REPORT AGAINST THE

NATIONAL ENVIRONMENT PROTECTION MEASURE

FOR AMBIENT AIR QUALITY FOR 2003

BY TASMANIA

JUNE 2004

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_3), the airshed may extend relatively large distances from the city centre. However, for a pollutant such as PM_{10} 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 GRUB 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.
- PM_{10} using:
  - a High Volume Air sampler (HVAS), according to AS 3580.9.6-1990, sampled every second day, and
  - a collocated TEOM direct-reading instrument with a PM_{10} head. Data is being accumulated to develop site specific temperature-dependent correlation factors.

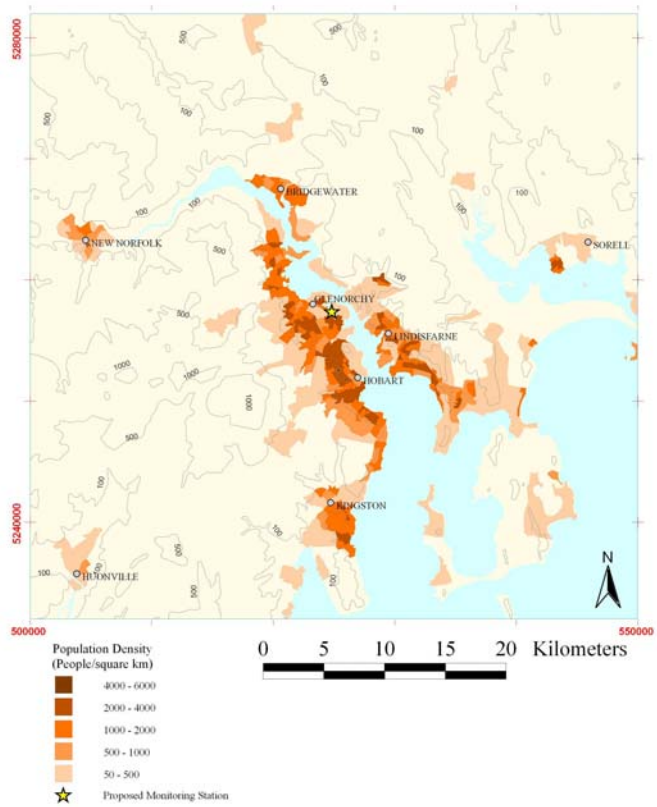

Figure 1: Map Of Hobart Region Including Population Density And Topography

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 GRUB STATION.

- PM_{10} 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_{10} 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.

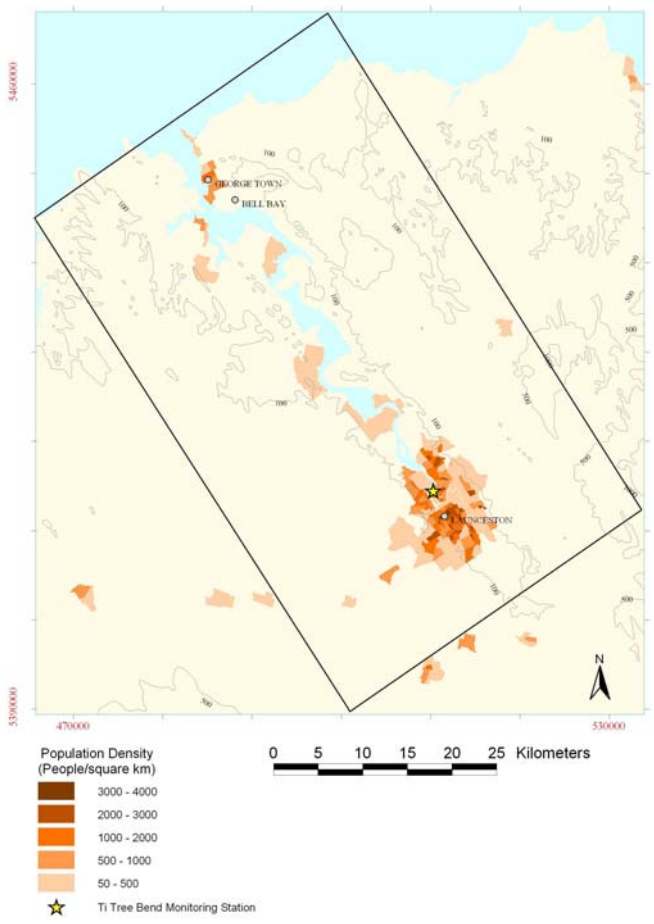

Figure 2: Map Of Launceston Region Including Population Density And Topography

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 GRUB 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.

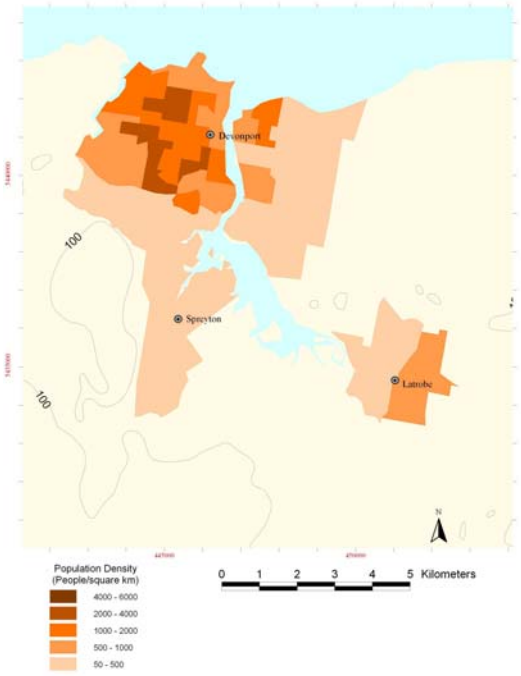

Figure 3: Map Of Devonport Region Including Population Density And Topography

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_{10} at Tasmanian Performance Monitoring stations.

Region/Performance Monitoring Station	**Data Availability Rates (% of days for sampling regime)**					**No. of Exceedences (days)**		**Performance Against Standard and Goal**
	Q1	***Q2***	***Q3***	***Q4***	***Annual***	***Period***	***No.***	
Hobart, POW Bay								
Carbon monoxide	100	100	100	100	100	8 hour	0	***MET***
PM_{10} (Total)							3	
HVAS (alternate days)	44	46	49	53	48	24 hour	2	***MET***
TEOM	100	100	100	100	100	24 hour	1(1)	
Launceston Ti Tree bend								
PM_{10} (Total)							26	
HVAS (every day)	36(3)	95	98	77	74	24 hour	23	***NOT MET***
TEOM(2)	40(3)	97	99	82	79	24 hour	25	
Devonport PM_{10}	0	0	17	27	11	24 hour	2	***NOT DEMONSTRATED***

Notes:

(1) High Volume Sampler not operating. See Section D-1.

(2) Temperature corrected using local model.

(3) Data lost due to interference from localised earthmoving equipment.

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_{10}. Three exceedences of the PM10 Standard were noted, as shown in Table 2.

Table 2: Exceedences of PM_{10} Standard at Prince of Wales Bay, Hobart, with Attribution of Cause.

Date	HVAS ($\mu g/m^3$)	TEOM ($\mu g/m^3$)	Temp (^oC)	Reason
1. 25 January 2003	No data	73	25.0	Smoke from the Broadmarsh bushfires transported down Derwent valley
2. 27 June 2003	54.1	42.1	7.6	Local temperature inversion with trapped wood smoke
3. 23 July 2003	53.6	39.7	6.4	Local temperature inversion with trapped wood smoke

2. LAUNCESTON

Results for Ti Tree Bend show that winter Air Quality does not comply with the Standard and Goal for PM_{10} (see Table 3), with 26 days where the daily average PM_{10} concentration exceeded 50 $\mu g/m^3$. Two of these exceedences were the result of smoke from summer bushfires and five (5) from local vegetation burning on days with poor smoke dispersion. The remaining 19 exceedences were attributed to the accumulation of woodsmoke particles in the Tamar Valley due to low ambient temperatures and strong temperature inversion conditions.

Table 3: Exceedences of PM_{10} standard at Ti Tree Bend, Launceston, with attribution of causes.

Date	HVAS ($\mu g/m^3$)	TEOM ($\mu g/m^3$)	Temp (^oC)	Reason
1. 25 January 2003	52	55	23.6	Smoke from local bushfires
2. 26 January 2003	48	52	19.1	Smoke from local bushfires
3. 5 May 2003	67	88	8.7	Local vegetation burning under poor smoke dispersion conditions
4. 6 May 2003	73	102	9.1	Local vegetation burning under poor smoke dispersion conditions
5. 7 May 2003	92	116	8.4	Local vegetation burning under poor smoke dispersion conditions
6. 8 May 2003	60	59	11.7	Local vegetation burning under poor smoke dispersion conditions
7. 26 May 2003	65	63	8.2	Local temperature inversion with trapped wood smoke
8. 27 May 2003	51	43	9.1	Local temperature inversion with trapped wood smoke
9. 17 June 2003	65	70	8.1	Local temperature inversion with trapped wood smoke
10. 19 June 2003	57	68	4.4	Local temperature inversion with trapped wood smoke
11. 20 June 2003	50	51	3.4	Local temperature inversion with trapped wood smoke
12. 21 June 2003	No data	66	4.4	Local temperature inversion with trapped wood smoke
13. 23 June 2003	53	51	5.2	Local temperature inversion with trapped wood smoke
14. 24 June 2003	73	72	3.9	Local temperature inversion with trapped wood smoke
15. 1 July 2003	53	50	5.3	Local temperature inversion with trapped wood smoke
16. 2 July 2003	51	52	3.0	Local temperature inversion with trapped wood smoke
17. 4 July 2003	56	60	3.4	Local temperature inversion with trapped wood smoke
18. 9 July 2003	71	66	5.2	Local temperature inversion with trapped wood smoke
19. 10 July 3003	69	68	7.4	Local temperature inversion with trapped wood smoke
20. 18 July 2003	74	77	5.2	Local temperature inversion with trapped wood smoke
21. 21 July 2003	75	72	7.0	Local temperature inversion with trapped wood smoke
22. 26 July 2003	53	58	4.6	Local temperature inversion with trapped wood smoke
23. 27 July 2003	56	57	6.6	Local temperature inversion with trapped wood smoke
24. 30 July 2003	49	59	5.0	Local temperature inversion with trapped wood smoke
25. 31 July 2003	66	74	4.9	Local temperature inversion with trapped wood smoke
26. 17 Nov. 2003	50	60	13.1	Local vegetation burning under poor smoke dispersion conditions

3. DEVONPORT

The results from the winter monitoring campaign at the Devonport High School showed that the daily average particulate concentrations in the city of Devonport exceeded the 50 µg/m^3 NEPM limit on two of the 40 days for which the sampler was operating. On this basis, is has not been demonstrated that the Ambient Air Quality in Devonport complies with the NEPM standards. The two observed exceedences of the Standard are shown in Table 4.

Table 4: Exceedences of PM_{10} Standard at Devonport High School, with Attribution of Cause.

Date	HVAS (µg/m^3)	TEOM (µg/m^3)	Temp (^{o}C)	Reason
1. 1 July 2003	58	No data	5.3	Local temperature inversion with trapped wood smoke
2. 4 August 2003	67	No data	12.4	Local wind-borne pollution? No temperature inversion

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. Only on one occasion did corrected TEOM data show an exceedence of the standard while the high volume air sampler was not operating (see Table 1).

Results at the GRUB site at Prince of Wales Bay complied with the standards for both carbon monoxide and PM_{10}. Levels of carbon monoxide were generally so low that no particular trend was discernible. Concentrations of PM_{10} were also low on most occasions, with few exceedences recorded, so no trends are obvious in particle levels.

The status of this site is under review during winter 2004, in order to assess future needs for representative monitoring in Hobart.

2. LAUNCESTON

Air Quality in Launceston, as measured at Ti Tree bend has consistently been out of compliance with the PM_{10} Standard since commencement of monitoring in 1997.

The winter of 2002 was unusually mild and as a result fewer exceedences were recorded of the PM10 Standard (13) than expected. Conditions returned to a more usual pattern in 2003. This is illustrated by the clear trend shown in Figure 4, indicating a reduction in the number of exceedences over this period from 51 to 26 in the current reporting year. Although showing persistent improvement in air quality, this trend line demonstrates that air quality is still heavily compromised in Launceston.

At Launceston, where daily sampling was undertaken, exceedences quoted in tables 1 and 3 are based on high volume air sampler results, except for three days (26 January 2003, 21 June 2003 and 30 July 2003), where the decision was based on temperature corrected TEOM data, as high volume air sampler data was equivocal or not available. For the remaining 23 exceedence days, TEOM results, corrected for temperature using a local model, are included for comparison.

3. DEVONPORT

The winter monitoring campaign in Devonport has shown 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 2005-6 financial year.

Table 5: 2003 Summary Statistics for daily peak Carbon Monoxide
AQ NEPM Standard: 9.0pmm (8 Hour average)
Note: All hour timestamps are "hour ending"

Site	Number of Valid days	Highest		2nd Highest		Percentiles		
		ppm	Date:Hr	ppm	Date:Hr	98th	95th	90th
POW Bay, Hobart	365	2.4	29/6/2003 01:00	2.1	15/5/2003 23:00	0.8	0.4	0.2

Table 6: 2003 Summary Statistics for PM_{10}
AQ NEPM Standard: 50µg/m^3 (24 Hour Average)

Pollutant	Number of Valid days	Highest		2nd Highest		Percentiles [µg/m^3]		
		µg/m^3	Date	µg/m^3	Date	98th	95th	90th
POW Bay, Hobart								
HV Air Sampler (alternate days)	171	54	27/6/2003	54	23/7/2003	32	29	23
TEOM	365	73	25/1/2003	50	22/7/2003	30	25	22
Ti Tree Bend, Launceston								
HV Air Sampler	280	92	7/5/2003	75	21/7/2003	70	56	46
TEOM	300	116	7/5/2003	102	6/5/2003	72	59	46
Devonport High School								
HV Air Sampler (alternate days)	40	67	4/8/2003	58	1/7/2003	58	48	42

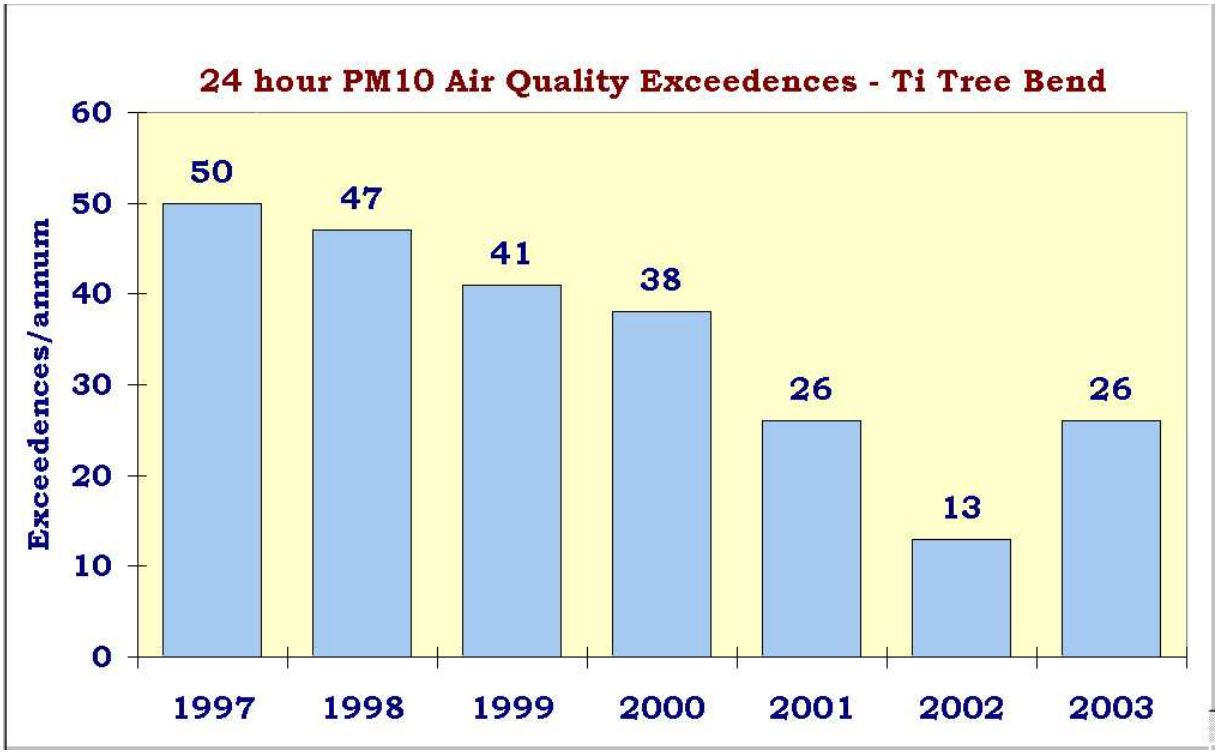

Figure 4: Annual exceedences of the PM_{10} Standard at Launceston for 1997 to 2003

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.

THE FUTURE

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:

- Development of an Environment Protection Policy (Air Quality), which is in draft form at the time of writing and will hopefully go before Parliament in late 2004. The Draft Policy includes specific reference to meeting the requirements of the Air NEPM (cl. 7) through regulation of industry and the application of emission standards and operating conditions on the use of solid fuel burning domestic heaters.

- Development of a Strategy to implement the Policy within 12 months of its being made, including programmes to further reduce domestic and industrial emissions or fine particles in critical regions of the State.

- The Tasmanian Government has provided funding of $816,000 over the period 2004 to 2008 to develop a monitoring capability for $PM_{2.5}$ particles as required in the amendment to the Air NEPM (May 2003), and upgrade existing PM_{10} monitoring. It is projected that the new system will be in operation by the second quarter of 2005. The program will initially focus on Launceston and Hobart in 2004-05, with establishment of a PM_{10} monitoring station in Devonport projected for 2005-06.

- Support for the Launceston Woodheater Program. Although the Commonwealth-funded replacement Scheme ceased in May 2004, the education component is continuing. Some 2200 woodheaters were removed from the airshed as a direct result of this program.