Monitoring Stations														
	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Port Phillip Control Region															
Museum															
Alphington															
Dandenong															
Parliament Place															
RMIT															
Camberwell															
Footscray															
Mt Cottrell															
Pt Cook															
Paisley															
Brighton															
Flemington															
Pt Henry															
Geelong Sth															
Box Hill															

5.2 Western Australia

Monitoring for CO in WA began in 1988 in Hope Valley, and in 1999 there were six sites that provided monitoring data. The Queens Buildings site has been providing data for carbon monoxide since 1989. Table 34 presents a list of the stations that have performed carbon monoxide monitoring from 1988 to present.

Table 34: Stations in WA conducting carbon monoxide monitoring

	CO monitoring											
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Bunbury												
Caversham												
Dampier												
Duncraig												
Hope Valley												
Leeming												
Queens Buildings												
Swanbourne												

5.3 New South Wales

Carbon monoxide monitoring in NSW was largely conducted at one site during the 1980s. In the 1990s this expanded so that there were 11 sites undertaking this monitoring at various times. However, most of these sites have provided data for a very short time, and only four have provided data for more than 2 consecutive years.

Table 35: Stations in NSW conducting carbon monoxide monitoring

Station Name	CO monitoring											
	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Newcastle									—	—	—	—
Wollongong									—	—	—	—
Blacktown									—	—	—	—
City	—	—	—	—	—	—	—	—	—	—	—	—
Kensington										—	—	
Liverpool										—	—	—
Richmond									—	—		
Rozelle									—	—	—	—
St Marys									—	—		
Vineyard										—		
Westmead												—

5.4 South Australia

A limited number of stations in Adelaide have performed carbon monoxide monitoring since the beginning of the air quality network. Only one station has been operating at any one time, with a period of a little more than one year in 1987 where there was no monitoring performed. The site that has conducted the longest period of carbon monoxide monitoring is the McDonald’s station, which has been open for the past 12 years. Table 36 lists the stations in Adelaide conducting CO monitoring since 1985.

Table 36: Stations in Adelaide conducting carbon monoxide monitoring.

Station Name	Type	CO monitoring														
		1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Paringa Bldg	CBD	—	—													
McDonalds	CBD				—	—	—	—	—	—	—	—	—	—	—	—

CBD = Central Business District

5.5 Queensland

Carbon monoxide monitoring has been conducted at a few sites over the course of the monitoring network in Queensland. Fortitude Valley has provided the longest duration of data, beginning in 1978 and finishing in 1995. The other two sites, Brisbane CBD and Woolloongabba, began operation in 1995 and 1998 respectively, and have provided continuous data since this time.

Table 37: Stations in Queensland conducting carbon monoxide monitoring

Station Name	CO monitoring														
	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Fortitude Valley	—	—	—	—	—	—	—	—	—	—	—				
Brisbane CBD											—	—	—	—	—
Woolloongabba														—	—

6. OZONE (O₃)

6.1 Victoria

Ozone monitoring began in 1979 at three stations in Melbourne – Museum, Alphington and Westmeadows. It then increased to 12 stations in 1985, during the Melbourne Airshed Study, and declined to 8 in 1989, however, many of the stations did not operate continuously during this time. There were 12 operational stations in 1999. Seven of these sites have been conducting ozone monitoring for over 15 years, and Alphington has conducted continuous monitoring since 1979. Table 38 lists the stations in Victoria that have undertaken ozone monitoring since 1985.

Table 38: Stations in Victoria that have conducted ozone monitoring

Monitoring Stations	O ₃ Monitoring Stations														
	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Port Phillip Control Region															
Museum															
Alphington															
Dandenong															
Parliament Place															
RMIT															
Camberwell															
Footscray															
Westmeadows															
Seddon															
Mt Cottrell															
Pt Cook															
Sydenham															
Paisley															
Brighton															
Flemington															
Pt Henry															
Geelong Sth															
Grovedale															
Box Hill															
Latrobe Valley Control Region															
Traralgon															
Moe															

6.2 Western Australia

Ozone monitoring has been undertaken at 12 sites in WA over the past 11 years. Monitoring began in 1989 at Caversham and has continued at this site until present. In 1999 there were six sites that provided monitoring data for ozone. In addition to Caversham, there were three sites that provided data for the past seven years, although there have been small gaps in the data at two of these sites. Table 39 lists the stations that have conducted ozone monitoring in Western Australia from 1989 to present.

Table 39: Stations in WA conducting ozone monitoring

	O ₃ monitoring											
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Caversham												
Cullacabardee												
Dampier												
Gingin												
Jandakot												
Kenwick												
Quinns Rocks												
Rolling Green												
Rottnest Island												
Rockingham												
Swanbourne												
Two Rocks												

6.3 New South Wales

Since 1993, ozone monitoring has been undertaken quite extensively in NSW. Prior to 1993 monitoring was inconsistent and did not provide wide coverage of the airshed. There are currently 13 sites operating in the Sydney area with several other monitors in operation in the Illawarra and Lower Hunter regions. Table 40 lists the sites that have been conducting ozone monitoring in NSW since the mid 1980's.

Table 40 Stations in NSW conducting ozone monitoring

Station Name	O ₃ monitoring											
	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Beresfield												
Newcastle												
Wallsend												
Wollongong												
Blacktown												
Bondi Junction												
Bringelly												
Camden												
Campbelltown												
Earlwood												
Fairfield												
Kensington												
Lansvale												
Lidcombe												
Lindfield												
Liverpool												
Randwick												
Richmond												
Rozelle												
St Marys												
Vineyard												
Westmead												
Woolooware												
Albion Park												
Appin												
KemblaGrange												
Warrawong												

6.4 South Australia

Monitoring of ozone has been conducted at several sites in Adelaide over the past 15 years. However, all but one of the sites has been open for only a short period of time. The exception, Hampstead Centre, has been operating from 1979 to the end of 1996. Monitoring undertaken after 1996 is not presented here, due to a re-examination of the data currently taking place. Table 41 lists the stations that have undertaken ozone monitoring from 1985 to 1995.

Table 41 Stations in Adelaide conducting ozone monitoring

Station Name	Type	O ₃ monitoring										
		1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Campbelltown	Res	—										
Hampstead Centre	Res	—	—	—	—	—	—	—	—	—	—	—
Gawler	Res		—	—								
Roseworthy Agric college	Rural			—	—							
North Adelaide	City	—										

Res = Residential

6.5 Queensland

Monitoring of ozone in Queensland has been at a number of sites over the past decade. While three sites provided data during the 1980s, there were 10 sites operating for the best part of the last 6-7 years.

Table 42 Stations in Queensland conducting ozone monitoring

Station Name	O ₃ monitoring														
	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Deception Bay											—				
Eagle Farm															
Wynnum											—	—	—	—	—
Fortitude Valley											—	—			
Brisbane CBD												—	—	—	—
Rocklea															
Springwood															—
Mount Warren Park												—	—	—	—
North Maclean												—	—	—	—
Helensvale															—
Flinders View												—	—	—	—
Mutdapily												—	—	—	—

APPENDIX 1 - PERIODS OF OPERATION OF AIR QUALITY MONITORING STATIONS 1974-1999 (VIC)

Station	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	Area	
Port Phillip Region																										
Science Museum																										
Parliament Place																										CBD
Preston																										
Oakleigh																										
Altona																										
Fishermens Bend																										
Maribymong Berth No. 1																										
Clayton																										
Maribymong																										
Watsonia																										
Box Hill																										
South Caulfield																										
Alphington																										R/LI
Westmeadows																										
Dandenong/Keysbr																										LL/R
Camberwell																										I/R
Footscray																										RL
Mount Cottrell																										RL
Taylor's Lakes																										RL
Point Cook																										RL
Sydenham																										R/I
Paisley																										R
Brighton																										
Seddon																										
Laverton																										
Debnay Park (Flemington)																										
Geelong Rifle Range																										I/RL
Point Henry *																										RL
Geelong South																										RL
Grovedale																										RL
Box Hill																										RL
RMIT Building 3																										CBD

APPENDIX 1 CONTINUED
PERIODS OF OPERATION OF AIR QUALITY MONITORING STATIONS 1974-1999

Latrobe Valley:	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	Area	
Hazelwood North	—																									
Moe	—	—																								R
Traralgon West		—																								
Flynn		—																								
Rosedale South		—																								
Morwell East		—																								
Traralgon		—																								R
Sale East		—																								
Sale South		—																								

- R = Residential
- I = Industrial
- LI = Light Industrial
- CBD = Central Business District
- RL = Rural

APPENDIX 2 - PERIODS OF OPERATION OF LEAD SAMPLING SITES 1974-1999 (VIC)

Station Location	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Area		
Science Museum																													
Fishermens Bd																													
Mrbng#1 Berth																													
Mrbng																													
Pt Melbourne																													
Watsonia																													
Box Hill																													
Sth Caulfield																													
Alphington																												R/LI	
Dandenong																													
Camberwell																													
Macarthur St *																													
Paisley																												Res/Inc	
Debney Park (Flemington)																													
RMIT Building 3																												CBD	
Alexandra Pde																													
Keele St Child																													
Minding Centre																													
F. Johnson Child																													
Care Centre																													
Gold St Child																													
Minding Centre																													
Lord St Child																												Res	
Care Centre																													
Sackville St **																												Res/LI	
Collingwood																													
Com Hlth Centre																													

* Macarthur St and Parliament Place are the same location. This is due to renaming of streets in the area. ** Keele St Site moved to Sackville St Oct. 91

APPENDIX 2 CONTINUED
PERIODS OF OPERATION OF LEAD SAMPLING SITES 1974-1999

Station Location	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Area
Geelong:																											
Rifle Range				—																							
Geelong Sth																			—	—	—	—	—	—	—	—	Rur
Latrobe Valley :																											
Flynn			—	—																							
Rosedale Sth				—	—																						
Morwell East					—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Thoms Bridge								—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Moe								—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Traralgon								—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	

Res = Residential
 Ind = Industrial
 LI = Light Industrial
 CBD = Central Business District
 Rur = Rural

**APPENDIX 3 - SUMMARY OF POLLUTANTS MONITORED BY
EXISTING AIR MONITORING NETWORKS IN AUSTRALIA**

	TSP	PM ₁₀	PM _{2.5}	TEOM ₁₀	TEOM _{2.5}	NEPH	NO ₂	CO	O ₃	SO ₂
QUEENSLAND										
BRISBANE										
Eagle Farm		X		X		X	X		X	X
Wynnum				X			X		X	X
Brisbane Cbd			X	X		X	X	X	X	X
Woollongabba	X	X		X				X		
Rocklea		X	X	X	X	X	X		X	
Springwood				X	X		X		X	X
Helensvale				X			X		X	
Flinders View				X		X	X		X	X
Deception Bay							X		X	
Fortitude Valley										X
Mount Warren Park							X		X	
North Maclean							X		X	
Mutdapilly							X		X	
Darra		X								
GLADSTONE										
Barney Point		X				X	X			X
South Gladstone				X			X			
Clinton		X								
Targinie						X	X			
										X
TOWNSVILLE										
Townsville Port				X						
South Townsville		X								
Garbutt		X								

	TSP	PM ₁₀	PM _{2.5}	TEOM ₁₀	TEOM _{2.5}	NEPH	NO ₂	CO	O ₃	SO ₂
CAIRNS	X									
Mount Isa										X
Rockhampton		X								
Mackay				X		X				
VICTORIA										
MELBOURNE										
Alphington		X		X	X	X	X	X	X	X
Dandenong				X		X	X		X	
Rmit		X				X	X	X	X	X
Footscray				X	X	X	X	X	X	X
Mt Cottrell									X	
Pt Cook						X	X		X	
Paisley		X				X	X		X	X
Brighton				X	X	X	X		X	
Box Hill				X		X	X	X	X	X
Collingwood		X								
Richmond		X								
GELONG										
Geelong South		X				X	X	X	X	X
Pt Henry									X	X
Grovedale									X	
LATROBE VALLEY										
Traralgon						X	X		X	X
Moe						X	X		X	X

	TSP	PM ₁₀	PM _{2.5}	TEOM _{M10}	TEOM _{M2.5}	NEPH	NO ₂	CO	O ₃	SO ₂
NEW SOUTH WALES										
SYDNEY										
Blacktown		X		X		X	X	X	X	X
Bringelly				X		X	X		X	X
Camden							X			
Campbelltown				X						
Earlwood	X	X		X	X	X	X		X	
Lidcombe				X	X		X		X	
Lindfield		X		X			X		X	X
Liverpool				X	X	X	X	X	X	
Randwick				X		X	X		X	X
Richmond		X		X	X	X	X		X	X
Rozelle	X	X				X	X	X	X	
St Mary's				X		X	X		X	
Sydney	X	X						X		
Vineyard				X			X		X	X
Wentworth-Falls				X		X	X		X	
Westmead				X	X	X	X	X	X	
Woolooware				X	X	X	X		X	X
ILLAWARRA										
Albion Park		X		X		X	X		X	X
Kembla Range		X				X	X		X	X
Port Kembla 1	X									
Port Kembla 2	X									
Port Kembla 3	X									
Warrawong		X		X			X		X	
Wollongong		X		X		X	X	X	X	X

	TSP	PM ₁₀	PM _{2.5}	TEOM ₁₀	TEOM _{2.5}	NEPH	NO ₂	CO	O ₃	SO ₂
LOWER HUNTER										
Beresfield		X		X	X	X	X		X	X
Newcastle		X				X	X	X	X	
Wallsend		X		X	X	X	X		X	X
RURAL NEW SOUTH WALES										
Armidale						X				
Cooma						X				
Griffith						X				
Lithgow						X				
Orange						X				
SOUTH COAST										
Nowra		X								
WESTERN AUSTRALIA										
PERTH										
Queen's Buildings	X	X				X	X	X		
Hope Valley						X	X			X
Caversham		X			X	X	X	X		
Duncraig		X		X	X	X	X	X		
Leeming					X	X	X	X		
Swanbourne		X				X	X		X	
Quinns Rocks						X	X		X	
Rolling Green							X		X	
Rockingham							X		X	X
Wattleup										X
BUNBURY										
Busselton				X	X	X		X		
Dampier				X			X	X	X	

	TSP	PM ₁₀	PM _{2.5}	TEOM _{M10}	TEOM _{M2.5}	NEPH	NO ₂	CO	O ₃	SO ₂
SOUTH AUSTRALIA										
ADELAIDE										
Osborne	X	X								
Peterhead	X									
Pt Adelaide	X	X								
Hampstead Centre	X						X		X	
Gilles Plains	X	X								
Kensington Gardens	X									
Adelaide (Hindley St)								X		
Thebarton	X	X								
Parkside	X									
Netley						X	X		X	
Christie's Beach										X
PORT PIRIE										
Dhc	X	X								
West Primary School	X									
Hospital	X	X								
Vera Street		X								
Solomontown Bridge	X									
PORT AUGUSTA		X								
WHYALLA	X	X								
TASMANIA										
Hobart										
Moonah, Dpr	X									

	TSP	PM ₁₀	PM _{2.5}	TEOM _{M10}	TEOM _{2.5}	NEPH	NO ₂	CO	O ₃	SO ₂
LAUNCESTON										
Newnham		X								
Ti Tree		X								
ACT										
Civic		X				X	X	X	X	
Monash		X				X	X	X	X	
Woden		X								