

**REPORT AGAINST THE  
NATIONAL  
ENVIRONMENT  
PROTECTION MEASURE**

**FOR AMBIENT AIR  
QUALITY FOR 2004**

**BY TASMANIA**

**SEPTEMBER 2005**

## **SECTION A – MONITORING SUMMARY**

### **OVERVIEW OF REGIONS**

#### **1 HOBART**

##### **1.1 REGION BOUNDARIES**

The extent to which pollutants emitted in a given area can impact on air quality elsewhere depends on a number of factors. These factors include topography, meteorology and the chemical and physical properties of pollutants. The term airshed is commonly used to refer to an area that is defined by natural or topographic features affecting air quality.

In the case of a secondary pollutant (ie. one that is formed by chemical reactions in the atmosphere, rather than being directly emitted, eg. O<sub>3</sub>), the airshed may extend relatively large distances from the city centre. However, for a pollutant such as PM<sub>10</sub> in winter, the extent of influence may be more localised and perhaps confined to areas sharing common nocturnal-drainage airflows.

For Hobart, the availability of meteorological data tends to be relatively low. Moreover, complex atmospheric dispersion models have not been developed for the region. For these reasons, the extent of the Hobart airshed is unclear.

For the purpose of the Measure, the Hobart Region boundaries are defined as presented in Figure 1. Although there is no functional purpose served in exactly defining the boundary AMG co-ordinates, these may be taken to be defined by the south-west corner (Easting 500,000; Northing 521,000) and the north-east corner (Easting 550,000; Northing 5290,000).

##### **1.2 POPULATION AND TOPOGRAPHY**

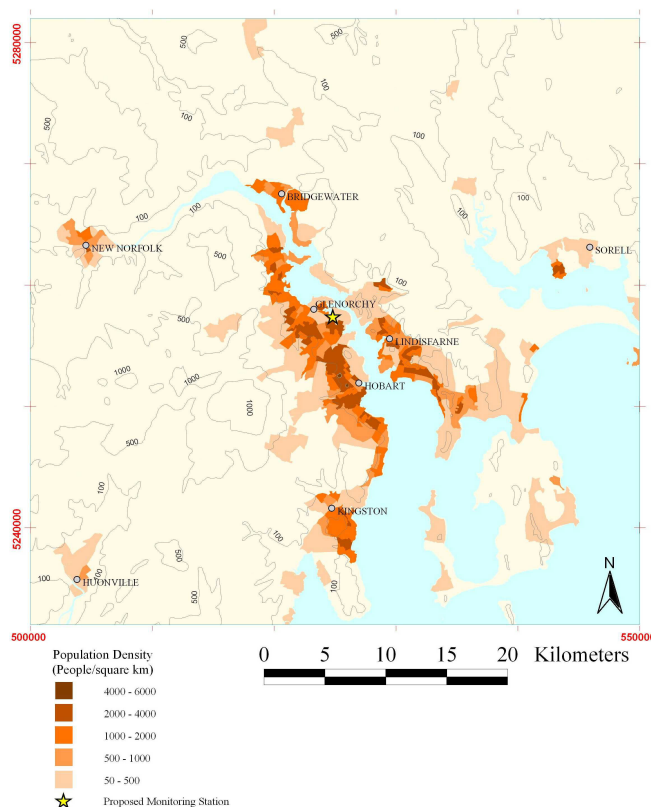
The population density and topography for the Hobart Region is presented in Figure 3-1. The majority of the population resides within approximately a 10 kilometres radius of the Central Business District (CBD). Moreover, significant satellite urban centres are located within a 30 kilometres radius of the CBD. These include Kingston-Blackmans Bay to the south (population 13,746), and Bridgewater-Gagebrook (population 7,451) and New Norfolk (population 5,286) to the north.

##### **1.3 HOBART, PRINCE OF WALES BAY PERFORMANCE AND TREND MONITORING STATION:**

Two indicators are routinely monitored at Prince of Wales Bay:

- Carbon monoxide according to AS3580.7.1-1992, using a Monitor Labs 9830B analyser. Carbon monoxide monitoring was terminated at this site in August 2004, due to recorded levels being consistently well below the National Environment Protection Standard.
- PM<sub>10</sub> using:
  - a High Volume Air sampler (HVAS), according to AS3580.9.6-1990, sampled every second day, and
  - a collocated TEOM direct-reading instrument with a PM<sub>10</sub> head.

Monitoring for PM<sub>10</sub> in accordance with the requirements of the Measure has been undertaken at Launceston and Hobart since 2001, using High Volume Air Samplers and TEOM instrumentation. However, much of the original equipment is very old and is quickly reaching the end of its serviceable life.



**Figure 1: Map Of Hobart Region Including Population Density And Topography**

In response, the Tasmanian Government is providing \$816,000 of capital funding over four years to upgrade the Tasmanian Air Quality Monitoring System. The Tasmanian Air Quality Monitoring System Development Project, 2004-2008, comprises a program to purchase new low volume sequential air samplers, to develop a PM<sub>2.5</sub> monitoring capability, in accordance with requirements of the amended Measure and to replace old PM<sub>10</sub> high volume air samplers. To support the new program, a new micro-weighing facility is due to be completed in March 2005, and is projected to be fully operating by the end of July 2005.

In view of the significant changes to the monitoring program as submitted in the original Plan, the document has been amended and upgraded the document to reflect the new configuration, and to update other contextual information that is relevant to air quality management in Tasmania.

In 2004, monitoring surveys were undertaken in Greater Hobart on the basis of increasing concerns about the representativeness of data from Prince of Wales Bay. The concerns were based partly on direct observations and partly on studies commissioned by Hobart City Council in 2003 that showed elevated levels of particles from wood smoke and inferred significant concentrations of polycyclic aromatic hydrocarbons in some areas (Todd, 2004).

The Environment Division also performed short term measurements during winter 2004, using Dustrak monitors simultaneously at Prince of Wales Bay and various other areas around Greater Hobart on nights when inversion conditions were current, especially those areas where smoke was considered likely to accumulate. In at least one area, readings were greater than those at Prince of Wales Bay by a factor of close to 4, and greater than 2 in several other areas.

These results have shown that data from Prince of Wales Bay are unlikely to provide useful information on performance and trends of particle pollution in Greater Hobart and are certainly not representative of broader upper bound population exposure. Also our observations of ponding in the area have suggested the likelihood that a station in New Town will measure elevated concentrations of PM<sub>10</sub> typical of surrounding residential suburbs, when favourable meteorological conditions prevail within the valley. In the light of this, the primary *Hobart Performance and Trend Monitoring Station* will be located in New Town, on property leased by the Hockey Association of Tasmania, some 2km SSE from the original station.

The choice of this site is also supported by recent preliminary TAPM modelling of the greater Hobart airshed, which predicts elevated smoke concentrations in the area.

In order to maintain a certain level of continuity between the old and new stations, Tasmania intends to retain a high volume air sampler at Prince of Wales Bay for a period of at least 12 months. Further, as knowledge of spatial patterns of pollution movement in Hobart is still not well-characterised, a long term study of particulates using a network of nephelometers will be undertaken in strategic areas of the Derwent Valley. As nephelometry is not an equivalent method under the NEPM, this data will not be reported for compliance purposes.

The station is projected to be operating by the end of September 2005.

## **2 LAUNCESTON**

### **2.1 REGION BOUNDARIES**

Launceston and the Tamar Valley as a whole have been reasonably well studied in terms of the meteorology and atmospheric dispersion of the region. Results of three-dimensional atmospheric dispersion modelling have indicated that emissions from heavy industry at Bell Bay, some 40 kilometres north-west of Launceston, may in cases impact on air quality in Launceston (DPIWE, 1997).

For the purpose of the Measure, the Launceston Region boundaries are defined as presented in Figure 2 and cover an area approximately 40 kilometres wide and 60 kilometres long. This area has been selected for consistency with the Tamar Valley Airshed Study (DELM, 1995). Although there is no functional purpose served in exactly defining the boundary AMG co-ordinates, these may be taken to be defined by the south-most corner (Easting 501,250; Northing 5,389,750) and the north-most corner (Easting 498,750; Northing 5,467,250).

### **2.2 POPULATION AND TOPOGRAPHY**

The population density and topography of the Launceston Region is presented in Figure 3-6.

Launceston has a population of 67 700 with the second largest urban centre in the region, George Town, having a population of 4 500. The majority of Launceston's population is located within approximately 5 kilometres of the city centre, with the highest densities located south-east of the city centre and significant densities on the banks of the Tamar River to the north and north-west of the city.

In total, the population of the Launceston Region defined in this Plan is approximately 95,000. Launceston is located on the upper reaches of the Tamar River, in a well defined

valley that extends some 50 kilometres to Bass Strait. The valley axis is mostly aligned in a north-west to south-east orientation and is flanked by hills that reach heights of up to 400 m.

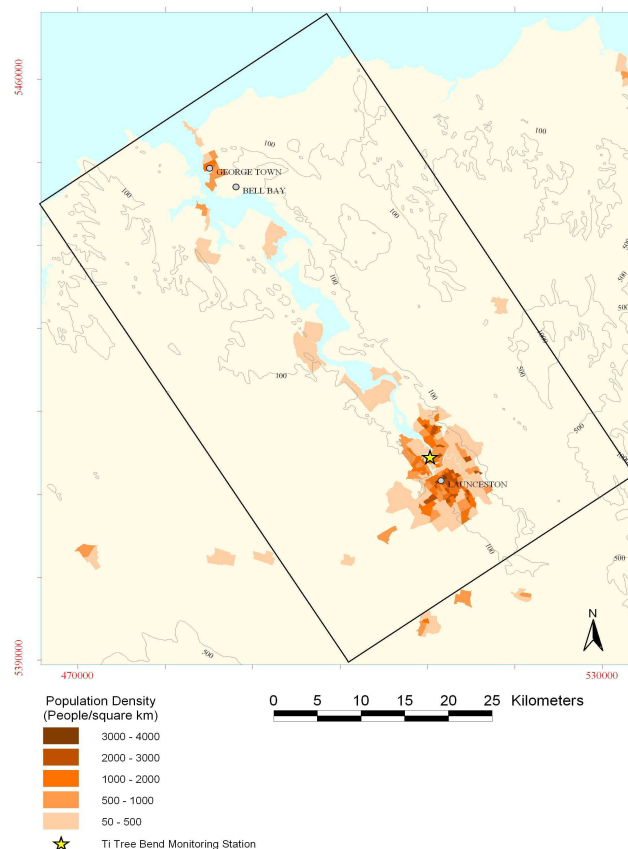
### **2.3 METEOROLOGY**

Northerly winds tend to prevail all year round in Launceston, with atmospheric calm conditions reported to be most frequent in the winter and autumn months (Power, 2000).

Available data for the Region clearly indicate that high concentrations of particles are frequently associated with light winds and highly stable atmospheric conditions. Moreover, because of night-time ground cooling and the formation of drainage flows, relatively high pollutant concentrations are likely to be found in topographic hollows and basins, and on low-lying land.

### **2.4 LAUNCESTON, TI TREE BEND PERFORMANCE AND TREND MONITORING STATION.**

- PM<sub>10</sub> is measured by High Volume Air sampler (HVAS), according to AS 3580.9.6-1990, sampled every day.
- TEOM direct-reading instrument with a PM<sub>10</sub> head is collocated with the HVAS and data is being accumulated to develop site specific temperature-dependent correlation factors.
- In addition, comparative studies have been undertaken of DustTrak particle counters against both of the above methods, as part of the Launceston Woodheater Program.



**Figure 2: Map Of Launceston Region Including Population Density And Topography**

### 3. DEVONPORT

#### 3.1 REGION BOUNDARIES

For Devonport, the availability of meteorological data tends to be relatively low. Moreover, complex atmospheric dispersion models have not been developed for the Region. For these reasons, the extent of the Devonport airshed is unclear.

For the purpose of the Measure, the Devonport Region boundaries are defined as presented in Figure 3-12. Although there is no functional purpose served in exactly defining the boundary AMG co-ordinates, these may be taken to be defined by the south-west corner (Easting 441,000; Northing 5430,000) and the north-east corner (Easting 454,000; Northing 5444,000).

#### 3.2 POPULATION AND TOPOGRAPHY

The population density and topography for the Devonport Region is presented in Figure 3-12. The majority of the population resides within approximately a 5 km radius of the CBD. In total, the population of the Devonport Region defined in this Plan is approximately 30,000.

Devonport is located in a shallow coastal plain on the banks of the Mersey River. The Mersey connects the town of Latrobe with Devonport.

#### 3.3 METEOROLOGY

Westerly winds tend to prevail in the Devonport Region, with atmospheric calm conditions most frequent in winter and autumn.

Strongly stable atmospheric conditions in Devonport are normally associated with southerly, south-easterly or easterly winds draining out of the Valley. This is especially evident in winter.

#### 3.4 DEVONPORT PERFORMANCE AND TREND MONITORING STATION

Campaign monitoring of particulates was completed at Devonport in 2003, to assess the need for a permanent station. Results confirmed that air pollution in Devonport is significant, and in response, a PM10 monitoring station will be installed there in 2005-06 as part of Tasmania's four year upgrade program.

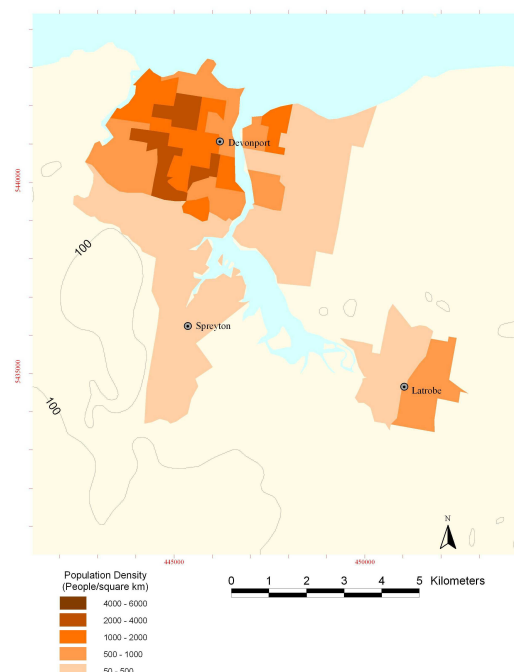


Figure 3: Map Of Devonport Region Including Population Density And Topography

## SECTION B – ASSESSMENT OF COMPLIANCE WITH STANDARDS AND GOAL

Results from monitoring at current Tasmanian Performance Monitoring stations are presented in Table 1.

**Table 1: Compliance summary for carbon monoxide and PM<sub>10</sub> at Tasmanian Performance Monitoring stations.**

Region/Performance Monitoring Station	Data Availability Rates (% of days for sampling regime)					No. of Exceedences		Performance Against Standard and Goal
	Q1	Q2	Q3	Q4	Annual	Period	No.	
<b>Hobart, POW Bay<sup>(1)</sup></b> Carbon monoxide	100	100	45	0	61	8 hour	0 hours	<b>NOT DEMONSTRATED<sup>(2)</sup></b>
PM <sub>10</sub> (Total)	100	100	65 <sup>(3)</sup>	100	91	24 hour	0 days	<b>MET</b>
HVAS (alternate days)	50	50	32	50	45	24 hour	0	
TEOM	100	100	53	100	88	24 hour	0	
<b>Launceston Ti Tree bend</b> PM <sub>10</sub> (Total)								<b>NOT MET</b>
HVAS (every day)	77	96	97	90	89	24 hour	10	
TEOM <sup>(4)</sup>	83	91	96	92	91	24 hour		
<b>Devonport</b> PM <sub>10</sub>	Monitoring to commence 2005-06					24 hour	N/A	<b>NOT DEMONSTRATED</b>

Notes:

- (1) Recorded levels of carbon monoxide were well below National Environment Protection Standard over the previous three years, so air quality is considered to comply with standard and goal – monitoring ceased August 2004.
- (2) Site considered not representative of population exposure. Station being moved October 2005 (see text)
- (3) Both instruments offline for extended periods during the third quarter – total effective loss of 32 days of samples.
- (4) Temperature corrected using local model according to Technical Guidance Paper 10..

## SECTION C – ANALYSIS OF AIR QUALITY MONITORING

### 1. HOBART

Results for Hobart show that Air Quality, as measured at Prince of Wales Bay is well within compliance with the Standards for carbon monoxide and PM<sub>10</sub>. No exceedences of the PM<sub>10</sub> Standard were recorded, as shown in Table 2.

**Table 2: Exceedences of PM<sub>10</sub> Standard at Prince of Wales Bay, Hobart, with Attribution of Cause.**

Date	HVAS (µg/m <sup>3</sup> )	24 Hour TEOM (µg/m <sup>3</sup> )	Mean Temp (°C)	Reason
NO EXCEEDENCES RECORDED				

### 2. LAUNCESTON

Results for Ti Tree Bend show that winter Air Quality does not comply with the Standard and Goal for PM<sub>10</sub> (see Table 3), with 10 days where the daily average PM<sub>10</sub> concentration exceeded 50 µg/m<sup>3</sup>. All of these exceedences have been attributed to winter woodsmoke built up under still atmospheric conditions.

**Table 3: Exceedences of PM<sub>10</sub> standard at Ti Tree Bend, Launceston, with attribution of causes (In descending order of concentration).**

Date	HVAS (µg/m <sup>3</sup> )	24 hour TEOM (µg/m <sup>3</sup> )	Mean Temp (°C)	Reason
1. 20 July	86.1	70.7	3.9	Temp. inversion with wood smoke
2. 21 July	75.3	82.0	5.5	Temp. inversion with wood smoke
3. 15 May	67.6	50.2	6.3	Temp. inversion with wood smoke
4. 19 July	63.5	78.6	2.3	Temp. inversion with wood smoke
5. 6 June	56.9	67.2	3.8	Temp. inversion with wood smoke
6. 9 July	54.6	60.3	6.3	Temp. inversion with wood smoke
7. 5 June	54.0	55.2	3.5	Temp. inversion with wood smoke
8. 11 July	52.0	50.8	6.9	Temp. inversion with wood smoke
9. 21 June	50.9	54.8	6.7	Temp. inversion with wood smoke
10. 28 July	50.7	59.5	4.3	Temp. inversion with wood smoke



### **3. DEVONPORT**

No data is available. A new station is due to be established at Devonport in 2005-06 in response to the results of monitoring undertaken there in 2003.

## **SECTION D – DATA ANALYSIS**

TEOM and high volume air samplers were collocated at Hobart and Launceston stations for the whole year. The high volume sampler was taken as being the reference for determining compliance, this being the standard methodology cited in Schedule 3 of the Air NEPM. So where results from the two methods differed on individual days, high volume sampler data were used to determine exceedences.

### **1. HOBART:**

In Hobart, where the high volume air sampler was operated on alternate days, exceedences are based on data from both methods.

Data recorded at the Performance and Trend station indicated that air quality at Prince of Wales Bay complied with the standards for both carbon monoxide and PM<sub>10</sub>. Levels of carbon monoxide were generally so low that no particular trend was discernible and monitoring ceased at this location in August 2004.

However, as foreshadowed in the 2003 report, the status of this site was reviewed during winter 2004, in order to assess future needs for representative monitoring in Hobart. As a result, the Performance and Trend station will be relocated in September 2005 to a site in New Town. Details of the re-location are contained in an amended Tasmanian Air Monitoring Plan, submitted to the Peer review Committee in May 2005.

### **2. LAUNCESTON**

Air Quality in Launceston, as measured at Ti Tree bend has consistently been out of compliance with the PM<sub>10</sub> Standard since commencement of monitoring in 1997. That said, air quality, as measured by the number of exceedences, has improved dramatically over recent years. Relatively mild weather conditions prevailed during the winter of 2004, and as a result, there were 10 exceedences of the National Environment Protection Standard for PM<sub>10</sub>, compared with 2003, when cooler conditions and frequent inversions contributed to 26 exceedences. In 2004, there were no exceedences that could be directly attributed to bushfires or planned burning.

### **3. DEVONPORT**

The winter monitoring campaign in Devonport during winter 2003 showed that the local air quality is adversely affected by particulate pollution and may not comply with the NEPM goal. It is planned to establish an air quality monitoring station in Devonport in the 2005-06 financial year.

**Table 5: 2004 Summary Statistics for daily peak Carbon Monoxide**

AQ NEPM Standard: 9.0ppm (8 Hour average)

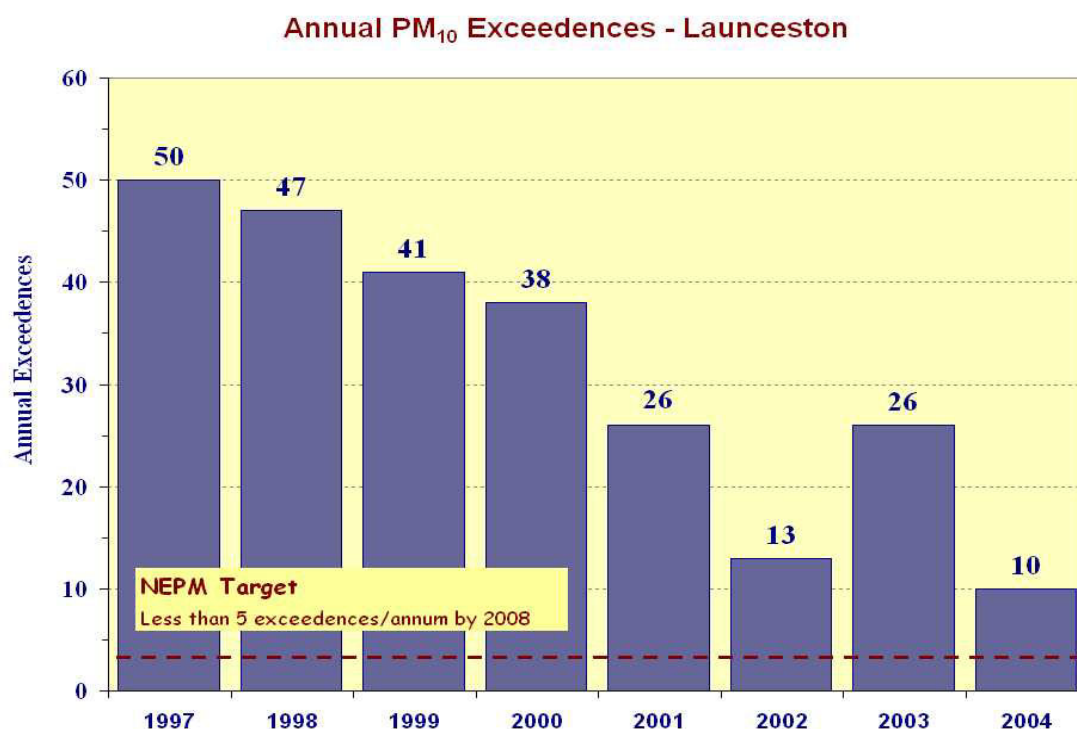
Note: All hour timestamps are “hour ending”

Site	Number of Valid days	Highest		6 <sup>th</sup> Highest		Percentiles		
		ppm	Date:Hr	ppm	Date:Hr	98 <sup>th</sup>	95 <sup>th</sup>	90 <sup>th</sup>
POW Bay, Hobart	215	1.25	11 June	1.16	29 April	065	040	0.03

**Table 6: 2004 Summary Statistics for PM<sub>10</sub>**

AQ NEPM Standard: 50µg/m<sup>3</sup> (24 Hour Average)

Pollutant	Number of Valid days	Highest		6 <sup>th</sup> Highest		Percentiles [µg/m <sup>3</sup> ]		
		µg/m <sup>3</sup>	Date	µg/m <sup>3</sup>	Date	98 <sup>th</sup>	95 <sup>th</sup>	90 <sup>th</sup>
<b>POW Bay, Hobart</b>								
HV Air Sampler (alternate days)	160	48.0	16 May	34.2	22 April	34.2	26.7	20.8
TEOM	299	26.9	18 Feb	22.6	16 Feb	22.6	18.9	16.5
<b>Ti Tree Bend, Launceston</b>								
HV Air Sampler	322	86.1	20 July	54.6	9 July	52.0	43.7	37.4
TEOM	348	82	21 July	59.5	28 July	56.1	46.3	35.8
<b>Devonport High School</b>	Monitoring scheduled to commence in 2005-06							



**Figure 4: Annual exceedences of the PM<sub>10</sub> Standard at Launceston for 1997 to 2004**

**NOTE:** The development of the Tasmanian Air Quality Database has allowed the air density corrections for the historical high volume air sampler data to be recalculated using the observed meteorological data for the measurement period. This has resulted in some revision of the historical PM10 concentrations and the number of exceedences for past years.

## SUMMARY OF ACHIEVEMENTS AND FUTURE DIRECTIONS

The Tasmanian Government has several programmes in place to assess compliance with the Air NEPM and to implement progressive improvement towards meeting the Air NEPM Goals.

These include:

- The Environment Protection Policy (Air Quality) 2004 came into force on 1 June 2005. The Policy includes specific reference to meeting the requirements of the Air NEPM through regulation of industry and management of diffuse sources and planned burning activities.
- New Regulations are also under development, aimed at controlling the import, sale and installation of domestic solid fuel heaters, creating an offence for emission of excessive smoke from domestic flues and in addition, restricting backyard burning in Tasmania. It is expected that the Regulations will be made in late 2005 or early 2006.
- A consultation draft of the *Tasmanian Air Quality Strategy* is to be released by the Minister of Environment and Planning, Hon Judy Jackson on 26 August 2005, and will be available for comment until mid-October. The five-year Strategy includes programs to further reduce domestic and industrial emissions of fine particles in critical regions of the State, while maintaining a balance with economic growth and social equity issues, particularly relating to home energy use and conservation.
- The Tasmanian Government has provided funding of \$816,000 over the period 2004 to 2008 to develop a monitoring capability for PM<sub>2.5</sub> particles as required in the amendment to the Air NEPM (May 2003), and upgrade existing PM<sub>10</sub> monitoring. The new system is in operation at Hobart and Launceston and will be extended to Devonport in 2005-06, in line with the *Amended Tasmanian Air Monitoring Plan 2005*.
- The Australian Government-funded Launceston Woodheater Replacement Program replacement Scheme ceased in May 2004. This was a joint project between local, State and national governments, managed through the Launceston City Council and directly resulting in removal of some 2200 woodheaters from the airshed. However, many more were also replaced during the three-year program and it is likely that some of these were an indirect result of the education component of the program. The education program is continuing in Launceston as part of the Tamar Valley Air Quality Strategy developed by councils in the Valley, with input from the Environment Division.
- The Department initiated further community education programs in Greater Hobart during 2004, including a winter media advertising campaign. A monitoring program using nephelometers is also being established in three school in Greater Hobart to support the main performance and trend station at New Town. These stations will also form part of the education program, with air quality issues being incorporated into school curricula.