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LVAMN Annual Summary for 2011.

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Foreword

This report presents the annual air quality summary for the Latrobe Valley Air Monitoring Network (LVAMN) for the year 2011. The LVAMN consists of three air quality monitoring stations and an acoustic sounder operated on behalf of PowerWorks and one air quality monitoring station operated at Traralgon on behalf of EPA Victoria. All of these stations were operated and maintained by Aurecon's NATA accredited facility in Morwell.

The EPA station at Traralgon is a performance monitoring station 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 this performance monitoring station.

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

- AS 3580.5.1 - 2011 Methods for sampling and analysis of ambient air – Determination of oxides of nitrogen – Chemiluminescence method.
- AS 3580.4.1 - 2008 Methods for sampling and analysis of ambient air – Determination of sulfur dioxide – Direct-reading instrumental method.
- AS 3580.6.1 - 2011 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 – PM₁₀ high volume sampler with size selective inlet – Gravimetric method.
- AS 3580.9.8 - 2008 Method for sampling and analysis of ambient air – Determination of suspended particulate matter – PM₁₀ continuous direct mass method using a tapered element oscillating microbalance (TEOM) analyser.
- AS 3580.14 – 2011 ¹ Measurement of horizontal wind for air quality applications.
- AS 3580.1.1 - 2008 ¹ Guide to siting of air monitoring equipment

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 Aurecon's offices at 3 Lignite Court, Morwell, Victoria.

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



David Guy
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¹ The sites at Traralgon and Jeeralang Hill do not meet all the requirements of these standards with regard to adequate distances from disturbances such as trees.

Summary

LATROBE VALLEY AIR MONITORING NETWORK ANNUAL AIR QUALITY COMMENTARY 2011

Annual air quality summaries and commentaries are presented below for the air quality monitoring stations comprising the Latrobe Valley Air Monitoring Network (LVAMN) for the year January to December 2011.

Network Monitoring Stations

Three air monitoring stations were in operation for the complete twelve months; these were the Traralgon urban site and the Rosedale South and Jeeralang Hill rural sites. Darnum North, a rural site operated for three months only (January to March 2011).

Sulfur Dioxide

The highest measured values of sulfur dioxide (SO₂) in the Latrobe Valley can usually be attributed to power station emissions. The highest 1hr average concentration in 2011 of 0.290 ppm was measured on 13 November 2011 at Jeeralang Hill in the Strzelecki Ranges. The *State Environment Protection Policy (Ambient Air Quality)* ("SEPP") 1hr Environmental Quality Objective is 0.20 ppm (refer Table 2). The SEPP 1 hr Objective was exceeded at Jeeralang Hill on two occasions only during the year. Once on 13 November as stated above and the other occurring on 31 January when a level of 0.257 was recorded.

The highest 1hr average SO₂ concentration measured on the floor of the Latrobe Valley was 0.053 ppm at Rosedale South on 22 February.

Nitrogen Oxides

The highest 1hr average nitric oxide (NO) concentration, 0.150 ppm, was measured at Traralgon on 26 August. This was attributed to local domestic/urban fuel combustion sources. There is no SEPP Objective for nitric oxide.

The highest 1hr average nitrogen dioxide (NO₂) concentration, 0.034 ppm measured at Traralgon on 27 August, was also attributed to an accumulation of local emissions from domestic/urban fuel combustion sources. This was well below the SEPP 1hr Objective for NO₂ of 0.12 ppm.

Particulate Matter

Particulate matter less than 10 microns in diameter (PM₁₀) is measured by two different methods, but all data are compared against the same Objective of 50.0µg/m³, 24-hour average. There were no exceedances of the SEPP Objective during 2011. The highest 24 hour average PM₁₀ concentration using TEOM¹ method was 41.8 µg/m³, measured at Traralgon. The highest 24 hour average PM₁₀ concentration measured using a high volume sampler was 31.7µg/m³ measured at Rosedale South. The SEPP Objective was therefore met.

Local Visual Distance

The SEPP 1hr Objective for Local Visual Distance (LVD) of 20 km was exceeded on 22 separate days during the year. The SEPP Objective is that exceedances should occur on no more than 3 days per year per site. The most exceedance days recorded by a single station was 13 at Traralgon. The Objective was also breached at Rosedale South, with 12 exceedance days. Widespread LVD breaches were attributed mainly to bushfire activity and planned burning. The total number of exceedances for the Network was 25, which is comparable to most recent years.

Ozone

The highest 1hr average ozone (O₃) concentration for the year was 0.069 ppm, which occurred on 26 February at Darnum North. Therefore, there was no exceedance of the SEPP 1hr Air Quality Objective of 0.10 ppm.

The highest 4hr rolling average O₃ concentration for the year, 0.056 ppm, occurred at Darnum North on 26 February. This measurement did not exceed the SEPP Objective of 0.08 ppm. The SEPP Objective was therefore met.

Data Capture Rates

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.

What is measured?

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 as ozone concentrations are not a concern during the winter months.

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 PM₁₀ size selective inlet method).

Jeeralang Hill: Ozone, Sulphur Dioxide, Wind Speed, Wind Direction and Inhalable Particles (HiVol PM₁₀ size selective inlet method).

Traralgon: Nitrogen Oxides, Sulphur Dioxide, Ozone, Local Visual Distance, Dry Bulb Temperature, Wind Speed, Wind Direction and Inhalable Particles (TEOM continuous PM₁₀ method).

An acoustic sounder (SODAR) is located at "The Ridge" in Morwell at the southern end of the PowerWorks building. The sounder measures wind speed, wind direction and temperature inversions 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.

¹ Tapered element oscillating microbalance

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 2011. All monitoring stations were operated and maintained by Aurecon 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 - 2011	Oxides of Nitrogen (NO _x , NO ₂ , and NO)
AS 3580.4.1 - 2008	Sulphur Dioxide (SO ₂)
AS 3580.6.1 - 2011	Ozone (O ₃)
AS 3580.9.6 - 2003	Suspended Particulate Matter (PM ₁₀) Hi-Vol method
AS 3580.9.8 - 2008	Suspended Particulate Matter (PM ₁₀) TEOM method
AS 3580.14 - 2011	Measurement of horizontal wind for air quality applications
AS 3580.1.1 - 2008	Guide to siting of air monitoring equipment

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, 1981). 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 Traralgon monitoring station is a performance monitoring station.

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 2011

2.1 Network operations

Three air monitoring stations were in operation for the complete twelve months; these were the Traralgon urban site and the Rosedale South and Jeeralang Hill rural sites. Darnum North, a rural site, operated for three months only (January to March 2011).

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 as ozone concentrations are not a concern during the winter months.

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 PM₁₀ size selective inlet method).

Jeeralang Hill: Ozone, Sulphur Dioxide, Wind Speed, Wind Direction and Inhalable Particles (Hivol PM₁₀ size selective inlet method).

Traralgon: Nitrogen Oxides, Sulphur Dioxide, Ozone, Local Visual Distance, Dry Bulb Temperature, Wind Speed, Wind Direction and Inhalable Particles (TEOM continuous PM₁₀ method).

An acoustic sounder (SODAR) is located at "The Ridge" in Morwell at the southern end of the PowerWorks building. The sounder measures wind speed, wind direction and temperature inversions 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 site at Traralgon is regarded as a "Performance Monitoring" site and is equipped with continuous analysers in accordance with the NEPM¹ 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 "LVAMN Air Quality Instrument Performance Statistics for 2011").

The NEPM requires 75% valid data capture for each parameter in each calendar quarter. This requirement was met at the Traralgon performance monitoring station.

¹ *National Environment Protection (Ambient Air Quality) Measure*

3. Latrobe Valley Air Quality 2011

The summary of air quality measurements for the Latrobe Valley Air Monitoring Network for the period January 2011 to December 2011 is shown in Table 3 and Table 4.

The highest values² measured in the Latrobe Valley for each year from September 1980 to December 2011 are shown in Tables 5a, 5b and 5c, except for Local Visual Distance where the lowest values are shown.

Measured concentrations are rounded to the nearest 0.001 ppm, 0.1 km or 0.1 µg/m³ in accordance with reporting protocols agreed under the NEPM and with EPAV.

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 usually occur at township stations, which measure far higher concentrations of NO than do rural stations. 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 1hr average NO concentrations at Traralgon were 0.150 ppm on 26 August, and 0.144 ppm on 30 June. These urban measurements were characteristic of traffic, heating and cooking emissions accumulating during near calm stable weather conditions, and were consistent with previous years' data.

The two highest 1hr average NO concentrations measured at the rural Rosedale South station were 0.120 ppm on 23 January and 0.041 ppm on 25 November. Generally, these readings are considerably lower than at the urban Traralgon site.

3.2 Nitrogen dioxide (NO₂)

NO₂ 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 1hr average concentration in 2011, 0.034 ppm measured at Traralgon on 27 August, was still below the SEPP 1hr Objective for NO₂ of 0.12 ppm. This maximum NO₂ was attributed to an accumulation of local urban source emissions such as traffic, heating and cooking.

The highest 1hr average concentration measured at a rural site was 0.016 ppm at Rosedale South on 1 & 26 February and 27 November. These maximums were attributed to industrial source emissions.

The highest annual average NO₂ concentration measured at either an urban or rural site during 2011 was 0.007 ppm at Traralgon, well below the SEPP objective of 0.03 ppm.

² The lowest values for local visual distance (LVD).

3.3 Sulfur dioxide (SO₂)

About 95% of all SO₂ in the Latrobe Valley originates from industrial sources. The highest values can usually be attributed to power station emissions.

The highest 1hr average SO₂ concentration during 2011, 0.290 ppm measured at Jeeralang Hill on 13 November, was attributed to a plume strike from Loy Yang A and B Power Stations occurring under stable weather conditions during the morning. A total of two exceedances occurred at Jeeralang Hill with the other exceedance occurring on 31 January, a level of 0.257 was recorded. Other elevated SO₂ concentrations at Jeeralang Hill, not including exceedances, indicative of power station emission impacts, included measurements exceeding 0.100 ppm on 4 days and 0.05 ppm on 14 days. These impacts are indicative of those 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 in 2011 was met at the performance monitoring site at Traralgon.

The highest 1hr average SO₂ concentration measured on the Latrobe Valley floor was 0.053 ppm. This occurred at Rosedale South on 22 February. This was attributed to power station emissions being convectively mixed to ground level under unstable weather conditions. The second highest event was 0.039 ppm also measured at Rosedale South on 8 December. This measurement was also attributed to power station plume impact.

The highest 24hr average concentration of SO₂ measured by the LVAMN was 0.029 ppm at Jeeralang Hill on 31 January 2011. This did not breach the SEPP 24hr Objective of 0.08 ppm, the plume impact was however evident for approximately 7 hours at the monitoring station.

The SEPP Objective for the annual average concentration of SO₂ is 0.020 ppm and is not to be exceeded. The highest annual average concentration of SO₂ was 0.002 ppm, measured at Traralgon, Rosedale South and Jeeralang Hill. This is well below the Objective.

3.4 Ozone (O₃)

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 2011 the highest 1hr ozone concentration was 0.069 ppm, recorded at Darnum North on 26 February. Other maxima recorded in the network were 0.057 ppm at Jeeralang Hill, 0.050 ppm at Traralgon and 0.047 ppm at Rosedale South. The Goal is that the Objective may be exceeded on one day only per year per site. The SEPP 1hr Air Quality Objective of 0.10 ppm for ozone was therefore met at all monitoring sites.

The highest rolling 4hr average O₃ concentration for 2011 was 0.056 ppm, recorded at Darnum North on 26 February. This measurement did not exceed the SEPP Objective of 0.080 ppm. The SEPP Goal for 4hr ozone was therefore met.

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 measurements have been recorded within the LVAMN. Low LVD measured at ground level has been found to occur mainly in calm, stable weather conditions which result in the accumulation of pollution from ground based sources (Joynt, 1988).

The SEPP Objective of 20 km was exceeded on 22 separate days during the year. The objective was breached at Traralgon on 13 days, and at the rural station, Rosedale South, on 12 days, (total of 25

days). Breaches occurred at both stations on 3 days, indicating widespread visibility degradation on these days. The remaining 19 exceedances occurred at only one station on each given day, indicating a greater likelihood that these were due to local sources.

Bushfire activity and/or planned burning activities caused these impacts on 9 days over the period January to June. The remaining exceedances mainly occurred at Traralgon during the evening or early morning and were due to local urban (principally household and traffic) emissions.

3.6 Particulate matter less than 10 microns (PM₁₀)

PM₁₀ (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 PM₁₀ measured in the Latrobe Valley can be attributed to bushfires and planned burns.

PM₁₀ is measured by two methods in the LVAMN. The urban station at Traralgon uses a continuous analyser known as a TEOM³, 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 PM₁₀ concentration of 41.8µg/m³ was measured on 8 March at Traralgon and was attributed to bushfire activity. The PM₁₀ Objective of 50µg/m³ was therefore not exceeded.

The highest PM₁₀ measurement at a rural station occurred at Rosedale South, where a 24-hour average PM₁₀ concentration of 31.7µg/m³ was caused by bushfire smoke on the 25 January. The 24hr SEPP Objective of 50.0µg/m³ was not exceeded at this site.

Monthly and yearly average PM₁₀ concentrations for the LVAMN sites are given in Table 6. The highest annual concentration of PM₁₀ was 15.6 µg/m³ measured at Traralgon. There is no SEPP Objective for the annual concentration, but this measured value is slightly higher than in previous years for the LVAMN sites.

³ Tapered element oscillating microbalance

4. References

LVAMN Network Database - WINCOLLECT - Validated data from January 2011 to December 2011.

LVAMN Annual Air Quality Commentary, January to December 2009, CW Report No ARM-2009-03.

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 planned burning and bushfire activity in the Gippsland Region during 2011.

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

5. Tables

Table 1: Latrobe Valley Air Monitoring Network Stations 2011

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 [%] 25/09/00 [#]	3	413400	5779000	Nilma-Shady Creek Road, Approx 100m north of Halls and Porches Rd.
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 [@]	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.

[%] Initial installation with complete instrument set as per Rosedale South.

[#] Commencement of six months per year operation with ozone measurement only.

[@] 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 2: State Environmental Protection Policy (SEPP) Air Quality Objectives

State Environment Protection Policy (Ambient Air Quality)
Relevant Environmental Quality Objectives and Goals

Pollutant	Averaging Period	Environmental Quality Objectives ¹	Goal - Maximum Allowable Exceedances
Nitrogen dioxide	1 hour 1 year	0.12ppm 0.03 ppm	1 day a year None
Photochemical oxidant (as ozone)	1 hour 4 hours ²	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
Particles as PM ₁₀	1 day	50 µg/m ³	5 days a year ³
Visibility Reducing Particles	1 hour	20 km ⁴	3 days a year

Notes to table:

- Objectives are maximum concentrations in each case, except for visibility reducing particles which is a minimum visual distance.
- Rolling averages based on consecutive 1 hour averages.
- Five exceedances per year allowed for daily monitoring (equivalent to 1 exceedance per year where measurements are undertaken on a one day in six basis using high volume samplers).
- Minimum visual distance.

Important Note:

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

The urban site at Traralgon have been designated "performance monitoring site" 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.

Table 3: Air Quality January 2011 to December 2011 – 1 Hour Averages

STATION		DN	TR	RS	JH	SEPP Objectives and Goals	
STATION NUMBER		1	13	17	36		
NUMBER OF MONTHS IN SERVICE		3 (a)	12	12	12		
HOURS OF AVAILABLE DATA	NO	N/A	8335	7942	N/A		
	NO ₂	N/A	8336	7942	N/A		
(Total annual hours per parameter = 8784 hrs)	SO ₂	N/A	8337	7924	7990		
	O ₃	2161	8358	8103	7987		
	LVD	N/A	8366	8083	N/A		
	TEOM	N/A	8660	N/A	N/A		
MAXIMUM MEASURED CONCENTRATION	NO (ppb)	N/A	150	120	N/A		
	NO ₂ (ppb)	N/A	34	16	N/A		
	SO ₂ (ppb)	N/A	38	53	290		
	O ₃ (ppb)	69	50	47	57		
MINIMUM MEASURED VISIBILITY	LVD (km)	N/A	4.1	3.4	N/A		
SECOND HIGHEST DAILY MAXIMUM	NO (ppb)	N/A	144	41	N/A		
	NO ₂ (ppb)	N/A	30	15	N/A	120ppb (b)	
	SO ₂ (ppb)	N/A	25	39	257	200ppb (b)	
	O ₃ (ppb)	59	42	46	49	100ppb (b)	
FOURTH LOWEST DAILY MINIMUM	LVD (km)	N/A	14.4	9.0	N/A	20km (c)	
DAYS WITH VISIBILITY MINIMUM < 20 km		N/A	13	12	N/A	3 days	
DAYS WITH 1-HR O ₃ MAXIMUM > 100ppb		0	0	0	0	1 day	

NOTES TO TABLE

(a) Darnum North operated for three months only; January to March and was decommissioned in October.

(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 4: Air Quality January 2011 to December 2011 – Longer Term Averages

STATION		DN	TR	RS	JH	SEPP Objectives and Goals
STATION NUMBER		1	13	17	36	
NUMBER OF MONTHS IN SERVICE		3 (a)	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	363	344	N/A	
	24-HOUR NO ₂	N/A	363	347	N/A	
	24-HOUR SO ₂	N/A	363	344	344	
	24-HOUR O ₃	90	365	352	344	
	24-HOUR PM ₁₀	N/A	363	59	60	
	4-HOUR O ₃ (b)	2162	8722	8460	8316	
MAXIMUM MEASURED CONCENTRATION	24-HOUR NO (ppb)	N/A	42	20	N/A	
	24-HOUR NO ₂ (ppb)	N/A	15	10	N/A	
	24-HOUR SO ₂ (ppb)	N/A	5	13	29	
	24-HOUR PM ₁₀ (µg/m ³)	N/A	41.8	31.7	29.0	
	4-HOUR O ₃ (b) (ppb)	56	44	44	46	
SECOND HIGHEST DAILY MAXIMUM (c)	24-HOUR NO (ppb)	N/A	41	8	N/A	
	24-HOUR NO ₂ (ppb)	N/A	14	8	N/A	
	24-HOUR SO ₂ (ppb)	N/A	4	12	25	80ppb (d)
	4-HOUR O ₃ (b) (ppb)	55	38	42	43	80ppb (d)
SECOND HIGHEST DAILY MAXIMUM (c)	24-HOUR PM ₁₀ (µg/m ³)	N/A	N/A	25.8	27.9	50µg/m ³ (d,g)
SIXTH HIGHEST DAILY MAXIMUM (c)	24-HOUR PM ₁₀ (µg/m ³)	N/A	31.3	N/A	N/A	50µg/m ³ (f)
DAYS WITH 4-HR O ₃ MAXIMUM > 80ppb		0	0	0	0	1 day
DAYS WITH PM ₁₀ > 50 µg/m ³		N/A	0	0	0	See note (e)
ANNUAL AVERAGE CONCENTRATION	NO (ppb)	N/A	6	1	N/A	
	NO ₂ (ppb)	N/A	7	2	N/A	30ppb (h)
	SO ₂ (ppb)	N/A	2	2	2	20ppb (h)
	PM ₁₀ (µg/m ³)	N/A	15.6	11.6	10.5	
	O ₃ (ppb)	16	13	16	21	

NOTES TO TABLE

- (a) Darnum North operated for three months only: January to March and was decommissioned in October.
- (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 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 5(a): Air Quality Extremes and SEPP Objective Exceedances (1980 – 1992)

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	\$1992
NO (1h, ppm)	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
NO₂ (1h, ppm)	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
SO₂ (1h, ppm)	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
O₃ (1h, ppm)	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
CO (1h, ppm)	4	N/A	5	8	8	6	9	8	5	N/A	N/A	N/A	N/A
LVD (1h, km)	4	5	4	4	4	6	5	8	7	5	5	6	7
Days<20km	&47	&80	47	42	38	36	49	32	14	35	32	44	9
O₃ (4h, ppm)	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
O₃ (8h, ppm)	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
PM₁₀ (24h, µg/m³) *	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 ³	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	1	0	0
PM₁₀ (24h, µg/m³) +	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 ³	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

& Incomplete data set during commissioning of the Leeds and Northrup logging system.

Seasonal Year (September to August).

\$ September 1992 to December 1992.

* High volume sampler method.

+ TEOM method (commenced Nov 2002).

N/A Not available.

Table 5(b): Air Quality Extremes and SEPP Objective Exceedances (1993 – 2007)

Year	@1993	@1994	@1995	@1996	@1997	@1998	@1999	@2000	@2001	@2002	@2003	@2004	@2005	@2006	@2007
Parameter															
NO (1h, ppm)	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	0.269
NO₂ (1h, ppm)	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	0.038
^Days>0.12ppm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SO₂ (1h, ppm)	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	0.195
^Days>0.20ppm	0	0	0	0	0	1	1	3	4	1	1	5	1	2	0
O₃ (1h, ppm)	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	0.099
^Days>0.10ppm	0	0	0	0	1	0	0	0	0	0	0	0	0	3	0
LVD (1h, km)	5	5	11	7	7	7	11	12	9	4	2	4	4.4	0.5	0.5
^Days<20km	16	65	42	25	35	38	31 [#]	27 [#]	31 [#]	26 [#]	43 [#]	20 [#]	30	47	47
O₃ (4h, ppm)	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	0.09
^Days>0.08ppm	0	0	0	0	1	0	0	0	0	0	1	0	0	3	2
O₃ (8h, ppm)	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	N/A
^Days>0.05ppm	0	2	1	0	3	3	1	1	1	N/A	N/A	N/A	N/A	N/A	N/A
PM₁₀ (24h, µg/m³)[*]	79	58	31	63	55	88	50	36	39	42	85	34	32.8	69.3	60.1
^Days>50µg/m ³	1	1	0	1	1	4	0	0	0	0	1	0	0	1	1
PM₁₀ (24h, µg/m³)⁺	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	151.2
^Days>50µg/m ³	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	11	1	0	15	14

@ Calendar Year.

* High volume sampler method.

+ TEOM method (commenced Nov 2002).

Exceedances 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 5(c): Air Quality Extremes and SEPP Objective Exceedances 2008 to 2011

Year	@2008	@2009	@2010	@2011
Parameter				
NO (1h, ppm)	0.175	0.400	0.229	0.150
NO₂ (1h, ppm)	0.046	0.094	0.068	0.034
^Days>0.12ppm	0	0	0	0
SO₂ (1h, ppm)	0.334	0.254	0.525	0.290
^Days>0.20ppm	4	2	4	2
O₃ (1h, ppm)	0.074	0.104	0.070	0.069
^Days>0.10ppm	0	1	0	0
LVD (1h, km)	2.1	3.3	2.1	3.4
^Days<20km	31	38	27	22
O₃ (4h, ppm)	0.061	0.088	0.062	0.056
^Days>0.08ppm	0	1	0	0
PM₁₀ (24h, µg/m³) *	36.2	51.4	49.5	31.7
^Days>50µg/m ³	0	2	0	0
PM₁₀ (24h, µg/m³) *	90.9	169.6	77.6	41.8
^Days>50µg/m ³	6	8	3	0

@ Calendar Year.

* High volume sampler method.

+ TEOM method (commenced Nov 2002).

Exceedances 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 6: Inhalable Particulate Summary for 2011

From January 2011 through December 2011

PM₁₀ Monthly Averages in µg/m³

Month	JH	RS	TR¹
January	13.1	18.7	17.6
February	13.9	17.1	15.2
March	14.7	16.7	16.5
April	12.1	12.1	14.1
May	10.1	10.4	15.6
June	3.9	6.2	16.8
July	4.9	3.8	17.0
August	9.0	10.7	15.9
September	14.3	12.5	15.9
October	8.4	7.6	13.5
November	10.7	12.3	14.3
<u>December</u>	<u>10.6</u>	<u>12.2</u>	<u>15.0</u>
12 month average	10.5	11.6	15.6

¹ Traralgon PM₁₀ 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.

² Average of 5 of 6, 24 hour samples only.

³ Average of 4 of 5, 24 hour samples at Jeeralang only.

Table 7: Air Quality Instrument Performance Statistics for 2011

STATION	NO ₂	NO	SO ₂	O ₃	LVD	DBT	WS	WD	GLB	UVA	TEOM	PM ₁₀
Darnum ¹				96			100	100				
Rosedale	91	91	90	93	92	97	99	99	99	99		97
Jeeralang			90	91			90	97				98
Traralgon	95	95	95	95	96	100	100	100			99	

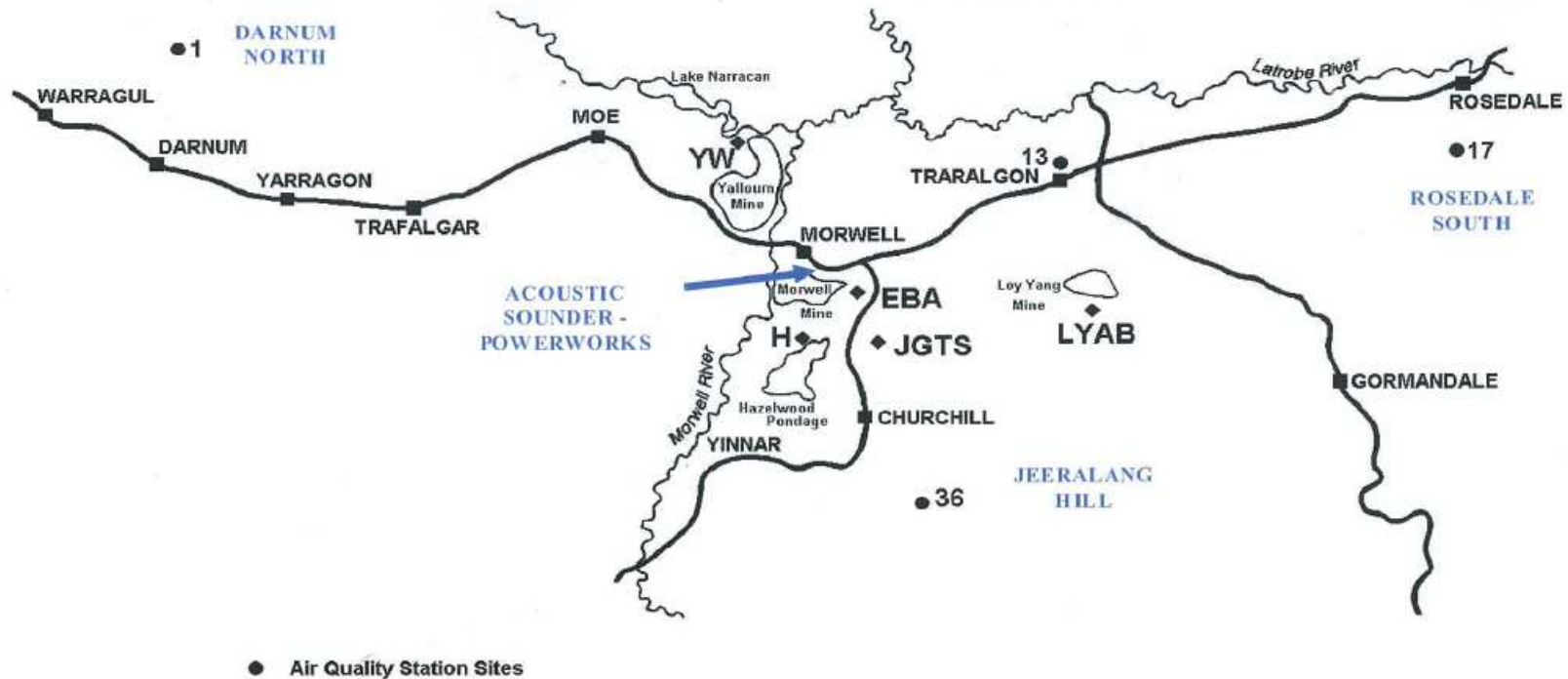
The above table represents the percentage of 1 hour average validated data capture for the LVAMN. The maximum achievable data capture for the calibrated parameters NO₂, NO, SO₂, O₃ and LVD is 96%, because 1 hour per day is spent in calibration mode.

1. Darnum North was operated only from 1 January to 31 March and was decommissioned in October 2011.

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

6. Figures

Figure 1: Latrobe Valley Air Monitoring Network 2011



Major power station sources

YW – Yallourn W

EBA – Energy Brix

H – Hazelwood

JGTS – Jeeralang (Gas Turbine Station)

LYAB – Loy Yang A, Loy Yang B