

# Connell Wagner

**Latrobe Valley Air Monitoring Network  
Annual Summary for 2006  
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**Connell Wagner**

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## FOREWORD

This report presents the annual air quality summary for the Latrobe Valley Air Monitoring Network (LVAMN) for the year 2006. The LVAMN consists of three air monitoring stations and an acoustic sounder operated on behalf of PowerWorks and two air monitoring stations operated on behalf of EPA Victoria. All of these stations were operated and maintained by Connell Wagner.

The two EPA stations are performance monitoring stations for the purposes of the *State environment protection policy (Ambient Air Quality)*. Assessment of air quality against the goals set in the policy is undertaken at these performance monitoring stations.

The data reported has been determined in accordance with the following Australian Standards:

- AS 3580.5.1 - 1993 Methods for sampling and analysis of ambient air – Determination of oxides of nitrogen – Chemiluminescence method.
- AS 3580.4.1 - 1990 Methods for sampling and analysis of ambient air – Determination of sulfur dioxide – Direct-reading instrumental method.
- AS 3580.6.1 - 1990 Methods for sampling and analysis of ambient air – Determination of ozone – Direct-reading instrumental method.
- AS 3580.9.6 - 2003 Methods for sampling and analysis of ambient air – Determination of suspended particulate matter – PM<sub>10</sub> high volume sampler with size selective inlet – Gravimetric method.
- AS 3580.9.8 - 2001 Method for sampling and analysis of ambient air – Determination of suspended particulate matter – PM<sub>10</sub> continuous direct mass method using a tapered element oscillating microbalance, (TEOM) analyser.
- AS 2923 – 1987<sup>1</sup> Ambient air - guide for measurement of horizontal wind for air quality applications.


Determination of local visual distance (LVD) has been performed in accordance with EPA Victoria's designated method that is based on AS/NZS 3580.12.1:2001.

All requirements for instrument performance (measured as available data generated for the year) have been met.

The summary is therefore an accurate record of the state of the Latrobe Valley's air quality at this time.

The summaries for all stations were prepared from validated data sets stored on the central computer system housed in Connell Wagner's offices at 26 Buckley Street, Morwell, Victoria.

Validated data has been provided to EPA for archiving, and is available from EPA on request.



John Marsiglio (EPA Victoria)  
Chairman,  
LVAMN Operations & Performance Review  
Committee

<sup>1</sup> The sites at Moe, Traralgon and Jeeralang Hill do not meet all the requirements of this standard with regard to adequate distances from disturbances such as trees.

## LATROBE VALLEY AIR MONITORING NETWORK

### ANNUAL AIR QUALITY COMMENTARY 2006

#### Summary

Annual air quality summaries and commentaries are presented for each air quality station in the Latrobe Valley Air Monitoring Network (LVAMN) for the year January 2006 to December 2006.

Air quality in the Latrobe Valley is usually affected to a degree by smoke from prescribed burning activities. The smoke from bushfires in January, November and December 2006 affected regional air quality to a larger extent than in most years, causing smoke particle concentrations, (measured as PM<sub>10</sub> and LVD), to exceed policy objectives more frequently. Smoke also caused ozone concentrations to exceed policy objectives for the first time in a number of years, while nitrogen dioxide levels were also higher than in most previous years.

The highest measured values of sulfur dioxide (SO<sub>2</sub>) in the Latrobe Valley can usually be attributed to power station emissions. The highest concentration in 2006 (0.272 ppm) was measured on 24 October at Jeeralang Hill in the Strzelecki Ranges. The *State Environment Protection Policy (Ambient Air Quality)* ("SEPP") 1hr Environmental Quality Objective of 0.20 ppm (refer Table 2), was exceeded at Jeeralang Hill on two days during the year.

The highest 1hr SO<sub>2</sub> concentration measured on the floor of the Latrobe Valley was 0.095 ppm which occurred at Traralgon on 27 February. This event was attributed to power station emissions.

The highest nitric oxide (NO) concentration, 0.208 ppm, was measured at Traralgon on 30 May. This was attributed to urban emissions (traffic, heating and cooking emissions) accumulating during calm stable conditions in the early evening. There is no SEPP Objective for nitric oxide levels.

The highest nitrogen dioxide (NO<sub>2</sub>) concentration, 0.058 ppm measured at Moe on 21 December, was attributed to local bushfire activity in the northern ranges of the Latrobe Valley. This was well below the SEPP 1hr Objective for NO<sub>2</sub> of 0.12 ppm, but slightly higher than in previous years due to bushfire smoke.

Particulate matter less than 10 microns in diameter (PM<sub>10</sub>) is measured by two different methods, but all data is compared against the same Objective of 50µg/m<sup>3</sup>, 24-hour average. Numerous exceedences of the SEPP Objective occurred at Moe, (15 days), and Traralgon, (8 days), due to widespread bushfires, while one exceedence at Rosedale South was caused by fuel reduction burning. The highest 24 hour average PM<sub>10</sub> concentration was 254.0 µg/m<sup>3</sup>, measured at Moe. The highest 24 hour average PM<sub>10</sub> concentration measured at Traralgon was 193.5 µg/m<sup>3</sup> and the highest at Rosedale South was 69.3µg/m<sup>3</sup>.

The SEPP 1hr Objective for Local Visual Distance (LVD) of 20 km was exceeded on 47 separate days during the year. The SEPP goal is that exceedences should occur on no more than 3 days per year per site. The most exceedence days recorded by a single station was 32 at Traralgon, which breached the SEPP goal. The Goal was also breached at Moe, with 31 exceedence days. Widespread LVD breaches were attributed to fuel reduction burning and extreme bushfire activity in Gippsland and north eastern Victoria. The total number of exceedences for the Network is 87, which is slightly more than in recent years and reflects the impact of the bushfires.

Ozone levels were significantly affected at all monitoring stations by the bushfire smoke. The highest 1hr average ozone (O<sub>3</sub>) concentration for the year was 0.138 ppm, which occurred on 10 December at

Traralgon. This value exceeded the SEPP 1hr Air Quality Objective of 0.10 ppm. The SEPP Goal, which allows one exceedence per year, was also breached at Traralgon.

The highest 4hr rolling average O<sub>3</sub> concentration for the year, 0.124 ppm, occurred at Rosedale South on 10 December. This measurement exceeded the SEPP rolling 4hr O<sub>3</sub> Objective of 0.08 ppm. The SEPP Goal was breached at both Moe and Traralgon.

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## 1 INTRODUCTION

Annual summaries of air quality statistics and commentaries for the Latrobe Valley Air Monitoring Network (LVAMN) are presented for the period January to December 2006. All monitoring stations were operated and maintained by Connell Wagner on behalf of PowerWorks and EPA Victoria. A list of all current LVAMN stations is given in Table 1 and their locations are shown in Figure 1.

The data reported have been determined in accordance with the following Australian Standards:

AS 3580.5.1 - 1993	Oxides of Nitrogen (NO <sub>x</sub> , NO <sub>2</sub> , and NO);
AS 3580.4.1 - 1990	Sulphur Dioxide (SO <sub>2</sub> );
AS 3580.6.1 - 1990	Ozone (O <sub>3</sub> );
AS 3580.9.6 - 2003	Suspended Particulate Matter (PM <sub>10</sub> ) Hi-Vol method;
AS 3580.9.8 - 2001	Suspended Particulate Matter (PM <sub>10</sub> ) TEOM method;
AS 2923 - 1987	Measurement of horizontal wind for air quality applications.

Determination of Local Visual Distance (LVD) has been undertaken in accordance with the Environment Protection Authority of Victoria designated method that is based on AS/NZS 3580.12.1:2001.

Table 2 shows the *State Environment Protection Policy (Ambient Air Quality)* ("SEPP") Environmental Quality Objectives and Goals for Victoria (Victoria, 1999). While the Objectives apply to all ambient air in Victoria, it should be noted that evaluation of air quality against the Goals is to be undertaken at performance monitoring stations located in urban or populated areas only. The Moe and Traralgon monitoring stations are performance monitoring stations.

The rural sites of Darnum North, Jeeralang Hill and Rosedale South serve as surveillance sites and measurements are used for air quality modelling, plume impact and other studies.

## 2 LVAMN OPERATIONS FOR 2006

### 2.1 Network Operations

Four air monitoring stations were in operation for the complete twelve months; these were Traralgon and Moe urban sites and Rosedale South and Jeeralang Hill rural sites. Darnum North, a rural site, operated for six months only (January to March & October to December).

The parameters measured at each monitoring station are:

**Darnum North:** Ozone, Wind Speed, Wind Direction for the spring and summer (October to March) period only.

**Rosedale South:** Nitrogen Oxides, Sulphur Dioxide, Ozone, Local Visual Distance, Dry Bulb Temperature, Wet Bulb Temperature, Wind Speed, Wind Direction, Global Solar Radiation, Ultra-Violet Radiation and Inhalable Particles (HiVol PM<sub>10</sub> size selective inlet method).

**Jeeralang Hill:** Ozone, Sulphur Dioxide, Wind Speed, Wind Direction and Inhalable Particles (Hivol PM<sub>10</sub> size selective inlet method).

**Moe:** Nitrogen Oxides, Sulphur Dioxide, Ozone, Local Visual Distance, Dry Bulb Temperature, Wind Speed, Wind Direction and Inhalable Particles (TEOM continuous PM<sub>10</sub> method).

**Traralgon:** Nitrogen Oxides, Sulphur Dioxide, Ozone, Local Visual Distance, Dry Bulb Temperature, Wind Speed, Wind Direction and Inhalable Particles (TEOM continuous PM<sub>10</sub> method).

An acoustic sounder is located at “The Ridge” in Morwell at the southern end of the PowerWorks building. The sounder measures wind speed, wind direction and temperature at a range of heights to enable more accurate tracking of stack emissions and provides important data for the modelling of emissions and atmospheric dispersion.

The urban monitoring sites of Moe and Traralgon are regarded as “Performance Monitoring” sites and are equipped with continuous analysers in accordance with the NEPM<sup>1</sup> measurement criteria.

A complete list of current LVAMN stations is shown in Table 1 and the locations of these stations are shown in Figure 1.

## **2.2 Network Performance**

All monitoring equipment used in the LVAMN stations performed extremely well for the year. All parameters performed above the individual minimum requirement of 80% valid data capture. Data losses from power interruptions and air conditioner breakdowns (causing over temperature trips) were the most significant causes of lost data (refer to Table 7 for instrument performance details).

Refurbishment of the Moe air monitoring station resulted in the station being off-line from 14 March to 10 April and hence having reduced data availability for the year. Nevertheless, annual data availability for Moe still exceeded 80%.

## **3 LATROBE VALLEY AIR QUALITY, 2006**

The summary of air quality measurements for the Latrobe Valley Air Monitoring Network for the period January 2006 to December 2006 is shown in Table 3 and Table 4.

The highest values<sup>2</sup> measured in the Latrobe Valley for each year from September 1980 to December 2006 are shown in Tables 5a & 5b.

Measured concentrations are rounded to the nearest 0.001 ppm, 0.1 km or 0.1 µg/m<sup>3</sup> in accordance with reporting protocols agreed under the NEPM and with EPAV.

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<sup>1</sup> *National Environment Protection (Ambient Air Quality) Measure*

<sup>2</sup> The lowest values for local visual distance (LVD).

### **3.1 Nitric oxide (NO)**

Nitric oxide is discharged mainly from combustion processes. It is not considered to be harmful and it has no air quality objective. Its presence in air usually indicates the impact of a combustion source.

The highest concentrations of NO occur at township stations, which measure far higher concentrations of NO than do rural stations, often by a factor of 4 times or more. The highest levels usually occur in near-calm conditions in the evening or early morning in winter when the local emissions from traffic, heating and cooking are not flushed away by the wind.

The two highest NO concentrations at Traralgon were 0.208 ppm on 30 May, and 0.187 ppm on 1 June. The two highest NO concentrations at Moe were 0.151 ppm on 2 May, and 0.149 ppm on 8 June. These urban measurements were characteristic of traffic, heating and cooking emissions accumulating during near calm stable conditions, and were consistent with previous years data.

The two highest NO concentrations measured at the rural Rosedale South station were 0.034 ppm on 28 February and 0.025 ppm on 7 December. As expected, these were considerably lower than at the urban Traralgon and Moe sites.

### **3.2 Nitrogen dioxide (NO<sub>2</sub>)**

NO<sub>2</sub> is largely formed in the atmosphere by the oxidation of NO emissions that originate from urban and industrial sources.

Historically the measured levels have been well below the SEPP 1hr Air Quality Objective, and the maximum concentration in 2006 (0.058 ppm at Moe on 21 December) was well below the SEPP 1hr Objective for NO<sub>2</sub> of 0.12 ppm. The maximum NO<sub>2</sub> was slightly higher than in previous years because of bushfire activity in the region.

The highest concentration measured at a rural site was 0.034 ppm at Rosedale South on 14 December.

The highest annual average NO<sub>2</sub> concentration measured at either an urban or rural site during 2006 was 0.007 ppm at both Moe and Traralgon, well below the SEPP objective of 0.03 ppm.

### **3.3 Sulfur dioxide (SO<sub>2</sub>)**

About 95% of all SO<sub>2</sub> in the Latrobe Valley originates from anthropogenic sources. The highest measured values on investigation can usually be attributed to power station emissions.

The highest SO<sub>2</sub> concentration during 2006, 0.272 ppm measured at Jeeralang Hill on 24 October 2006, was attributed to a plume strike from Loy Yang A and B Power Stations occurring under stable conditions during the early morning. A total of two exceedences occurred at Jeeralang Hill with a level of 0.265 ppm recorded on 29 January. Other elevated SO<sub>2</sub> concentrations at Jeeralang Hill, indicative of power station emission impacts, included measurements exceeding 0.100 ppm on 14 days and 0.05 ppm on 34 days. This is typical of the impacts recorded in previous years and indicative of impacts likely to occur along the northern slopes of the Strzelecki Ranges.

The SEPP Goal of less than 0.20 ppm for all but one day per year was not exceeded in 2006 at any urban site

The highest SO<sub>2</sub> concentration measured on the Latrobe Valley floor was 0.095 ppm. This occurred at Traralgon on 27 February and was attributed to power station emissions being convectively mixed to ground under unstable conditions. The second highest event was 0.068 ppm also measured at Traralgon on 4 February. This measurement was also attributed to power station plume impact. These measurements are typical of previous years' measurements at these sites.

The highest 24hr average concentration of SO<sub>2</sub> measured by the LVAMN was 0.033 ppm at Jeeralang Hill on 14 October 2006. This value did not breach the SEPP 24hr Objective of 0.08 ppm. As expected, this event occurred on the same day as the highest 1hr concentration was measured, with the plume impact being evident for approximately 5 hours at the monitoring station.

The SEPP annual average concentration objective for SO<sub>2</sub> is 0.02 ppm and is not to be exceeded. The highest annual average concentration of SO<sub>2</sub> was 0.003 ppm, measured at Jeeralang Hill. This is well below the Objective.

### **3.4 Ozone (O<sub>3</sub>)**

Photochemical pollution (the action of sunlight on a mixture of oxides of nitrogen and hydrocarbons) is responsible for most of the measured high levels of ozone in the Latrobe Valley. In 2006 the high pollutant levels in bushfire smoke provided the primary reactants to cause the highest ozone concentrations ever measured in the monitoring network.

The SEPP 1hr Air Quality Objective of 0.10 ppm for ozone has previously been exceeded only once in the Latrobe Valley (0.110 ppm at Darnum North on 6 February 1997). In 2006 the highest 1hr ozone concentration was 0.138 ppm, recorded at Traralgon on 10 December. Other maxima also exceeded the Objective of 0.10 ppm, with 0.133 ppm being recorded at Rosedale South, 0.119 ppm at Jeeralang Hill, 0.111 ppm at Darnum North and 0.104 ppm at Moe. There were a total of 3 days with ozone exceeding the Objective at one or more monitoring stations, and the SEPP Goal for 1hr ozone was breached at Traralgon but not at Moe.

The highest rolling 4hr average O<sub>3</sub> concentration for 2006 was 0.124 ppm, recorded at Rosedale South on 10 December. This annual maximum is the highest since 4hr measurements began in 1992 (see Table 5b) and exceeds the SEPP 4hr rolling average Objective of 0.08 ppm. The Objective was exceeded on a total of 3 days at one or more monitoring stations, and the SEPP Goal for 4hr ozone was breached at Moe and Traralgon.

### **3.5 Visibility reducing particles (measured as LVD)**

The SEPP Objective for visibility reducing particles is based on aesthetic considerations. The Objective is measured as local visual distance (which is degraded by airborne particles smaller than 2.5 µm in diameter) and states that the LVD should be at least 20 km. The Goal is that the Objective be exceeded for no more than 3 days per year per site. The Goal has been breached at one or more sites every year since the commencement of the LVAMN. Low LVD measured at ground level has been found to occur mainly in calm, stable conditions which result in the accumulation of pollution from ground based sources (Joynt, 1988).

The SEPP Objective of 20 km was exceeded on 47 separate days during the year. The objective was breached at Moe on 31 days, at Traralgon on 32 days, and at the rural station, Rosedale South, on 24 days. Breaches occurred at all three stations on 14 days, and at two of three stations on 12 days, indicating widespread visibility degradation on these 26 days. The remaining 21

exceedences occurred at only one station on each given day, indicating a greater likelihood that these were due to local sources.

Bushfires in January, November and December caused these impacts on 24 days, while prescribed burning activities resulted in exceedences on 9 days. The remaining exceedences occurred at Moe and Traralgon during the evening or early morning and were due to local urban, (household and traffic), emissions.

### **3.6 Particulate matter less than 10 microns (PM<sub>10</sub>)**

PM<sub>10</sub> (particles less than 10µm) is a measure of inhalable particles that are generally larger than those causing visibility degradation. The Objective and Goal are based on human health considerations. In general, the highest concentrations of 24 hour PM<sub>10</sub> measured in the Latrobe Valley can be attributed to bushfires and burning off.

PM<sub>10</sub> is measured in two ways in the LVAMN. The urban stations at Moe and Traralgon use a continuous analyser known as a TEOM<sup>3</sup>, which obtains measurements every hour of the year. 24-hour averages are calculated for each day. Note that the 24hr average concentration values presented in this report have been adjusted for temperature to account for the loss of volatiles, in accordance with the standard method. Values presented in Table 6 have also been adjusted for temperature accordingly.

The rural stations at Rosedale South and Jeeralang Hill use high volume samplers which obtain a 24-hour average measurement on every sixth day.

The highest 24 hour average PM<sub>10</sub> concentration of 254.0 µg/m<sup>3</sup> was measured on 14 December at Moe. The highest 24 hour average at Traralgon, 193.5 µg/m<sup>3</sup> was measured on 21 December. These readings were attributed to the widespread smoke plume from extreme bushfire activity in Gippsland and north eastern Victoria, (see satellite image below). The PM<sub>10</sub> Objective was exceeded on 8 occasions at Traralgon and 15 occasions at Moe during 2006, thereby breaching the SEPP Goal at both sites.

The highest PM<sub>10</sub> measurement at a rural station occurred at Rosedale South, where a 24-hour average PM<sub>10</sub> concentration of 69.3 µg/m<sup>3</sup> was recorded on the 27 April. This value was the only recorded exceedence of the SEPP Objective of 50µg/m<sup>3</sup> at a rural site.

Monthly and yearly average PM<sub>10</sub> concentrations for the LVAMN sites are given in Table 6. The highest annual concentration of PM<sub>10</sub> was 20.8 µg/m<sup>3</sup> measured at Moe. There is no SEPP Objective for the annual concentration, but this measured value is slightly higher than in previous years for the LVAMN sites.

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<sup>3</sup> Tapered element oscillating microbalance



Satellite image of South Eastern Australia on 8 December 2006 showing the extensive bushfire smoke plume.

#### **4 REFERENCES**

LVAMN Network Database - WINCOLLECT - Validated data from January 2006 to December 2006.

LVAMN Annual Air Quality Commentary, January to December 2005, CWPPi Report No CWM/2006/04.

Victoria. (1999). State Environment Protection Policy (Ambient Air Quality), Victoria Government Gazette S19, 9 February 1999. Amendments as per Victoria Government Gazette S240, 21 December 2001, page 48.

Information provided by the Department of Sustainability and Environment (DSE) on fuel reduction burning and bushfire activity in the Gippsland Region during 2006.

Joynt, R C, (1988). Airborne Particles in the Latrobe Valley. Clean Air. Vol 22. No4, November 1988.

Station Number	Station Short Name	Station Name	Station Type	Station Start Date	Sampling Height (m agl)	Station Location	
						Coordinates (mE) (mN)	Description
1	DN	Darnum North **	AQR	11/05/79 <sup>%</sup> 25/09/00 <sup>#</sup>	3	413400 5779000	Nilma-Shady Creek Road, Approx 100m north of Halls and Porches Rd.
12	MO	Moe	AQU	05/05/82	3	434900 5773400	Vale St Oval, via South St, Moe
13	TR	Traralgon	AQU	6/01/82	3	459200 5772300	Kay St, Traralgon, adjacent to pool
17	RS	Rosedale South	AQR	2/06/87	3	480500 5772200	West of Willung Road, Rosedale South
36	JH	Jeeralang Hill	AQR	1/09/96	3	454010 5755500	1km north of Jeeralang North Road (Thomson Road)
37	PS	PowerWorks SODAR	AS	11/05/01	Multiple <sup>@</sup>	448550 5766390	South of PowerWorks building, Ridge Rd, Morwell

Notes:

AQR - Air Quality Rural

AQU - Air Quality Urban

AS - Acoustic Sounder

\*\* Darnum North is operated for six months per year: January to March, October to December.

<sup>%</sup> Initial installation with complete instrument set as per Rosedale South.

<sup>#</sup> Commencement of six months per year operation with ozone measurement only.

<sup>@</sup> Measures at various pre-selected heights up to approx 1500metres.

Map reference is the National Topographic Map series 1:100,000 (Sheets 8121 Moe, 8221 Traralgon).

The sampling height of anemometers and wind direction sensors at air monitoring stations is 10m above ground level (agl).

**Table 1: Latrobe Valley Air Monitoring Network Stations, 2006**

<b>Pollutant</b>	<b>Averaging Period</b>	<b>Environmental Quality Objectives <sup>1</sup></b>	<b>Goal - Maximum Allowable Exceedences</b>
Carbon monoxide	8 hours <sup>2</sup>	9.0 ppm	1 day a year
Nitrogen dioxide	1 hour 1 year	0.12ppm 0.03 ppm	1 day a year None
Photochemical oxidant (as ozone)	1 hour 4 hours <sup>2</sup>	0.10 ppm 0.08 ppm	1 day a year 1 day a year
Sulphur dioxide	1 hour 1 day 1 year	0.20 ppm 0.08 ppm 0.02 ppm	1 day a year 1 day a year None
Lead	1 year	0.50 µg/m <sup>3</sup>	None
Particles as PM <sub>10</sub>	1 day	50 µg/m <sup>3</sup>	5 days a year <sup>3</sup>
Visibility Reducing Particles	1 hour	20 km <sup>4</sup>	3 days a year

**Notes to table:**

1. Objectives are maximum concentrations in each case, except for visibility reducing particles which is a minimum visual distance.
2. Rolling averages based on consecutive 1 hour averages.
3. Five exceedences per year allowed for daily monitoring (equivalent to 1 exceedence per year where measurements are undertaken on a one day in six basis).
4. Minimum visual distance.

**Table 2. State Environment Protection Policy (Ambient Air Quality)  
- Environmental Quality Objectives and Goals**

***Important Note:***

The above air quality objectives apply to ambient air throughout Victoria.

The urban sites of Moe and Traralgon have been designated “performance monitoring sites” in accordance with the National Environment Protection Measure to monitor and assess the air quality in populated areas.

Rural air quality is monitored at the sites of Darnum North, Jeeralang Hill and Rosedale South. These sites also serve as surveillance sites and measurements are used for air quality modelling, plume impact and other studies.

STATION		DN	MO	TR	RS	JH	SEPP	
STATION NUMBER		1	12	13	17	36	Objectives and Goals	
NUMBER OF MONTHS IN SERVICE		6 (a)	12	12	12	12		
HOURS OF AVAILABLE DATA  (Total annual hours per parameter = 8760 hrs)	NO	N/A	7539	8280	8252	N/A		
	NO <sub>2</sub>	N/A	7540	8281	8252	N/A		
	SO <sub>2</sub>	N/A	7518	8157	8286	8347		
	O <sub>3</sub>	3895	7529	8326	8197	8342		
	LVD	N/A	7409	8372	8155	N/A		
	TEOM	N/A	7651	8682	N/A	N/A		
MAXIMUM MEASURED CONCENTRATION	NO (ppb)	N/A	151	208	34	N/A		
	NO <sub>2</sub> (ppb)	N/A	58	44	34	N/A		
	SO <sub>2</sub> (ppb)	N/A	46	95	49	272		
	O <sub>3</sub> (ppb)	111	104	138	133	119		
MINIMUM MEASURED VISIBILITY	LVD (km)	N/A	0.5	0.6	2.1	N/A		
SECOND HIGHEST DAILY MAXIMUM	NO (ppb)	N/A	149	187	25	N/A		120ppb (b) 200ppb (b) 100ppb (b)
	NO <sub>2</sub> (ppb)	N/A	52	32	32	N/A		
	SO <sub>2</sub> (ppb)	N/A	33	68	44	265		
	O <sub>3</sub> (ppb)	96	97	115	101	117		
FOURTH LOWEST DAILY MINIMUM	LVD (km)	N/A	1.6	1.2	2.3	N/A	20km (c)	
DAYS WITH VISIBILITY MINIMUM < 20 km		N/A	31	32	24	N/A	3 days	
DAYS WITH 1-HR O <sub>3</sub> MAXIMUM > 100ppb		1	1	3	2	2	1 day	

NOTES TO TABLE

(a) Darnum North is operated for six months per year: January to March and October to December.

(b) Not to be exceeded on more than one day in any one year.

(c) Not to be exceeded on more than three days in any one year.

**Table 3: Air Quality January 2006 to December 2006 - 1 Hour Averages**

STATION			DN	MO	TR	RS	JH	SEPP Objectives and Goals	
STATION NUMBER			1	12	13	17	36		
NUMBER OF MONTHS IN SERVICE			6 (a)	12	12	12	12		
PERIODS OF AVAILABLE DATA (e.g. 1 period = 24 hours and represents 75% or greater data capture for the period)	24-HOUR NO		N/A	331	365	358	N/A		
	24-HOUR NO <sub>2</sub>		N/A	296	359	358	N/A		
	24-HOUR SO <sub>2</sub>		N/A	323	353	360	359		
	24-HOUR PM <sub>10</sub>		N/A	321	364	59	59		
	4-HOUR O <sub>3</sub> (b)		4062	7820	8674	8546	8687		
MAXIMUM MEASURED CONCENTRATION	24-HOUR NO (ppb)		N/A	43	42	6	N/A		
	24-HOUR NO <sub>2</sub> (ppb)		N/A	20	15	11	N/A		
	24-HOUR SO <sub>2</sub> (ppb)		N/A	9	23	14	33		
	24-HOUR PM <sub>10</sub> (µg/m <sup>3</sup> )		N/A	254.0	193.5	69.3	44.2		
	4-HOUR O <sub>3</sub> (b) (ppb)		88	94	123	124	113		
SECOND HIGHEST DAILY MAXIMUM (c)	24-HOUR NO (ppb)		N/A	34	41	6	N/A		80ppb (d) 80ppb (d)
	24-HOUR NO <sub>2</sub> (ppb)		N/A	18	14	8	N/A		
	24-HOUR SO <sub>2</sub> (ppb)		N/A	8	8	13	31		
	4-HOUR O <sub>3</sub> (b) (ppb)		85	93	89	91	107		
SECOND HIGHEST DAILY MAXIMUM (c)	24-HOUR PM <sub>10</sub> (µg/m <sup>3</sup> )		N/A	N/A	N/A	36.1	34.5		50µg/m <sup>3</sup> (d,g)
SIXTH HIGHEST DAILY MAXIMUM (c)	24-HOUR PM <sub>10</sub> (µg/m <sup>3</sup> )		N/A	92.1	71.8	N/A	N/A	50µg/m <sup>3</sup> (f)	
DAYS WITH 4-HR O <sub>3</sub> MAXIMUM > 80ppb			2	3	2	2	2	1 day	
DAYS WITH PM <sub>10</sub> > 50 µg/m <sup>3</sup>			N/A	15	8	1	0	See note (e)	
ANNUAL AVERAGE CONCENTRATION	NO (ppb)		N/A	5	6	1	N/A	30ppb (h) 20ppb (h)	
	NO <sub>2</sub> (ppb)		N/A	7	7	3	N/A		
	SO <sub>2</sub> (ppb)		N/A	1	3	2	3		
	PM <sub>10</sub> (µg/m <sup>3</sup> )		N/A	20.8	20.3	14.4	11.4		
	O <sub>3</sub> (ppb)		23	17	17	18	24		

NOTES TO TABLE

- (a) Darnum North is operated for six months per year: January to March and October to December.
- (b) 4-hour rolling averages.
- (c) Equal daily maxima counted separately.
- (d) Not to be exceeded on more than one day in any year.
- (e) No more than one day in any year at RS and JH, and no more than five days in any year at MO and TR.
- (f) Not to be exceeded on more than five days in any year.
- (g) One day in six operation.
- (h) Never to be exceeded.

**Table 4: Air Quality January 2006 to December 2006 - Longer Term Averages**

Year Parameter	#1980 /81	#1981 /82	#1982 /83	#1983 /84	#1984 /85	#1985 /86	#1986 /87	#1987 /88	#1988 /89	#1989 /90	#1990 /91	#1991 /92	<sup>s</sup> 1992
<b>NO (1h, ppm)</b>	0.30	0.44	0.29	0.38	0.41	0.33	0.44	0.34	0.28	0.38	0.32	0.36	0.16
<b>NO<sub>2</sub> (1h, ppm)</b>	0.09	0.07	0.05	0.07	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.05	0.03
Days>0.12ppm	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>SO<sub>2</sub> (1h, ppm)</b>	0.05	0.06	0.05	0.05	0.04	0.07	0.09	0.15	0.08	0.09	0.07	0.08	0.06
Days>0.20ppm	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>O<sub>3</sub> (1h, ppm)</b>	0.08	0.09	0.10	0.08	0.08	0.07	0.10	0.08	0.07	0.08	0.06	0.06	0.05
Days>0.10ppm	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>CO (1h, ppm)</b>	4	N/A	5	8	8	6	9	8	5	N/A	N/A	N/A	N/A
<b>LVD (1h, km)</b>	4	5	4	4	4	6	5	8	7	5	5	6	7
Days<20km	<sup>&amp;</sup> 47	<sup>&amp;</sup> 80	47	42	38	36	49	32	14	35	32	44	9
<b>O<sub>3</sub> (4h, ppm)</b>	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.04
Days>0.08ppm	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0
<b>O<sub>3</sub> (8h, ppm)</b>	0.06	0.06	0.07	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.04
Days>0.05ppm	2	2	9	0	1	1	1	3	1	5	2	0	0
<b>PM<sub>10</sub> (24h, µg/m<sup>3</sup>)<sup>*</sup></b>	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	50	67	46	22
Days>50µg/m <sup>3</sup>	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	1	0	0
<b>PM<sub>10</sub> (24h, µg/m<sup>3</sup>)<sup>+</sup></b>	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Days>50µg/m <sup>3</sup>	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

<sup>&</sup> Incomplete data set during commissioning of the Leeds and Northrup logging system.

<sup>#</sup> Seasonal Year (September to August).

<sup>\$</sup> September 1992 to December 1992

<sup>\*</sup> High volume sampler method.

<sup>+</sup> TEOM method (commenced Nov 2002).

N/A Not available.

**Table 5a: Air Quality Extremes and SEPP Objective Exceedences**

Year	@1993	@1994	@1995	@1996	@1997	@1998	@1999	@2000	@2001	@2002	@2003	@2004	@2005	@2006
<b>Parameter</b>														
<b>NO (1h, ppm)</b>	0.37	0.22	0.25	0.30	0.36	0.29	0.31	0.28	0.26	0.28	0.25	0.26	0.225	0.208
<b>NO<sub>2</sub> (1h, ppm)</b>	0.05	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.04	0.04	0.05	0.04	0.040	0.058
^Days>0.12ppm	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>SO<sub>2</sub> (1h, ppm)</b>	0.13	0.17	0.14	0.10	0.20	0.24	0.25	0.29	0.61	0.25	0.23	0.35	0.297	0.272
^Days>0.20ppm	0	0	0	0	0	1	1	0	4	1	1	5	1	2
<b>O<sub>3</sub> (1h, ppm)</b>	0.06	0.07	0.07	0.07	0.11	0.07	0.07	0.10	0.08	0.07	0.09	0.07	0.067	0.138
^Days>0.10ppm	0	0	0	0	1	0	0	0	0	0	0	0	0	3
<b>LVD (1h, km)</b>	5	5	11	7	7	7	11	12	9	4	2	4	4.4	0.5
^Days<20km	16	65	42	25	35	38	31 <sup>#</sup>	27 <sup>#</sup>	31 <sup>#</sup>	26 <sup>#</sup>	43 <sup>#</sup>	20 <sup>#</sup>	30	47
<b>O<sub>3</sub> (4h, ppm)</b>	0.05	0.07	0.06	0.05	0.09	0.06	0.07	0.06	0.08	0.06	0.09	0.06	0.06	0.124
^Days>0.08ppm	0	0	0	0	1	0	0	0	0	0	1	0	0	3
<b>O<sub>3</sub> (8h, ppm)</b>	0.05	0.06	0.06	0.05	0.07	0.06	0.06	0.05	0.07	N/A	N/A	N/A	N/A	N/A
^Days>0.05ppm	0	2	1	0	3	3	1	1	1	N/A	N/A	N/A	N/A	N/A
<b>PM<sub>10</sub> (24h, µg/m<sup>3</sup>) *</b>	79	58	31	63	55	88	50	36	39	42	85	34	32.8	69.3
^Days>50µg/m <sup>3</sup>	1	1	0	1	1	4	0	0	0	0	1	0	0	1
<b>PM<sub>10</sub> (24h, µg/m<sup>3</sup>) +</b>	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	42	289	57	44.9	254.0
^Days>50µg/m <sup>3</sup>	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	11	1	0	15

@ Calendar Year.

\* High volume sampler method.

+ TEOM method (commenced Nov 2002).

# Exceedences adjusted to account for change in calibration reference temperature

^ Number of days when the relevant SEPP objective was exceeded at one or more monitoring stations.

N/A Not available.

**Table 5b: Air Quality Extremes and SEPP Objective Exceedences**

**Table 6: Inhalable Particulate Summary for 2006**

*From January 2006 through December 2006*

PM<sub>10</sub> Monthly Averages in µg/m<sup>3</sup>

<b>Month</b>	<b>JH</b>	<b>RS</b>	<b>MO<sup>1</sup></b>	<b>TR<sup>1</sup></b>
January	17.6	22.1	20.2	22.0
February	10.2	14.0	15.6	17.4
March	11.2	12.9	19.6 <sup>2</sup>	15.6
April	6.5	21.4	13.8 <sup>2</sup>	13.8
May	6.5	9.1	12.4	15.1
June	7.6	13.9	14.2	20.0
July	4.6	7.5	13.4	14.8
August	8.2	9.7	16.5	20.1
September	10.7	10.7	16.8	17.1
October	22.4	19.0	22.0	22.4
November	14.0	13.2	21.5	20.2
<u>December</u>	<u>18.3</u>	<u>19.0<sup>3</sup></u>	<u>64.1</u>	<u>44.4</u>
<b>12 month average</b>	<b>11.4</b>	<b>14.4</b>	<b>20.8</b>	<b>20.3</b>

<sup>1</sup> Moe & Traralgon PM<sub>10</sub> data have been adjusted for temperature to account for loss of volatiles – hence TEOM data can be directly compared with high volume sampler data from Rosedale South and Jeeralang Hill.

<sup>2</sup> Partial month only at Moe - new monitoring hut and infrastructure installed between 14 March and 10 April.

<sup>3</sup> Average of two 24 hour samples only at Rosedale South.

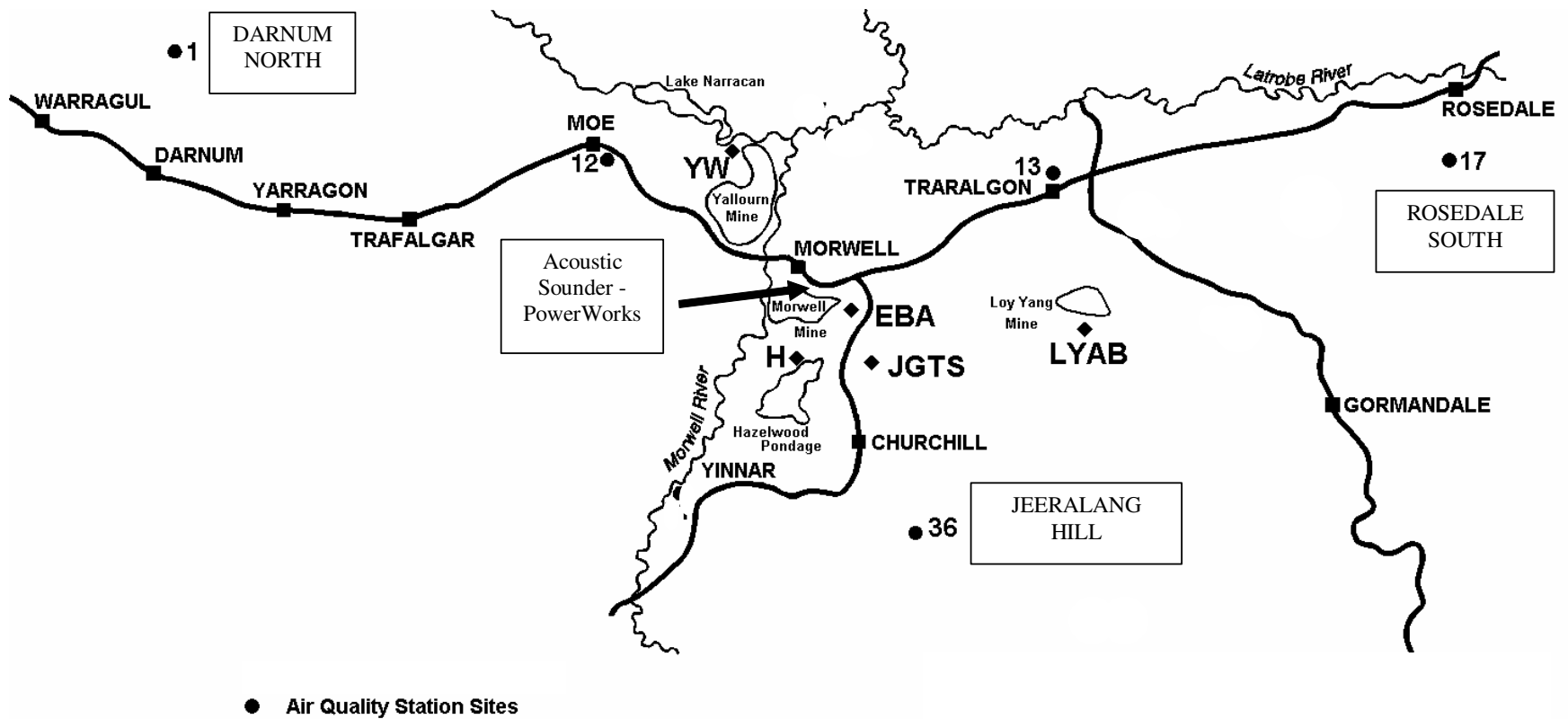
STATION	NO <sub>2</sub>	NO	SO <sub>2</sub>	O <sub>3</sub>	LVD	DBT	WBT	WS	WD	GLB	UVA	TEOM	PM <sub>10</sub>
Darnum <sup>1</sup>				89				94	94				
Rosedale	94	94	95	94	93	99	99	99	99	99	99		95
Jeeralang			95	95				96	96				95
Moe <sup>2</sup>	86	86	86	86	85	91		90	90			87	
Traralgon	95	95	92	95	96	90		90	90			99	

**Table 7: LVAMN Air Quality Instrument Performance Statistics for 2006**

The above table represents the percentage of validated data capture for the LVAMN. The maximum achievable data capture for the calibrated parameters NO<sub>2</sub>, NO, SO<sub>2</sub>, O<sub>3</sub> and LVD is 96%, because 1 hour per day is spent in calibration mode.

1. Darnum North was operated only from 1 January to 31 March and from 1 October to 31 December and the reported percentages relate to this period.
2. Moe site was decommissioned on 14 March and a new monitoring station installed and fully operational on 10 April 2006. Statistics therefore have a maximum of 92% possible (11 out of 12 months).

Note: Target for instrument performance is 80% valid data capture per parameter per calendar year.



**Major power station sources**

YW – Yallourn W

JGTS – Jeeralang (Gas Turbine Station)

EBA – Energy Brix

LYAB – Loy Yang A, Loy Yang B

H – Hazelwood

**Figure 1: Latrobe Valley Air Monitoring Network 2006**