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Latrobe Valley Air Monitoring Network (LVAMN)

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Foreword

This report presents the annual air quality summary for the Latrobe Valley Air Monitoring Network (LVAMN) for the year 2010. 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 - 1993 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 - 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_{10} 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 – PM_{10} continuous direct mass method using a tapered element oscillating microbalance (TEOM) analyser.
- AS 2923 – 1987 [1] Ambient air - guide for 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 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 (EPA Victoria)
Convener
LVAMN Operations & Performance Review Committee

[1] The sites at Traralgon and Jeeralang Hill do not meet all the requirements of this standard with regard to adequate distances from disturbances such as trees.

Summary

LATROBE VALLEY AIR MONITORING NETWORK

ANNUAL AIR QUALITY COMMENTARY 2010

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 to December 2010.

The highest measured values of sulfur dioxide (SO_2) in the Latrobe Valley can usually be attributed to power station emissions. The highest 1hr average concentration in 2010 (0.525 ppm) was measured on 24 December 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 four occasions during the year.

The highest 1hr average SO_2 concentration measured on the floor of the Latrobe Valley was 0.058 ppm at Rosedale South on 9 January.

The highest 1hr average nitric oxide (NO) concentration, 0.229 ppm, was measured at Traralgon on 23 June. This was attributed to local urban fuel combustion sources. There is no SEPP Objective for nitric oxide.

The highest 1hr average nitrogen dioxide (NO_2) concentration, 0.068 ppm measured at Rosedale South on 5 September, was attributed to an accumulation of area source emissions from the Latrobe Valley. This was still below the SEPP 1hr Objective for NO_2 of 0.12 ppm.

Particulate matter less than 10 microns in diameter (PM_{10}) is measured by two different methods, but all data are compared against the same Objective of 50.0µg/m^3, 24-hour average. There were three exceedences of the SEPP Objective at Traralgon during 2010. The highest 24 hour average PM_{10} concentration using TEOM[1] method was 77.6 µg/m^3, measured at Traralgon. The highest 24 hour average PM_{10} concentration measured using a high volume sampler was 49.5µg/m^3 measured at Rosedale South. The SEPP Goal was therefore met.

The SEPP 1hr Objective for Local Visual Distance (LVD) of 20 km was exceeded on 27 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 25 at Traralgon, which breached the SEPP goal. The Goal was also breached at Rosedale South, with 11 exceedence days. Widespread LVD breaches were attributed mainly to bushfire activity and planned burning. The total number of exceedences for the Network was 36, which is comparable to most recent years.

The highest 1hr average ozone (O_3) concentration for the year was 0.070 ppm, which occurred on 10 February at Jeeralang Hill. Therefore, there was no exceedence of the SEPP 1hr Air Quality Objective of 0.10 ppm.

The highest 4hr rolling average O_3 concentration for the year, 0.062 ppm, occurred at Darnum North on 10 February. This measurement did not exceed the SEPP Objective of 0.08 ppm. The SEPP Goal was therefore met.

[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 2010. 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 - 1993	Oxides of Nitrogen (NO_X, NO_2, and NO)
AS 3580.4.1 - 1990	Sulphur Dioxide (SO_2)
AS 3580.6.1 - 1990	Ozone (O_3)
AS 3580.9.6 - 2003	Suspended Particulate Matter (PM_{10}) Hi-Vol method
AS 3580.9.8 - 2001	Suspended Particulate Matter (PM_{10}) TEOM method
AS 2923 - 1987	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 2010

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 six months only (January to March and 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 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 PM_{10} size selective inlet method).

Jeeralang Hill: Ozone, Sulphur Dioxide, Wind Speed, Wind Direction and Inhalable Particles (Hivol PM_{10} 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 PM_{10} 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 site at Traralgon is regarded as a "Performance Monitoring" site and is equipped with continuous analysers in accordance with the NEPM[1] 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 2010").

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 2010

The summary of air quality measurements for the Latrobe Valley Air Monitoring Network for the period January 2010 to December 2010 is shown in Table 3 and Table 4.

The highest values[2] measured in the Latrobe Valley for each year from September 1980 to December 2010 are shown in Tables 5a, 5b and 5c.

Measured concentrations are rounded to the nearest 0.001 ppm, 0.1 km or 0.1 μg/m^3 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 0.229 ppm on 23 June, and 0.194 ppm on 9 July. 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 1hr average NO concentrations measured at the rural Rosedale South station were 0.177 ppm on 5 September and 0.025 ppm on 11 April. These elevated measurements were attributed to area source emissions and planned burns respectively. Generally, these readings are considerably lower than at the urban Traralgon site.

3.2 Nitrogen dioxide (NO_2)

NO_2 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 2010, 0.068 ppm measured at Rosedale on 5 September, was still below the SEPP 1hr Objective for NO_2 of 0.12 ppm. This maximum NO_2 was attributed to an accumulation of area source emissions from the Latrobe Valley.

The highest 1hr average concentration measured at an urban site was 0.032 ppm at Traralgon on 30 August. This maximum was attributed to local emissions sources.

The highest annual average NO_2 concentration measured at either an urban or rural site during 2010 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 (SO_2)

About 95% of all SO_2 in the Latrobe Valley originates from industrial sources. The highest values can usually be attributed to power station emissions.

The highest 1hr average SO_2 concentration during 2010, 0.525 ppm measured at Jeeralang Hill on 24 December 2010, was attributed to a plume strike from Loy Yang A and B Power Stations occurring under stable conditions during the late evening. A total of four exceedences occurred at Jeeralang Hill with a level of 0.338 ppm recorded on 25 December, 0.275 ppm on 21 January and 0.232 ppm on 21 October. Other elevated SO_2 concentrations at Jeeralang Hill, indicative of power station emission impacts, included measurements exceeding 0.100 ppm on 9 days and 0.05 ppm on 27 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 2010 was met at the urban monitoring sites.

The highest 1hr average SO_2 concentration measured on the Latrobe Valley floor was 0.0.058 ppm. This occurred at Rosedale South on 9 January. This was attributed to power station emissions being convectively mixed to ground level under unstable conditions. The second highest event was 0.049 ppm measured at Traralgon on 25 January. This measurement was also attributed to power station plume impact.

The highest 24hr average concentration of SO_2 measured by the LVAMN was 0.042 ppm at Jeeralang Hill on 24 December 2010. While this value did not breach the SEPP 24hr Objective of 0.08 ppm, the plume impact was evident for approximately 7 hours at the monitoring station.

The SEPP Objective for the annual average concentration of SO_2 is 0.020 ppm and is not to be exceeded. The highest annual average concentration of SO_2 was 0.003 ppm, measured at Jeeralang Hill. This is well below the Objective.

3.4 Ozone (O_3)

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 2010 the highest 1hr ozone concentration was 0.070 ppm, recorded at Jeeralang Hill on 10 February. Other maxima recorded in the network were 0.066 ppm at Darnum North, 0.059 ppm at Rosedale South and 0.057 ppm at Traralgon. 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 O_3 concentration for 2010 was 0.062 ppm, recorded at Darnum North on 10 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 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 27 separate days during the year. The objective was breached at Traralgon on 25 days, and at the rural station, Rosedale South, on 11 days, (total of 36

days). Breaches occurred at both stations on 9 days, indicating widespread visibility degradation on these days. The remaining 18 exceedences 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 13 days over January, February, March and April. The remaining exceedences 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 (PM_{10})

PM_{10} (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_{10} measured in the Latrobe Valley can be attributed to bushfires and planned burns.

PM_{10} is measured by two methods in the LVAMN. The urban station at Traralgon uses a continuous analyser known as a TEOM[3], 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_{10} concentration of 77.6μg/m^3 was measured on 17 March at Traralgon. The PM_{10} Objective was exceeded on 2 other occasions at Traralgon and therefore did not breach the SEPP Goal. Exceedences were attributed to bushfire activity and planned burning activities.

The highest PM_{10} measurement at a rural station occurred at Rosedale South, where a 24-hour average PM_{10} concentration of 49.5μg/m^3 was caused by bushfire smoke on the 23 January. The 24hr SEPP Objective of 50.0μg/m^3 was not exceeded at this site.

Monthly and yearly average PM_{10} concentrations for the LVAMN sites are given in Table 6. The highest annual concentration of PM_{10} was 16.8 μg/m^3 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 2010 to December 2010.

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 2010.

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 2010

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)
Environmental Quality Objectives and Goals

Pollutant	Averaging Period	Environmental Quality Objectives [1]	Goal - Maximum Allowable Exceedences
Carbon monoxide	8 hours[2]	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 [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
Lead	1 year	0.50 µg/m^3	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:
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.

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 2010 to December 2010 – 1 Hour Averages

STATION			DN	TR	RS	JH	SEPP
STATION NUMBER			1	13	17	36	Objectives
NUMBER OF MONTHS IN SERVICE			6 (a)	12	12	12	and Goals
HOURS OF AVAILABLE DATA	NO		N/A	8314	8172	N/A	
	NO_2		N/A	8314	8172	N/A	
(Total annual hours per parameter = 8784 hrs)	SO_2		N/A	8356	8170	8371	
	O_3		4179	8363	8170	8369	
	LVD		N/A	8375	8170	N/A	
	TEOM		N/A	8692	N/A	N/A	
MAXIMUM MEASURED CONCENTRATION	NO	(ppb)	N/A	229	177	N/A	
	NO_2	(ppb)	N/A	32	68	N/A	
	SO_2	(ppb)	N/A	49	58	525	
	O_3	(ppb)	66	57	59	70	
MINIMUM MEASURED VISIBILITY	LVD	(km)	N/A	2.1	2.6	N/A	
SECOND HIGHEST DAILY MAXIMUM	NO	(ppb)	N/A	194	25	N/A	
	NO_2	(ppb)	N/A	28	23	N/A	120ppb (b)
	SO_2	(ppb)	N/A	37	44	338	200ppb (b)
	O_3	(ppb)	65	56	53	66	100ppb (b)
FOURTH LOWEST DAILY MINIMUM	LVD	(km)	N/A	7.6	8.9	N/A	20km (c)
DAYS WITH VISIBILITY MINIMUM < 20 km			N/A	25	11	N/A	3 days
DAYS WITH 1-HR O_3 MAXIMUM > 100ppb			0	0	0	0	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 4: Air Quality January 2010 to December 2010 – Longer Term Averages

STATION			DN	TR	RS	JH	SEPP
STATION NUMBER			1	13	17	36	Objectives
NUMBER OF MONTHS IN SERVICE			6 (a)	12	12	12	and Goals
PERIODS OF AVAILABLE DATA	24-HOUR NO		N/A	362	355	N/A	
(e.g. 1 period = 24 hours and represents 75%	24-HOUR NO_2		N/A	362	355	N/A	
or greater data capture for the period)	24-HOUR SO_2		N/A	365	355	365	
	24-HOUR O_3		182	365	355	365	
	24-HOUR PM_{10}		N/A	365	60	59	
	4-HOUR O_3 (b)		4366	8730	8521	8716	
MAXIMUM MEASURED CONCENTRATION	24-HOUR NO	(ppb)	N/A	42	19	N/A	
	24-HOUR NO_2	(ppb)	N/A	13	10	N/A	
	24-HOUR SO_2	(ppb)	N/A	7	13	42	
	24-HOUR PM_{10}	($\mu g/m^3$)	N/A	77.6	49.5	37.0	
	4-HOUR O_3 (b)	(ppb)	62	47	56	61	
SECOND HIGHEST DAILY MAXIMUM (c)	24-HOUR NO	(ppb)	N/A	40	6	N/A	
	24-HOUR NO_2	(ppb)	N/A	13	7	N/A	
	24-HOUR SO_2	(ppb)	N/A	7	13	38	80ppb (d)
	4-HOUR O_3 (b)	(ppb)	55	47	54	58	80ppb (d)
SECOND HIGHEST DAILY MAXIMUM (c)	24-HOUR PM_{10}	($\mu g/m^3$)	N/A	N/A	41.2	30.7	$50\mu g/m^3$ (d,g)
SIXTH HIGHEST DAILY MAXIMUM (c)	24-HOUR PM_{10}	($\mu g/m^3$)	N/A	36.7	N/A	N/A	$50\mu g/m^3$ (f)
DAYS WITH 4-HR O_3 MAXIMUM > 80ppb			0	0	0	0	1 day
DAYS WITH PM_{10} > 50 $\mu g/m^3$			N/A	3	0	0	See note (e)
ANNUAL AVERAGE CONCENTRATION	NO	(ppb)	N/A	7	1	N/A	
	NO_2	(ppb)	N/A	7	2	N/A	30ppb (h)
	SO_2	(ppb)	N/A	2	2	3	20ppb (h)
	PM_{10}	($\mu g/m^3$)	N/A	16.8	12.7	10.5	
	O_3	(ppb)	20	14	17	24	

NOTES TO TABLE

(a) Darnum North is operated for six months per year: January to March and October to December inclusive.
(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 Exceedences (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
NO_2 (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
SO_2 (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
O_3 (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
O_3 (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
O_3 (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
PM_{10} (24h, µg/m^3) *	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
PM_{10} (24h, µg/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
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 Exceedences (1993 – 2007)

Year Parameter	@1993	@1994	@1995	@1996	@1997	@1998	@1999	@2000	@2001	@2002	@2003	@2004	@2005	@2006	@2007
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
NO_2 (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
SO_2 (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
O_3 (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
O_3 (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
O_3 (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
PM_{10} (24h, µg/m^3) *	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
PM_{10} (24h, µg/m^3) +	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).
# 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 5(c): Air Quality Extremes and SEPP Objective Exceedences 2008 to 2010

Year Parameter	@2008	@2009	@2010
NO (1h, ppm)	0.175	0.400	0.229
NO_2 (1h, ppm)	0.046	0.094	0.068
^Days>0.12ppm	0	0	0
SO_2 (1h, ppm)	0.334	0.254	0.525
^Days>0.20ppm	4	2	4
O_3 (1h, ppm)	0.074	0.104	0.070
^Days>0.10ppm	0	1	0
LVD (1h, km)	2.1	3.3	2.1
^Days<20km	31	38	27
O_3 (4h, ppm)	0.061	0.088	0.062
^Days>0.08ppm	0	1	0
O_3 (8h, ppm)	N/A	N/A	N/A
^Days>0.05ppm	N/A	N/A	N/A
PM_{10} (24h, µg/m^3) *	36.2	51.4	49.5
^Days>50µg/m^3	0	2	0
PM_{10} (24h, µg/m^3) +	90.9	169.6	77.6
^Days>50µg/m^3	6	8	3

@ 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 6: Inhalable Particulate Summary for 2010

From January 2010 through December 2010
PM_{10} Monthly Averages in µg/m^3

Month	JH	RS	TR[1]
January	21.0	25.3	21.1
February	11.0	12.2	17.0
March	18.3[2]	22.0[2]	21.2
April	14.2	15.9	16.6
May	13.2	14.5	16.2
June	5.0[3]	8.2	17.4
July	5.3	8.5	16.8
August	4.5	6.3	14.9
September	9.5	11.5	14.9
October	10.7	11.2	14.8
November	10.3	13.6	14.5
December	8.1	11.1	15.7
12 month average	**10.5**	**12.7**	**16.8[1]**

[1] Traralgon PM_{10} 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 2010

STATION	NO_2	NO	SO_2	O_3	LVD	DBT	WS	WD	GLB	UVA	TEOM	PM_{10}
Darnum [1]				96			100	100				
Rosedale	93	93	93	93	93	100	100	100	100	100		98
Jeeralang			96	96			100	100				97
Traralgon	95	95	95	95	96	100	100	100			99	

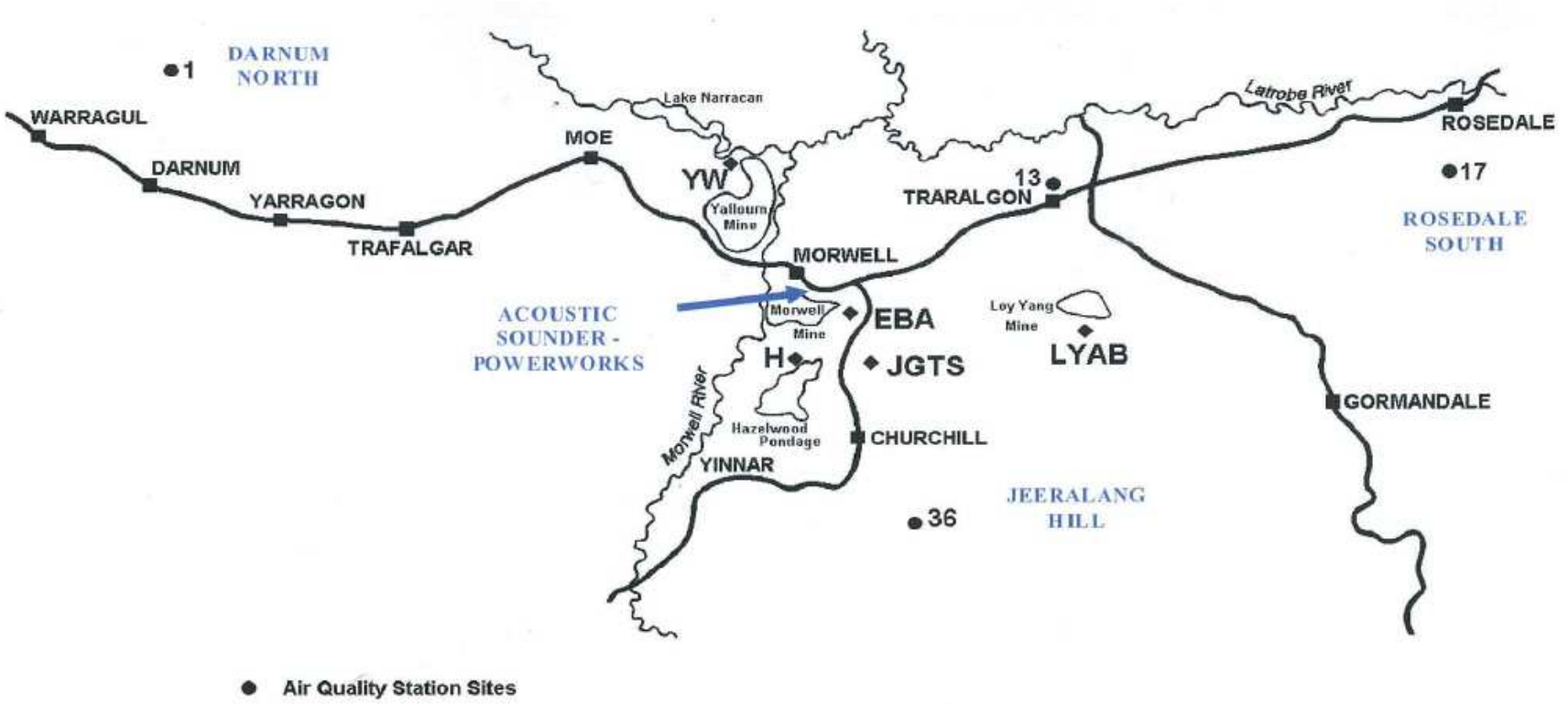
The above table represents the percentage of 1 hour average validated data capture for the LVAMN. The maximum achievable data capture for the calibrated parameters NO_2, NO, SO_2, O_3 and LVD is 96%, because 1 hour per day is spent in calibration mode.

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 six month period.

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

6. Figures

Figure 1: Latrobe Valley Air Monitoring Network 2010



Major power station sources

YW – Yallourn W **EBA – Energy Brix** **H – Hazelwood**
JGTS –Jeeralang (Gas Turbine Station) **LYAB – Loy Yang A, Loy Yang B**