aurecon

LVAMN 6 Monthly Summary

(January to June 2012).

Report No. ARM-2013-002

Prepared for: LVAMN Inc.
Project: 210259-01

Issue Date: 30 January 2013

NATA
ACCREDITED FOR
TECHNICAL
COMPETENCE

This document is issued in accordance with NATA's accreditation Requirements. Accredited for compliance with ISO/IEC 17025. The result of the tests, calibrations and measurements in this document are traceable to the Australian/National Standards.

Document Control Record

Document prepared by:
Aurecon Pty Ltd
ABN 54 005 139 873
Morwell Regional Office
PO Box 612
3 Lignite Court
Morwell Vic
Australia 3840

T +61351167205
F +61351167207
E morwell@aurecongroup.com
W aurecongroup.com

Document control						
		LVAMN 6-Monthly Summary for January to June 2012				
		ARM-2013-002 LVAMN 6-Monthly Summary 2012 (Jan-Jun).docm	**Project Number**		**210259-01**	
			Client Contact		**LVAMN Incorporated & EPAV**	
		Revision Details/Status	**Prepared by**	**Author**	**Verifier**	**Approver**
0	**30 January 2012**	**Original**	**MK**	**MK**	**TA**	**MH**
Current Revision		0				

Distribution		
Client Contact	**Delivery Format**	**Delivery Details**
Brian Ryan	**Electronic**	**PRyan9@optusnet.com.au**
Peter Maffei	**Electronic**	**PMaffei@ebac.com.au**
Malcolm Cooper	**Electronic**	**Malcolm.Cooper@epa.vic.gov.au**

Contents

Foreword

This report presents a six month air quality summary (January to June inclusive) for the Latrobe Valley Air Monitoring Network (LVAMN) for the year 2012. 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 – 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 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.

Mike Kitwood
Aurecon

[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

SIX MONTH AIR QUALITY COMMENTARY 2012

Six monthly air quality summaries and commentaries are presented below for the air quality monitoring stations comprising the Latrobe Valley Air Monitoring Network (LVAMN) for the period January to June 2012.

Network Monitoring Stations

Three air monitoring stations were in operation for the six month period; these were the Traralgon urban site and the Rosedale South and Jeeralang Hill rural sites.

Sulfur Dioxide

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 the January to June monitoring period of 0.174 ppm was measured on 29 January 2012 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 therefore not exceeded at Jeeralang Hill during the six month period.

The highest 1hr average SO_2 concentration measured on the floor of the Latrobe Valley was 0.119 ppm at Rosedale South on 25 January.

Nitrogen Oxides

The highest 1hr average nitric oxide (NO) concentration, 0.132 ppm, was measured at Traralgon on 20 May. This was attributed to local domestic/urban fuel combustion sources. There is no SEPP Objective for nitric oxide.

The highest 1hr average nitrogen dioxide (NO_2) concentration, 0.106 ppm measured at Rosedale South on 6 April, was attributed to power station emissions. This was below the SEPP 1hr Objective for NO_2 of 0.12 ppm.

Particulate Matter

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 no exceedances of the SEPP Objective during the six month monitoring period. The highest 24 hour average PM_{10} concentration using TEOM[1] method was 35.0 µg/m^3, measured at Traralgon on 25 January. The highest 24 hour average PM_{10} concentration measured using a high volume sampler was 21.8µg/m^3 measured at Jeeralang Hill on 25 February. The SEPP Objective was therefore met.

Local Visual Distance

The SEPP 1hr Objective for Local Visual Distance (LVD) of 20 km was exceeded on 12 separate days during the six months. 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 11 at Traralgon. The Objective was not breached at Rosedale South, with only 1 exceedance day recorded. The total number of exceedances for the Network was 12, which is slightly less than recent years.

Ozone

The highest 1hr average ozone (O_3) concentration for the six month period was 0.078 ppm, which occurred on 5 February at Rosedale South. Therefore, there was no exceedance of the SEPP 1hr Air Quality Objective of 0.10 ppm.

The highest 4hr rolling average O_3 concentration for the year, 0.053 ppm, occurred at Traralgon on 25 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:

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 (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

Six monthly summaries of air quality statistics and commentaries for the Latrobe Valley Air Monitoring Network (LVAMN) are presented for the period January to June 2012. 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 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 2012

2.1 Network operations

Three air monitoring stations were in operation for the six month period; these were the Traralgon urban site and the Rosedale South and Jeeralang Hill rural sites.

The parameters measured at each monitoring station are:

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 (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 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 six month period. 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 2012").

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 2012

The summary of air quality measurements for the Latrobe Valley Air Monitoring Network for the period January 2012 to June 2012 is shown in Table 3 and Table 4.

The highest values[2] measured in the Latrobe Valley for each year from September 1980 to June 2012 are shown in Tables 5a, 5b and 5c, except for Local Visual Distance where the lowest values are is shown.

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 0.132 ppm on 20 May, and 0.124 ppm on 18 May. 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 0.063 ppm on 26 June and 0.055 ppm on 20 April. 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 2012, 0.106 ppm measured at Rosedale South on 6 April, was still below the SEPP 1hr Objective for NO_2 of 0.12 ppm. This maximum NO_2 was attributed to power station emissions.

The highest 1hr average concentration measured at the urban site was 0.032 ppm at Traralgon on 13 April. This maximum was attributed to traffic, heating and cooking emissions accumulating during near calm stable weather conditions

The highest six monthly average NO_2 concentration measured at either an urban or rural site during 2012 was 0.002 ppm at Traralgon and Rosedale South, well below the (annual) 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 the six month period 0.174 ppm measured at Jeeralang Hill on 29 January, was attributed to a plume strike from Loy Yang A and B Power Stations occurring under stable weather conditions during the morning. Other elevated SO_2 concentrations at Jeeralang Hill, not including exceedances, indicative of power station emission impacts, included measurements exceeding 0.100 ppm on 6 days and 0.05 ppm on 13 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 2012 was therefore met for the months January to June 2012.

The highest 1hr average SO_2 concentration measured on the Latrobe Valley floor was 0.119 ppm. This occurred at Rosedale South on 25 January. This was attributed to power station emissions. The second highest event was 0.085 ppm measured at Traralgon on 19 January. This measurement was also attributed to power station plume impact.

The highest 24hr average concentration of SO_2 measured by the LVAMN was 0.039 ppm at Jeeralang Hill on 24 February 2012. This did not breach the SEPP 24hr (annual) 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 SO_2 is 0.020 ppm and is not to be exceeded. The highest six monthly 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.

During January to June 2012 the highest 1hr ozone concentration was 0.078 ppm, recorded at Rosedale South on 5 February. Other maxima recorded in the network were 0.054 ppm at Jeeralang Hill and 0.054 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 2012 was 0.053 ppm, recorded at Traralgon on 25 February. This measurement did not exceed the SEPP (annual) 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 12 separate days during the year. The objective was breached at Traralgon on 11 days, and at the rural station, Rosedale South, on 1 day. The single exceedance at Rosedale South was attributed to a local farm burn off.

Bushfire activity and/or planned burning activity caused a single impact at Traralgon. 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 (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 35.0μg/m^3 was measured on 25 January at Traralgon and was attributed to planned burning activity. The PM_{10} Objective of 50μgm^{-3} was therefore not exceeded.

The highest PM_{10} measurement at a rural station occurred at Jeeralang Hill, where a 24-hour average PM_{10} concentration of 21.8μg/m^3 was caused by bushfire smoke on the 25 January. The 24hr SEPP Objective of 50.0μg/m^3 was not exceeded at this site.

Monthly and six monthly average PM_{10} concentrations for the LVAMN sites are given in Table 6. The highest six monthly concentration of PM_{10} was 15.3 μg/m^3 measured at Traralgon.

[3] Tapered element oscillating microbalance

4. References

LVAMN Network Database - WINCOLLECT - Validated data from January 2012 to June 2012.

LVAMN Annual Air Quality Commentary, January to December 2011, Aurecon Report No ARM-2012-02.

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 2012.

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 2012

Station Number	Station Short Name	Station Name	Station Type	Station Start Date	*Sampling Height (m agl)*	*Station Location*	
						Coordinates (mE) (mN)	*Description*
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
[%] 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:
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 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).
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 2012 to June 2012 – 1 Hour Averages

STATION			TR	RS	JH	SEPP
STATION NUMBER			13	17	36	Objectives
NUMBER OF MONTHS IN SERVICE			6	6	6	and Goals
HOURS OF AVAILABLE DATA	NO		4022	3717	N/A	
	NO_2		4022	3717	N/A	
(Total annual hours per parameter = 8784 hrs)	SO_2		4156	3870	4019	
	O_3		4156	3873	4122	
	LVD		4163	3873	N/A	
	TEOM		4288	N/A	N/A	
MAXIMUM MEASURED CONCENTRATION	NO	(ppb)	132	63	N/A	
	NO_2	(ppb)	32	106	N/A	
	SO_2	(ppb)	85	119	174	
	O_3	(ppb)	55	78	54	
MINIMUM MEASURED VISIBILITY	LVD	(km)	7.8	9.1	N/A	
SECOND HIGHEST DAILY MAXIMUM	NO	(ppb)	124	55	N/A	
	NO_2	(ppb)	26	105	N/A	120ppb (a)
	SO_2	(ppb)	68	82	151	200ppb (a)
	O_3	(ppb)	53	55	51	100ppb (a)
FOURTH LOWEST DAILY MINIMUM	LVD	(km)	16.8	22.7	N/A	20km (b)
DAYS WITH VISIBILITY MINIMUM < 20 km			11	1	N/A	3 days
DAYS WITH 1-HR O_3 MAXIMUM > 100ppb			0	0	0	1 day

NOTES TO TABLE

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

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

Table 4: Air Quality January 2012 to June 2012 – Longer Term Averages

STATION			TR	RS	JH	SEPP Objectives and Goals
STATION NUMBER			13	17	36	
NUMBER OF MONTHS IN SERVICE			6	6	6	
PERIODS OF AVAILABLE DATA (e.g. 1 period = 24 hours and represents 75% or greater data capture for the period)	24-HOUR NO		177	167	N/A	
	24-HOUR NO_2		174	159	N/A	
	24-HOUR SO_2		181	167	173	
	24-HOUR O_3		181	166	178	
	24-HOUR PM_{10}		182	28	27	
	4-HOUR O_3 (a)		4334	3873	4298	
MAXIMUM MEASURED CONCENTRATION	24-HOUR NO	(ppb)	45	7	N/A	
	24-HOUR NO_2	(ppb)	13	16	N/A	
	24-HOUR SO_2	(ppb)	10	16	39	
	24-HOUR PM_{10}	($\mu g/m^3$)	35.0	20.7	21.8	
	4-HOUR O_3 (a)	(ppb)	53	47	48	
SECOND HIGHEST DAILY MAXIMUM (b)	24-HOUR NO	(ppb)	32	6	N/A	
	24-HOUR NO_2	(ppb)	12	11	N/A	
	24-HOUR SO_2	(ppb)	5	8	25	80ppb (c)
	4-HOUR O_3 (a)	(ppb)	46	44	46	80ppb (c)
SECOND HIGHEST DAILY MAXIMUM (b)	24-HOUR PM_{10}	($\mu g/m^3$)	N/A	14.6	20.8	$50\mu g/m^3$ (c,f)
SIXTH HIGHEST DAILY MAXIMUM (b)	24-HOUR PM_{10}	($\mu g/m^3$)	27.1	N/A	N/A	$50\mu g/m^3$ (e)
DAYS WITH 4-HR O_3 MAXIMUM > 80ppb			0	0	0	1 day
DAYS WITH PM_{10} > 50 $\mu g/m^3$			0	0	0	See note (d)
SIX MONTHLY AVERAGE CONCENTRATION	NO	(ppb)	6	1	N/A	
	NO_2	(ppb)	7	2	N/A	30ppb (g)
	SO_2	(ppb)	2	1	3	20ppb (g)
	PM_{10}	($\mu g/m^3$)	15.3	10.6	10.3	
	O_3	(ppb)	12	13	20	

NOTES TO TABLE

(a) 4-hour rolling averages.

(b) Equal daily maxima counted separately.

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

(d) No more than one day in any year at RS and JH, and no more than five days in any year at TR.

(e) Not to be exceeded on more than five days in any year.

(f) One day in six operation.

(g) Never to be exceeded (annual).

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
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 Exceedances (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).
# 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 2012

Year Parameter	@2008	@2009	@2010	@2011	$2012
NO (1h, ppm)	0.175	0.400	0.229	0.150	0.132
NO_2 (1h, ppm)	0.046	0.094	0.068	0.034	0.106
^Days>0.12ppm	0	0	0	0	0
SO_2 (1h, ppm)	0.334	0.254	0.525	0.290	0.174
^Days>0.20ppm	4	2	4	2	0
O_3 (1h, ppm)	0.074	0.104	0.070	0.069	0.078
^Days>0.10ppm	0	1	0	0	0
LVD (1h, km)	2.1	3.3	2.1	3.4	7.8
^Days<20km	31	38	27	22	12
O_3 (4h, ppm)	0.061	0.088	0.062	0.056	0.053
^Days>0.08ppm	0	1	0	0	0
PM_{10} (24h, µg/m^3) *	36.2	51.4	49.5	31.7	21.8
^Days>50µg/m^3	0	2	0	0	0
PM_{10} (24h, µg/m^3) +	90.9	169.6	77.6	41.8	35.0
^Days>50µg/m^3	6	8	3	0	0

@ Calendar Year.
$ Six months (January to June)
* 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 2012

From January 2012 through December 2012
PM_{10} Monthly Averages in µg/m^3

Month	JH	RS	TR[1]
January	14.8	14.2	17.5
February	10.6	12.3	14.0
March	12.6	14.5	14.8
April	10.5	11.1	15.4
May	8.1	6.1	16.7
June	5.0	5.2	13.8
6 month average	**10.3**	**10.6**	**15.3**

[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.

Table 7: Air Quality Instrument Performance Statistics for January to June 2012

STATION	NO_2	NO	SO_2	O_3	LVD	DBT	WS	WD	GLB	UVA	TEOM	PM_{10}
Rosedale	85	85	89	89	89	99	99	99	99	99		97
Jeeralang			92	94			60[1]	78[1]				97
Traralgon	92	92	95	95	95	100	100	100			98	
SODAR (750m Level)							24[2]	24[2]				

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.

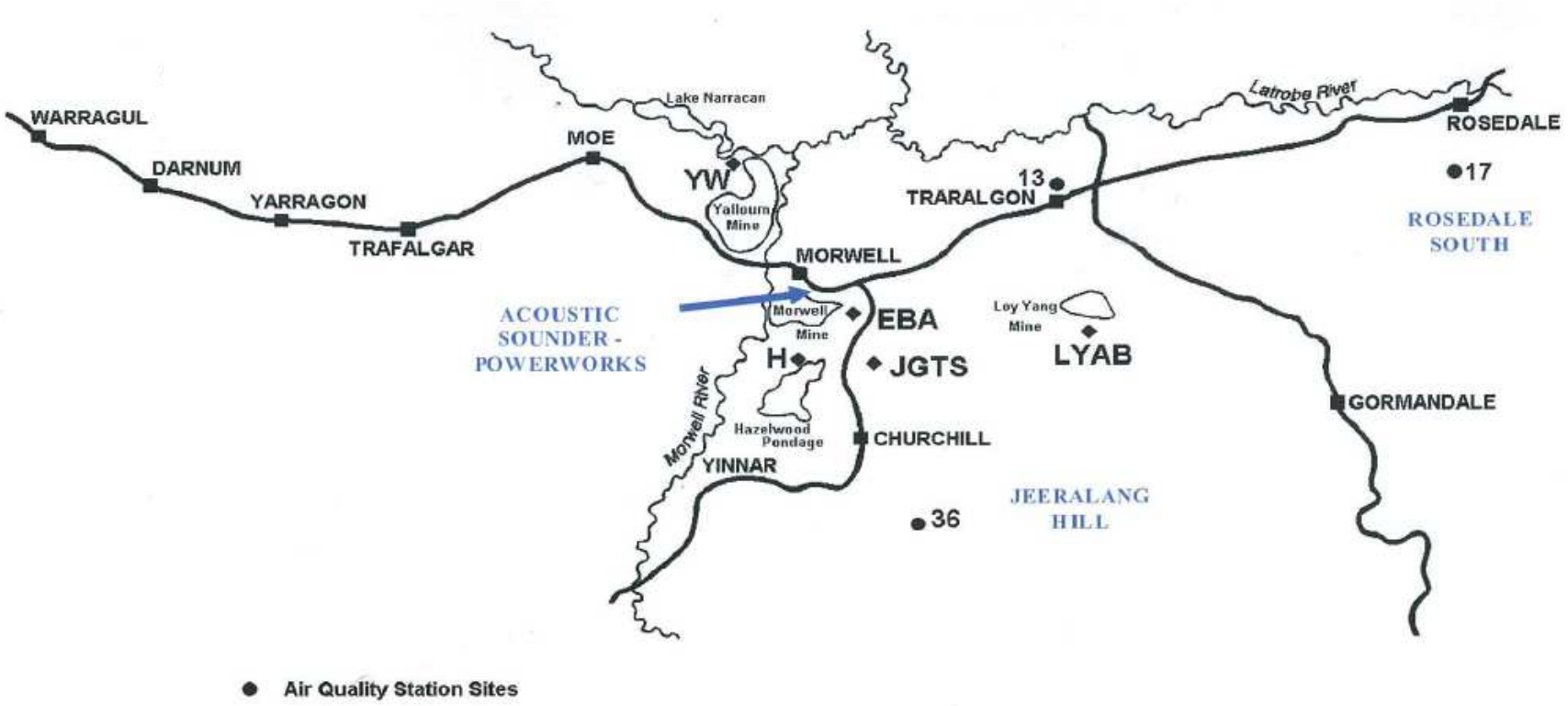
Note: Target for instrument performance is 80% valid data capture per parameter per calendar year.

[1] The wind sensor at Jeeralang Hill had to be replaced on two occasions due to electrical storm activity at the site. Delays were encountered on receiving replacement parts.

[2] The SODAR underwent extensive repairs and maintenance to rectify a loss of sensitivity at the upper monitoring levels.

6. Figures

Figure 1: Latrobe Valley Air Monitoring Network 2012



Major power station sources

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