
***Latrobe Valley Air Monitoring
Network
Annual Summary for 2004***

14/02/2005

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FOREWORD

This report presents the annual air quality summary for the Latrobe Valley Air Monitoring Network (LVAMN) for the year 2004. The LVAMN consists of three air monitoring stations and an acoustic sounder operated by CWPPPI on behalf of PowerWorks and two air monitoring stations operated on behalf of EPA Victoria.

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

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

- AS 3580.5.1 - 1993 Methods for sampling and analysis of ambient air – Determination of oxides of nitrogen – Chemiluminescence method.
- AS 3580.4.1 - 1990 Methods for sampling and analysis of ambient air – Determination of sulfur dioxide – Direct-reading instrumental method.
- AS 3580.6.1 - 1990 Methods for sampling and analysis of ambient air – Determination of ozone – Direct-reading instrumental method.
- AS 3580.9.6 - 2003 Methods for sampling and analysis of ambient air – Determination of suspended particulate matter – PM₁₀ high volume sampler with size selective inlet – Gravimetric method.
- AS 3580.9.8 - 2001 Method for sampling and analysis of ambient air – Determination of suspended particulate matter – PM₁₀ continuous direct mass method using a tapered element oscillating microbalance, (TEOM) analyser.
- AS 2923 - 1987 Ambient air - guide for measurement of horizontal wind for air quality applications.

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

Note that the number of LVD exceedences (totals for each year) from 1999 to 2003 have been adjusted as a result of a 20°C temperature correction applied.

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.

All monitoring stations were operated and maintained by Connell Wagner PPI and the summaries for all stations were prepared from validated data sets stored on the central computer system housed in the organisation's offices at 1 Church Street, Traralgon.

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



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

LATROBE VALLEY AIR MONITORING NETWORK

ANNUAL AIR QUALITY COMMENTARY 2004

Summary

Annual air quality summaries and commentaries are presented for each air quality station in the Latrobe Valley Air Monitoring Network (LVAMN) for the year January 2004 to December 2004.

The highest measured values of sulfur dioxide (SO₂) in the Latrobe Valley can usually be attributed to power station emissions. The highest concentration measured in 2004 (0.35 ppm) was measured at Jeeralang Hill in the Strzelecki Ranges. While this value exceeded the *State Environment Protection Policy (Ambient Air Quality)* (“SEPP”) 1hr Environmental Quality Objective of 0.20 ppm (refer Table 2), it should be noted that evaluation of air quality against the policy Goal (allowing one exceedence of the Objective per year) is applicable only to performance monitoring stations located in urban or populated areas only. SO₂ measurements exceeded 0.20 ppm at Jeeralang Hill rural site on 5 separate days.

The highest 1hr SO₂ concentration measured on the floor of the Latrobe Valley during 2004 occurred at Rosedale on the 1 January. This concentration, 0.09 ppm, was attributed to power station emissions.

The highest nitric oxide (NO) concentration, 0.26 ppm, was measured at Moe on the 30 July. This was attributed to urban emissions (traffic, heating and cooking emissions) accumulating during calm stable conditions in the early evening. There is no SEPP Objective for NO levels.

The highest nitrogen dioxide (NO₂) concentration, 0.04 ppm measured at Traralgon on the 14 April and 14 May, also originated from urban emissions during near calm stable conditions. This was well below the SEPP 1hr Objective for NO₂ of 0.12 ppm.

Particulate matter less than 10 microns in diameter (PM₁₀) is measured by two different methods, but all data is compared against the same Objective. The highest 24 hour average PM₁₀ concentration was 57 µg/m³, measured at Moe. Traralgon recorded 45 µg/m³ on the same day. The Moe value exceeded the SEPP 24h Objective of 50 µg/m³. No exceedences of the Objective were recorded at Jeeralang Hill and Rosedale South monitoring stations.

The SEPP 1hr Objective for Local Visual Distance (LVD) of 20 km was exceeded on 20 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 15 at Traralgon, which breached the SEPP goal. The Goal was also breached at Moe, with 7 exceedence days. Widespread LVD breaches were attributed to extensive fuel reduction burning. The total number of exceedences for the Network is 29, which is comparable with recent years.

The highest 1hr average ozone (O₃) concentration for the year was 0.07 ppm, which occurred on the 8 February at Jeeralang Hill. This value did not exceed the SEPP 1hr Air Quality Objective of 0.10 ppm.

The highest 4hr rolling average O₃ concentration for the year, 0.06 ppm, also occurred at Jeeralang Hill on the 20 February. This measurement did not exceed the SEPP rolling 4hr O₃ Objective of 0.08 ppm and also did not breach the Goal which allows one exceedence day per year.

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1 INTRODUCTION

Annual summaries of air quality statistics and commentaries for the Latrobe Valley Air Monitoring Network (LVAMN) are presented for the period January to December 2004. All monitoring stations were operated and maintained by Connell Wagner PPI 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. |

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

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

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

2 LVAMN OPERATIONS FOR 2004

2.1 Network Operations

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

The parameters measured at each monitoring station are:

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

Rosedale South: Nitrogen Oxides, Sulphur Dioxide, Ozone, Local Visual Distance, Dry Bulb Temperature, Wet Bulb Temperature, Wind Speed, Wind Direction, Global Solar Radiation, Ultra-Violet Radiation and Inhalable Particles (HiVol PM₁₀ size selective inlet method).

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

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

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

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

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

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

2.2 Network Performance

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

3 LATROBE VALLEY AIR QUALITY, 2004

The summary of air quality measurements for the Latrobe Valley Air Monitoring Network for the period January 2004 to December 2004 is shown in Table 3 and Table 4.

The highest values¹ measured in the Latrobe Valley for each year from September 1980 to December 2004 are shown in Tables 5a & 5b.

Measured concentrations are rounded to the nearest 0.01 ppm, 1 km or 1 µg/m³ in accordance with the precision of the SEPP Environmental Quality Objectives.

3.1 Nitric oxide (NO)

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

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

¹ The lowest values for local visual distance (LVD).

The two highest NO concentrations at Traralgon were 0.21 ppm on the 21 May, and 0.21 ppm on the 8 June. The two highest NO concentrations at Moe were 0.26 ppm on the 30 July, and 0.21 ppm on the 10 June. These urban measurements were characteristic of traffic, heating and cooking emissions accumulating during near calm stable conditions, and were consistent with previous years data.

The two highest NO concentrations measured at the rural Rosedale South station were 0.07 ppm on the 1 January and 0.05 ppm on the 24 March. As expected, these were considerably lower than at the urban Traralgon and Moe sites.

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 concentration in 2004 (0.04 ppm at Traralgon on the 14 April & 14 May) was similar to levels measured in previous years. This was again well below the SEPP 1hr Objective for NO₂ of 0.12 ppm.

The highest concentration measured at a rural site was 0.02 ppm at Rosedale South.

The highest annual average NO₂ concentration measured at either an urban or rural site during 2004 was 0.008 ppm at Traralgon, well below the SEPP objective of 0.03 ppm.

3.3 Sulfur dioxide (SO₂)

About 95% of all SO₂ in the Latrobe Valley originate from anthropogenic sources. The highest measured values on investigation can usually be attributed to power station emissions.

The highest SO₂ concentration during 2004, 0.35 ppm measured at Jeeralang Hill on the 2 January 2004, was attributed to a plume strike from Loy Yang A and B Power Stations occurring under stable conditions during the early morning. The measurement is typical of maxima previously measured at this site.

While the SEPP Goal of less than 0.20 ppm for all but one day per year was not exceeded in 2004 at an urban site, concentrations of SO₂ measured at Jeeralang Hill rural site exceeded 0.05 ppm on 25 days, 0.10 ppm on 12 days and the SEPP Environmental Quality Objective of 0.20 ppm on 5 days.

The highest SO₂ concentration measured on the Latrobe Valley floor was 0.09 ppm. This occurred at Rosedale on the 1 January and was attributed to power station emissions being convectively mixed to ground under unstable conditions. The second highest event was 0.08 ppm at Traralgon on 1 March. This measurement was also attributed to power station plume impact. These measurements are typical of previous years' measurements at these sites.

The highest 24hr average concentration of SO₂ measured by the LVAMN was 0.06 ppm at Jeeralang Hill on the 2 January 2004. This value did not breach the SEPP 24hr Objective of 0.08 ppm. As expected, this event occurred on the same day as the highest 1hr concentration was measured, with the plume impact being evident for approximately 10 hours at the monitoring station.

The SEPP annual average concentration objective for SO₂ is 0.02 ppm and is not to be exceeded. The highest annual average concentration of SO₂ was 0.003 ppm, measured at 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.

The SEPP 1hr Air Quality Objective of 0.10 ppm for ozone has been exceeded only once in the Latrobe Valley (0.11 ppm at Darnum North on the 6 February 1997). In 2004 the highest 1hr ozone concentration was 0.07 ppm, recorded at Jeeralang Hill on 8 February. This similar to previous years (see Table 5b) and did not breach the Objective.

The highest rolling 4hr average O₃ concentration for 2004 was 0.06 ppm, recorded at Jeeralang Hill on the 20 February. This is comparable with other annual maxima experienced in years since 1992 (see Table 5b) and did not breach the SEPP 4hr rolling average Objective of 0.08 ppm.

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 allows the Objective to 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 in calm, stable conditions which cause accumulation of pollution from ground based sources (Joynt, 1988).

The SEPP Objective of 20 km was exceeded on 20 separate days during the year. The objective was breached at Moe on 7 days, at Traralgon on 15 days, and at the rural station, Rosedale South, on 7 days. Breaches occurred at all three stations on 3 days, and at two of three stations on 4 days, indicating widespread visibility degradation on these 7 days. The remaining 13 exceedences occurred at only one station on each given day, indicating a greater likelihood that these were due to local sources.

The majority of LVD breaches at Moe and Traralgon occurring during early morning or evening were due to local urban (household and traffic) emissions.

LVD exceedences at Rosedale South were investigated with some being attributed to fuel reduction burns conducted by the Department of Sustainability and Environment; these low LVD days also coincided with low LVD measurements at Moe and Traralgon and showed widespread visibility degradation. Other exceedences were attributed to local sources.

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 burning off.

PM₁₀ is measured in two ways in the LVAMN. The urban stations at Moe and Traralgon use a continuous analyser known as a TEOM, which obtains measurements every hour of the year. 24-

hour averages are calculated for each day. 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 57 µg/m³ was measured on the 14 April at Moe. Traralgon on the same day had a measurement of 45 µg/m³. These readings were attributed to the widespread smoke plume from fuel reduction burns. The PM₁₀ Objective was exceeded on 1 day only at Moe.

The highest PM₁₀ measurement at a rural station occurred at Rosedale South, where a 24-hour average PM₁₀ concentration of 34 µg/m³ was recorded on the 13 April. This value did not exceed the SEPP Objective of 50µg/m³, and the SEPP Goal of no more than 1 exceedence day per year for a one day in six sampling frequency was not breached.

Monthly and yearly average PM₁₀ concentrations for the LVAMN sites are given in Table 6. The highest annual concentration of PM₁₀ was 16.0 µg/m³ measured at Traralgon. There is no SEPP Objective for the annual concentration, but this measured value is typical of previous years for the LVAMN sites.

3.7 Wind Roses

Annual wind roses are presented for all ambient air quality stations in the LVAMN on pages 19 through 23. Data are included for all hours of monitoring.

Note: Since Darnum North operates for only six months of the year, two wind roses are provided which cover the January to March and October to December periods of monitoring.

4 REFERENCES

LVAMN Network Database - WINCOLLECT - Validated data from January 2004 to December 2004.

LVAMN Annual Air Quality Commentary, January to December 2003, PPI Report PPI/2004/05.

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

Information provided by the Department of Sustainability and Environment (DSE) on fuel reduction burning in the Gippsland Region during 2004.

| 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. |
| 12 | MO | Moe | AQU | 05/05/82 | 3 | 434900 5773400 | Vale St Oval, via South St, Moe |
| 13 | TR | Traralgon | AQU | 6/01/82 | 3 | 459200 5772300 | Kay St, Traralgon, adjacent to pool |
| 17 | RS | Rosedale South | AQR | 2/06/87 | 3 | 480500 5772200 | West of Willung Road, Rosedale South |
| 36 | JH | Jeeralang Hill | AQR | 1/09/96 | 3 | 454010 5755500 | 1km north of Jeeralang North Road (Thomson Road) |
| 37 | PS | PowerWorks SODAR | AS | 11/05/01 | Multiple [@] | 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 are 10m above ground level (agl) at rural sites and 15m above ground level at urban sites.

Table 1: Latrobe Valley Air Monitoring Network Stations, 2004

| Pollutant | Averaging Period | Environmental Quality Objectives ¹ | Goal - Maximum Allowable Exceedences |
|----------------------------------|--------------------------------|--|---|
| Carbon monoxide | 8 hours* | 9.0 ppm | 1 day a year |
| Nitrogen dioxide | 1 hour 1 year | 0.12 ppm 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.

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

Important Note:

The above air quality objectives apply to ambient air throughout Victoria, but the goals apply only at ‘performance monitoring stations’ as defined in the SEPP. The urban sites of Moe and Traralgon are performance monitoring stations.

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

| STATION | | DN | MO | TR | RS | JH | SEPP |
|---|-----------------------|-------|------|------|------|------|--|
| STATION NUMBER | | 1 | 12 | 13 | 17 | 36 | Objectives and Goals |
| NUMBER OF MONTHS IN SERVICE | | 6 (a) | 12 | 12 | 12 | 12 | |
| HOURS OF AVAILABLE DATA | NO | N/A | 8403 | 8297 | 8324 | N/A | |
| | NO ₂ | N/A | 8403 | 8296 | 8326 | N/A | |
| (Total annual hours per parameter = 8760 hrs) | SO ₂ | N/A | 8395 | 8267 | 8322 | 8258 | |
| | O ₃ | 4124 | 8405 | 8217 | 8220 | 8157 | |
| | LVD | N/A | 8326 | 8368 | 8260 | N/A | |
| | TEOM | N/A | 7951 | 8745 | N/A | N/A | |
| MAXIMUM MEASURED CONCENTRATION | NO (ppb) | N/A | 263 | 214 | 66 | N/A | |
| | NO ₂ (ppb) | N/A | 33 | 36 | 22 | N/A | |
| | SO ₂ (ppb) | N/A | 48 | 79 | 93 | 351 | |
| | O ₃ (ppb) | 58 | 55 | 58 | 58 | 67 | |
| MINIMUM MEASURED VISIBILITY | LVD (km) | N/A | 4 | 11 | 6 | N/A | |
| SECOND HIGHEST DAILY MAXIMUM | NO (ppb) | N/A | 207 | 210 | 49 | N/A | 120ppb (b) 200ppb (b) 100ppb (b) |
| | NO ₂ (ppb) | N/A | 31 | 36 | 21 | N/A | |
| | SO ₂ (ppb) | N/A | 26 | 77 | 74 | 314 | |
| | O ₃ (ppb) | 58 | 54 | 52 | 56 | 63 | |
| FOURTH LOWEST DAILY MINIMUM | LVD (km) | N/A | 11 | 13 | 11 | N/A | 20km (c) |
| DAYS WITH VISIBILITY MINIMUM < 20 km | | N/A | 7 | 15 | 7 | N/A | 3 days |

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.

General Note: Data have been rounded from units of ppb as used throughout the LVAMN to the nearest 10ppb where appropriate.

Table 3: Air Quality January 2004 to December 2004 - 1 Hour Averages

| STATION | | DN | MO | TR | RS | JH | SEPP Objectives and Goals |
|--|---|-------|------|------|------|------|---------------------------------|
| STATION NUMBER | | 1 | 12 | 13 | 17 | 36 | |
| NUMBER OF MONTHS IN SERVICE | | 6 (a) | 12 | 12 | 12 | 12 | |
| PERIODS OF AVAILABLE DATA (e.g. 1 period = 24 hours and represents 75% or greater data capture for the period) | 24-HOUR NO | N/A | 366 | 362 | 363 | N/A | |
| | 24-HOUR NO ₂ | N/A | 366 | 362 | 363 | N/A | |
| | 24-HOUR SO ₂ | N/A | 365 | 360 | 363 | 360 | |
| | 24-HOUR PM ₁₀ | N/A | 334 | 365 | 59 | 58 | |
| | 4-HOUR O ₃ (b) | 4300 | 8775 | 8558 | 8577 | 8488 | |
| MAXIMUM MEASURED CONCENTRATION | 24-HOUR NO (ppb) | N/A | 69 | 53 | 8 | N/A | |
| | 24-HOUR NO ₂ (ppb) | N/A | 12 | 18 | 8 | N/A | |
| | 24-HOUR SO ₂ (ppb) | N/A | 11 | 11 | 10 | 62 | |
| | 24-HOUR PM ₁₀ (µg/m ³) | N/A | 57 | 45 | 34 | 26 | |
| | 4-HOUR O ₃ (b) (ppb) | 52 | 49 | 49 | 51 | 59 | |
| SECOND HIGHEST DAILY MAXIMUM (c) | 24-HOUR NO (ppb) | N/A | 47 | 52 | 6 | N/A | |
| | 24-HOUR NO ₂ (ppb) | N/A | 12 | 17 | 8 | N/A | |
| | 24-HOUR SO ₂ (ppb) | N/A | 6 | 10 | 7 | 29 | |
| | 4-HOUR O ₃ (b) (ppb) | 51 | 47 | 47 | 50 | 58 | |
| SECOND HIGHEST DAILY MAXIMUM (c) | 24-HOUR PM ₁₀ (µg/m ³) | N/A | N/A | N/A | 20 | 15 | 80ppb (d) |
| SIXTH HIGHEST DAILY MAXIMUM (c) | 24-HOUR PM ₁₀ (µg/m ³) | N/A | 39 | 36 | N/A | N/A | 80ppb (d) |
| DAYS WITH 4-HR O ₃ MAXIMUM > 80ppb | | 0 | 0 | 0 | 0 | 0 | 50µg/m ³ (d,g) |
| DAYS WITH PM ₁₀ > 50 µg/m ³ | | N/A | 1 | 0 | 0 | 0 | 50µg/m ³ (f) |
| ANNUAL AVERAGE CONCENTRATION | NO (ppb) | N/A | 5 | 7 | 1 | N/A | 1 day |
| | NO ₂ (ppb) | N/A | 6 | 8 | 3 | N/A | See note (e) |
| | SO ₂ (ppb) | N/A | 1 | 2 | 2 | 3 | |
| | PM ₁₀ (µg/m ³) | N/A | 15 | 16 | 11 | 8 | |
| | O ₃ (ppb) | 19 | 16 | 14 | 16 | 24 | |

NOTES TO TABLE

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

Table 4: Air Quality January 2004 to December 2004 - Longer Term Averages

| Year | #1980 | #1981 | #1982 | #1983 | #1984 | #1985 | #1986 | #1987 | #1988 | #1989 | #1990 | #1991 |
|--|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Parameter | /81 | /82 | /83 | /84 | /85 | /86 | /87 | /88 | /89 | /90 | /91 | /92 |
| 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 |
| 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 |
| Days>0.12ppm | 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 |
| Days>0.20ppm | 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 |
| Days>0.10ppm | 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 |
| LVD (1h, km) | 4 | 5 | 4 | 4 | 4 | 6 | 5 | 8 | 7 | 5 | 5 | 6 |
| Days<20km | &47 | &80 | 47 | 42 | 38 | 36 | 49 | 32 | 14 | 35 | 32 | 44 |
| 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 |
| 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 |
| 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 |
| Days>0.05ppm | 2 | 2 | 9 | 0 | 1 | 1 | 1 | 3 | 1 | 5 | 2 | 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 |
| 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 |
| 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 |
| 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 |

& Incomplete data set during commissioning of the Leeds and Northrup logging system.
Seasonal Year (September to August).
* High volume sampler method.
+ TEOM method (commenced Nov 2002).
N/A Not available.

Table 5a: Air Quality Extremes and SEPP Objective Exceedences

| Year | [§] 1992 | [@] 1993 | [@] 1994 | [@] 1995 | [@] 1996 | [@] 1997 | [@] 1998 | [@] 1999 | [@] 2000 | [@] 2001 | [@] 2002 | [@] 2003 | [@] 2004 |
|--|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Parameter | | | | | | | | | | | | | |
| NO (1h, ppm) | 0.16 | 0.37 | 0.22 | 0.25 | 0.30 | 0.36 | 0.29 | 0.31 | 0.28 | 0.26 | 0.28 | 0.25 | 0.26 |
| NO₂ (1h, ppm) | 0.03 | 0.05 | 0.04 | 0.04 | 0.04 | 0.04 | 0.05 | 0.05 | 0.05 | 0.04 | 0.04 | 0.05 | 0.04 |
| Days>0.12ppm | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SO₂ (1h, ppm) | 0.06 | 0.13 | 0.17 | 0.14 | 0.10 | 0.20 | 0.24 | 0.25 | 0.29 | 0.61 | 0.25 | 0.23 | 0.35 |
| Days>0.20ppm | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 4 | 1 | 1 | 5 |
| O₃ (1h, ppm) | 0.05 | 0.06 | 0.07 | 0.07 | 0.07 | 0.11 | 0.07 | 0.07 | 0.10 | 0.08 | 0.07 | 0.09 | 0.07 |
| Days>0.10ppm | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| LVD (1h, km) | 7 | 5 | 5 | 11 | 7 | 7 | 7 | 11 | 12 | 9 | 4 | 2 | 4 |
| Days<20km | 9 | 16 | 65 | 42 | 25 | 35 | 38 | 31 [#] | 27 [#] | 31 [#] | 26 [#] | 71 [#] | 29 [#] |
| O₃ (4h, ppm) | 0.04 | 0.05 | 0.07 | 0.06 | 0.05 | 0.09 | 0.06 | 0.07 | 0.06 | 0.08 | 0.06 | 0.09 | 0.06 |
| Days>0.08ppm | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| O₃ (8h, ppm) | 0.04 | 0.05 | 0.06 | 0.06 | 0.05 | 0.07 | 0.06 | 0.06 | 0.05 | 0.07 | N/A | N/A | N/A |
| Days>0.05ppm | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 3 | 3 | N/A | N/A | N/A |
| PM₁₀ (24h, µg/m³) * | 22 | 79 | 58 | 31 | 63 | 55 | 88 | 50 | 36 | 39 | 42 | 85 | 34 |
| Days>50µg/m ³ | 0 | 1 | 1 | 0 | 1 | 1 | 4 | 0 | 0 | 0 | 0 | 1 | 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 | 42 | 289 | 57 |
| Days>50µg/m ³ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 0 | 18 | 1 |

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

§ September 1992 to December 1992.

@ Calendar Year.

* High volume sampler method.

+ TEOM method (commenced Nov 2002).

Exceedences adjusted to account for change in calibration reference temperature

N/A Not available.

Table 5b: Air Quality Extremes and SEPP Objective Exceedences

Table 6: Inhalable Particulate Summary for 2004

From January 2004 through December 2004

PM₁₀ Monthly Averages in µg/m³

| <u>Month</u> | <u>JH</u> | <u>RS</u> | <u>MO</u> | <u>TR</u> |
|-------------------------|------------|-------------|-------------|-------------|
| January | 9.7 | 14.8 | 16.7 | 17.3 |
| February | 7.9 | 14.5 | 20.3 | 20.4 |
| March | 8.2 | 12.9 | 23.3 | 18.8 |
| April | 11.2 | 17.3 | N/A | 20.2 |
| May | 7.0 | 12.3 | N/A | 16.3 |
| June | 3.9 | 4.6 | 11.0 | 13.8 |
| July | 3.1 | 4.7 | 11.1 | 13.7 |
| August | 5.5 | 6.0 | 11.0 | 12.9 |
| September | 7.4 | 8.6 | 8.6 | 11.3 |
| October | 7.2 | 8.3 | 14.5 | 13.8 |
| November | 13.7 | 13.6 | 16.0 | 16.2 |
| <u>December</u> | <u>7.2</u> | <u>8.3</u> | <u>14.4</u> | <u>14.9</u> |
| 12 month average | 7.9 | 10.7 | 15.0 | 15.8 |

| STATION | NO ₂ | NO | SO ₂ | O ₃ | LVD | DBT | WBT | WS | WD | GLB | UVA | TEOM | PM ₁₀ |
|---------------------|-----------------|----|-----------------|----------------|-----|-----|-----|----|----|-----|-----|------|------------------|
| Darnum ¹ | | | | 94 | | | | 90 | 90 | | | | |
| Rosedale | 95 | 95 | 95 | 94 | 95 | 99 | 99 | 98 | 98 | 99 | 99 | | 97 |
| Jeeralang | | | 94 | 93 | | | | 96 | 96 | | | | 95 |
| Moe | 96 | 96 | 96 | 96 | 95 | 100 | 100 | 95 | 95 | | | 90 | |
| Traralgon | 94 | 94 | 94 | 94 | 95 | 99 | 99 | 85 | 85 | 100 | | 91 | |

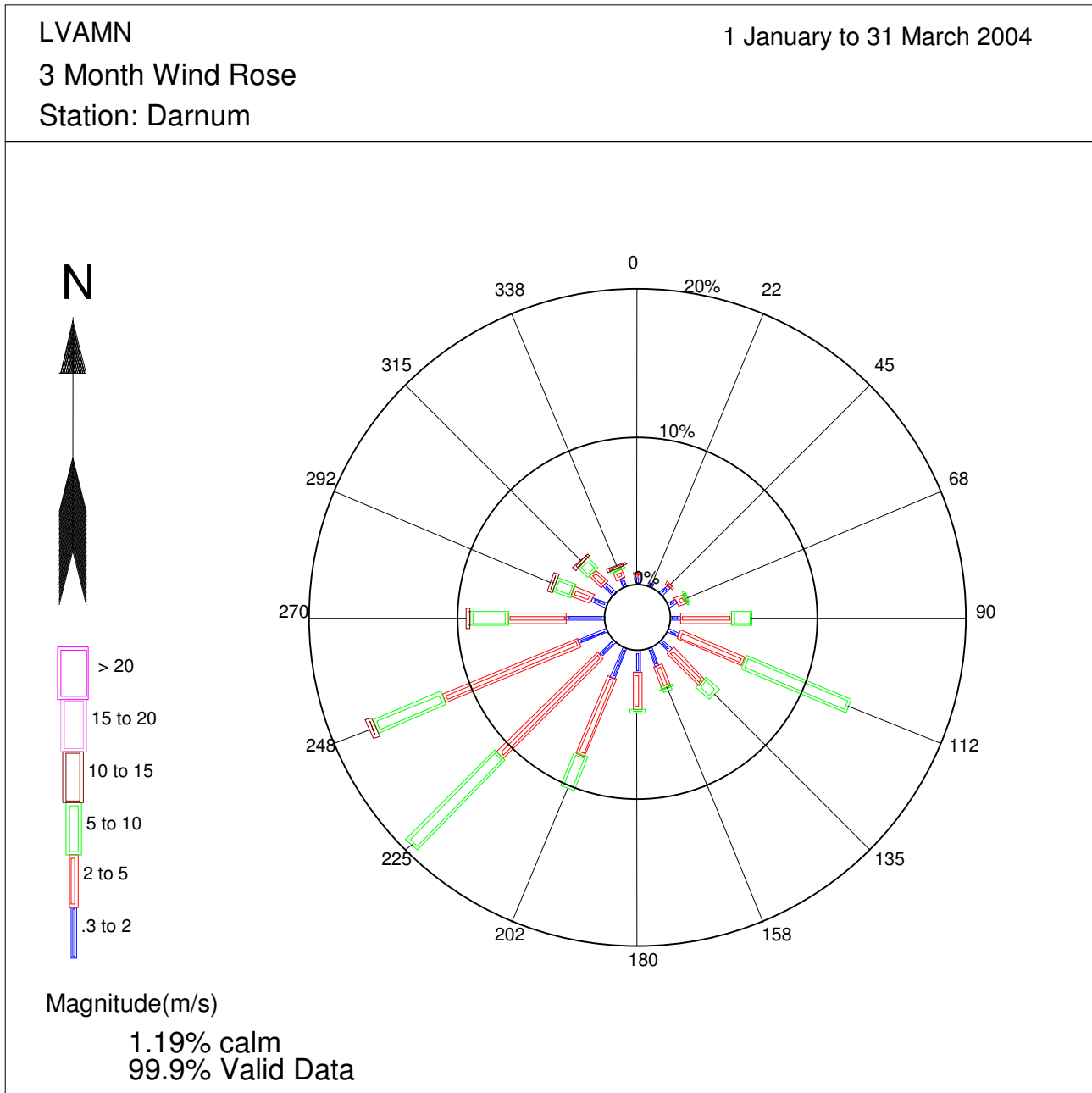
Table 7: LVAMN Air Quality Instrument Performance Statistics for 2004

The above table represents the percentage of 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.

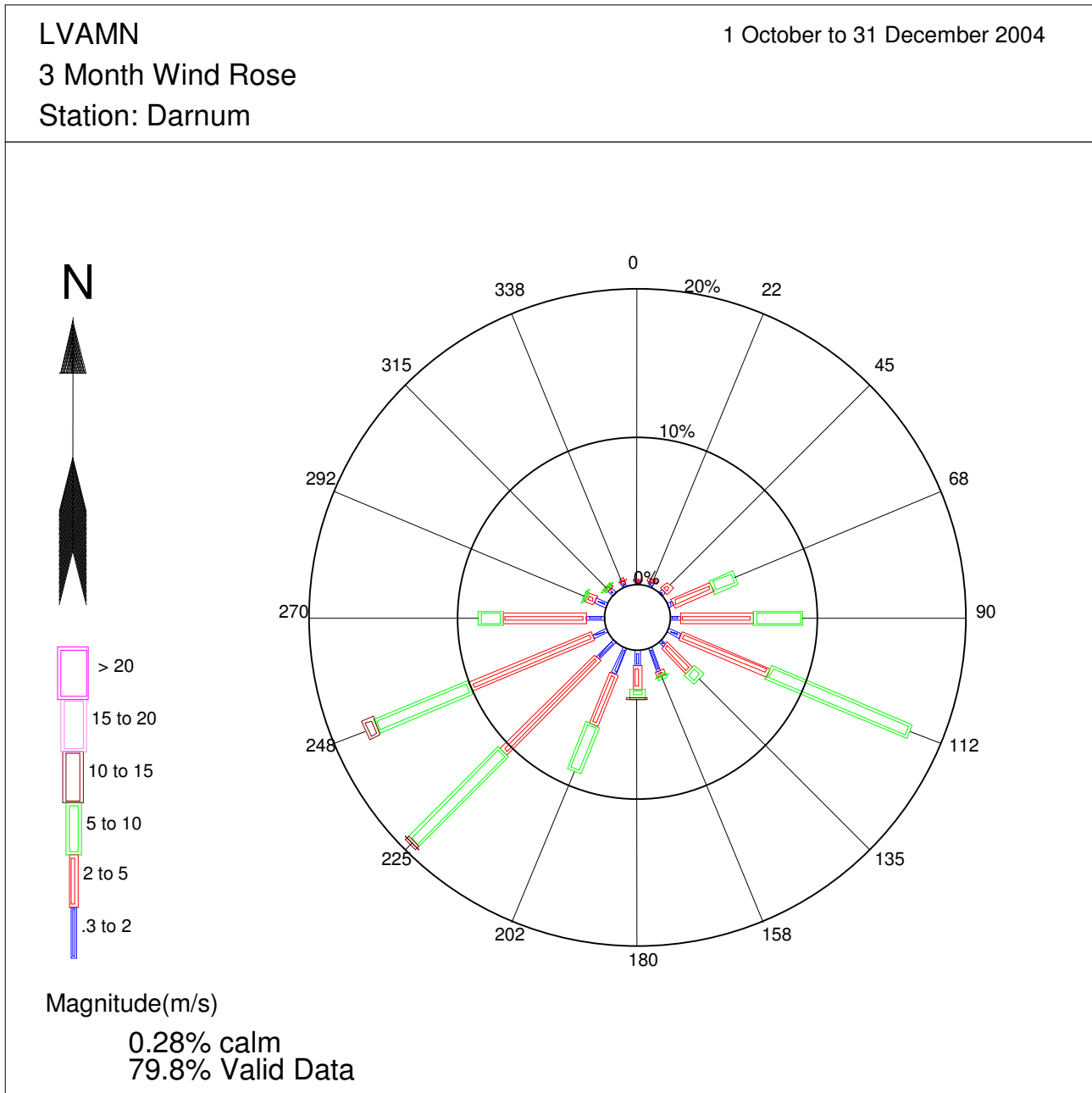
1. Darnum North was operated only from 1 January to 31 March and from 1 October to 31 December.

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

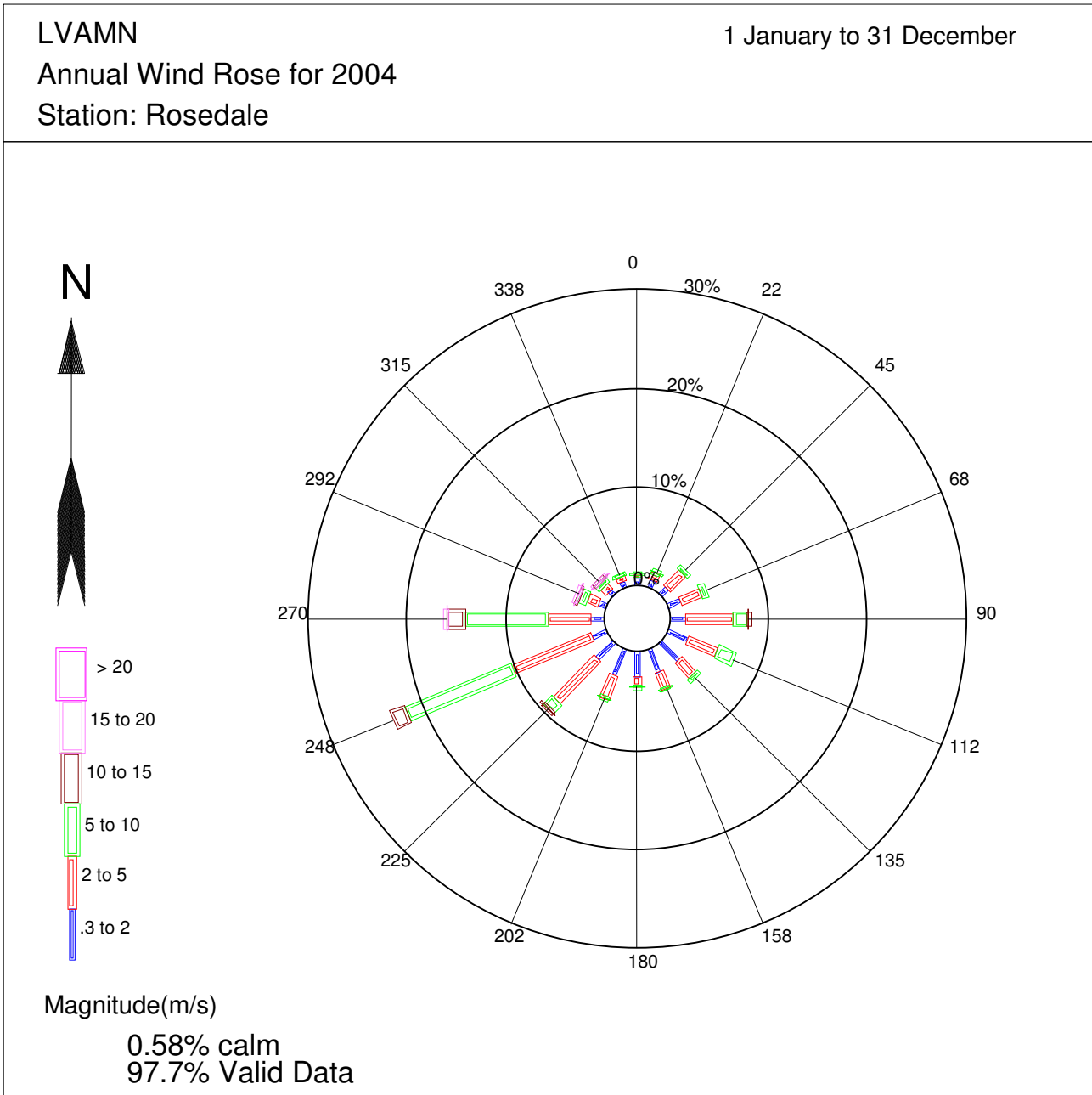
6.1 DARNUM NORTH WIND ROSE – 1 January to 31 March 2004



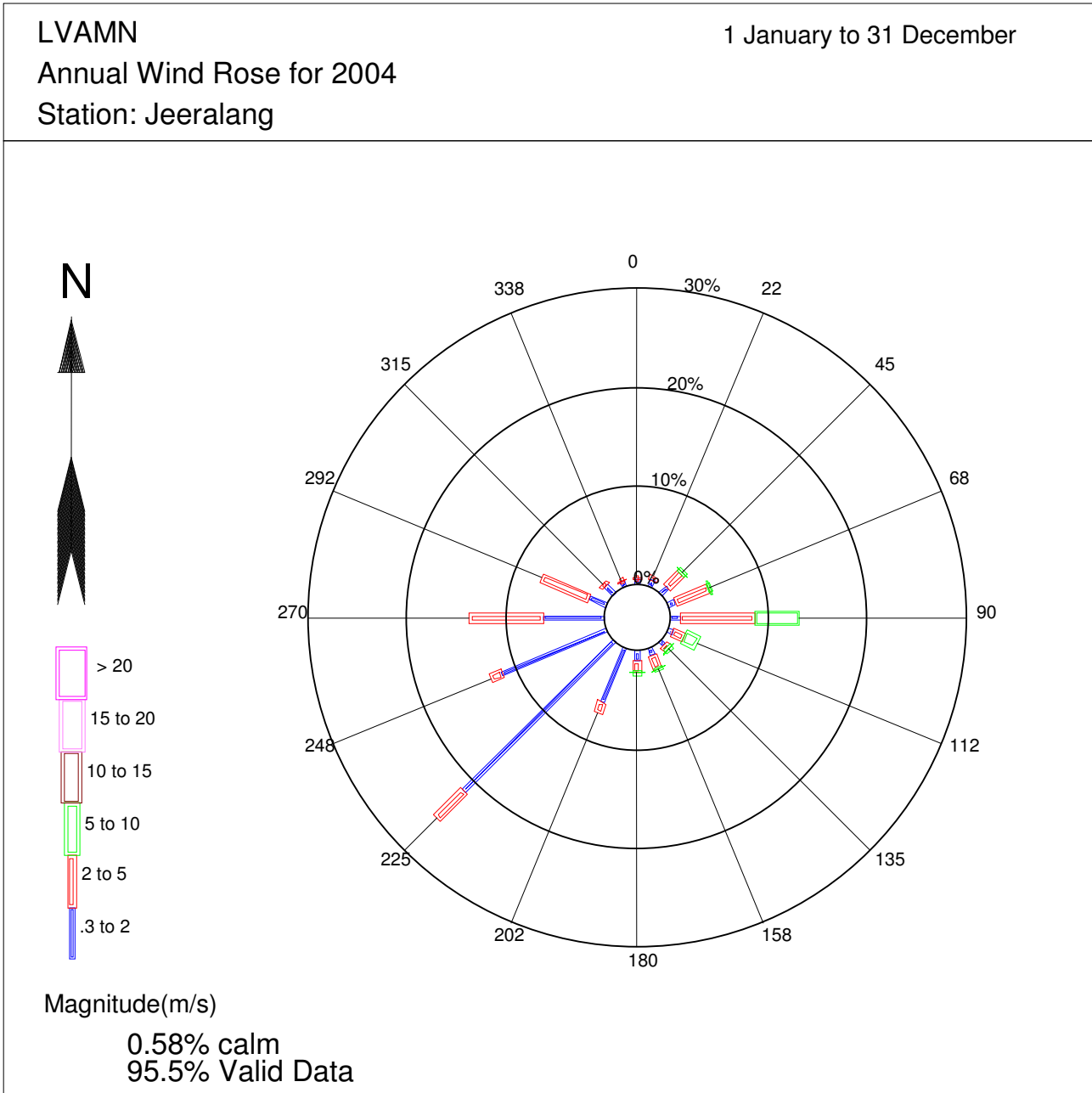
6.2 DARNUM NORTH WIND ROSE – 1 October to 31 December 2004



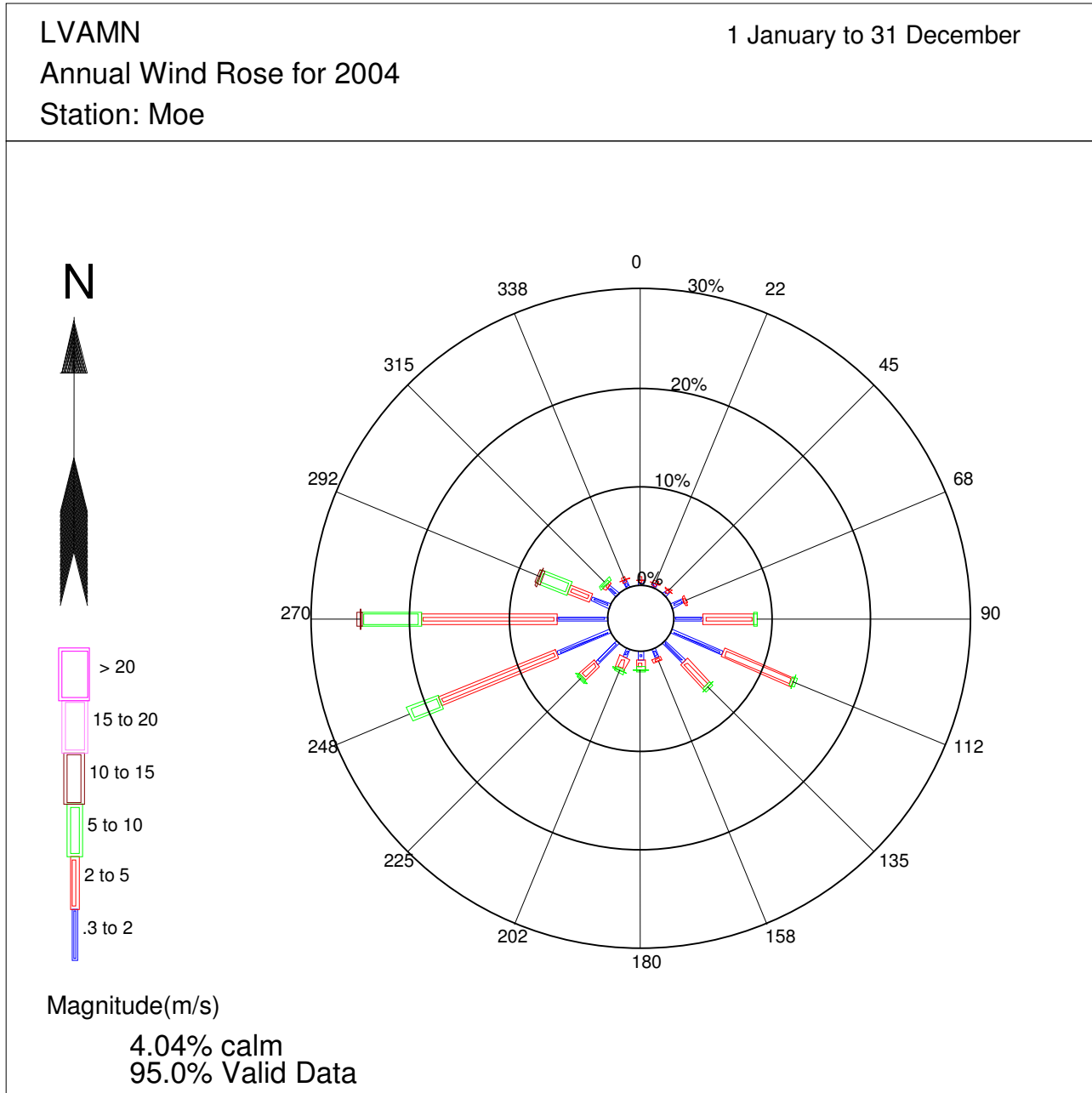
6.3 ROSEDALE SOUTH WIND ROSE – 1 January to 31 December 2004



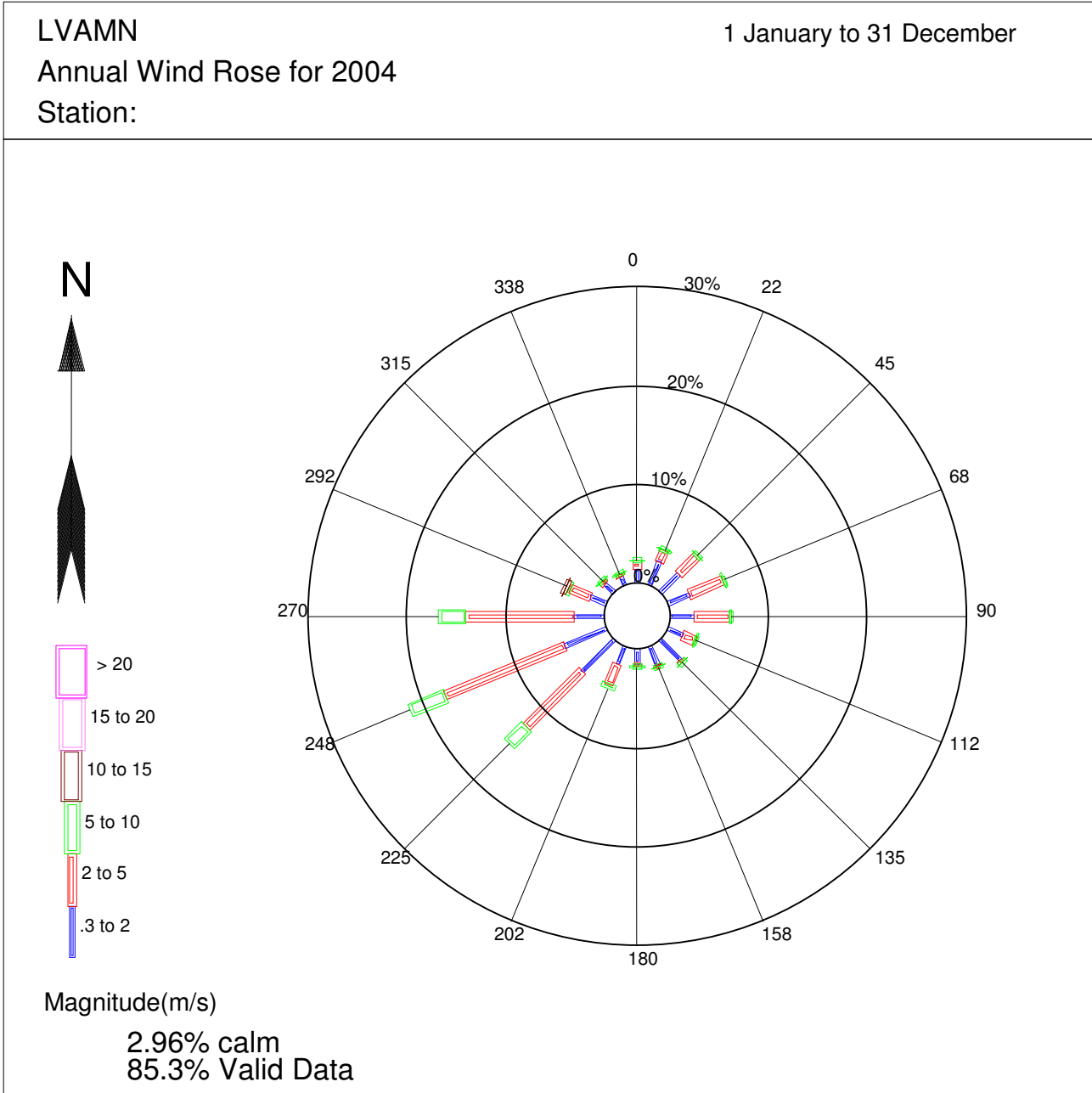
6.4 JEERALANG HILL WIND ROSE – 1 January to 31 December 2004

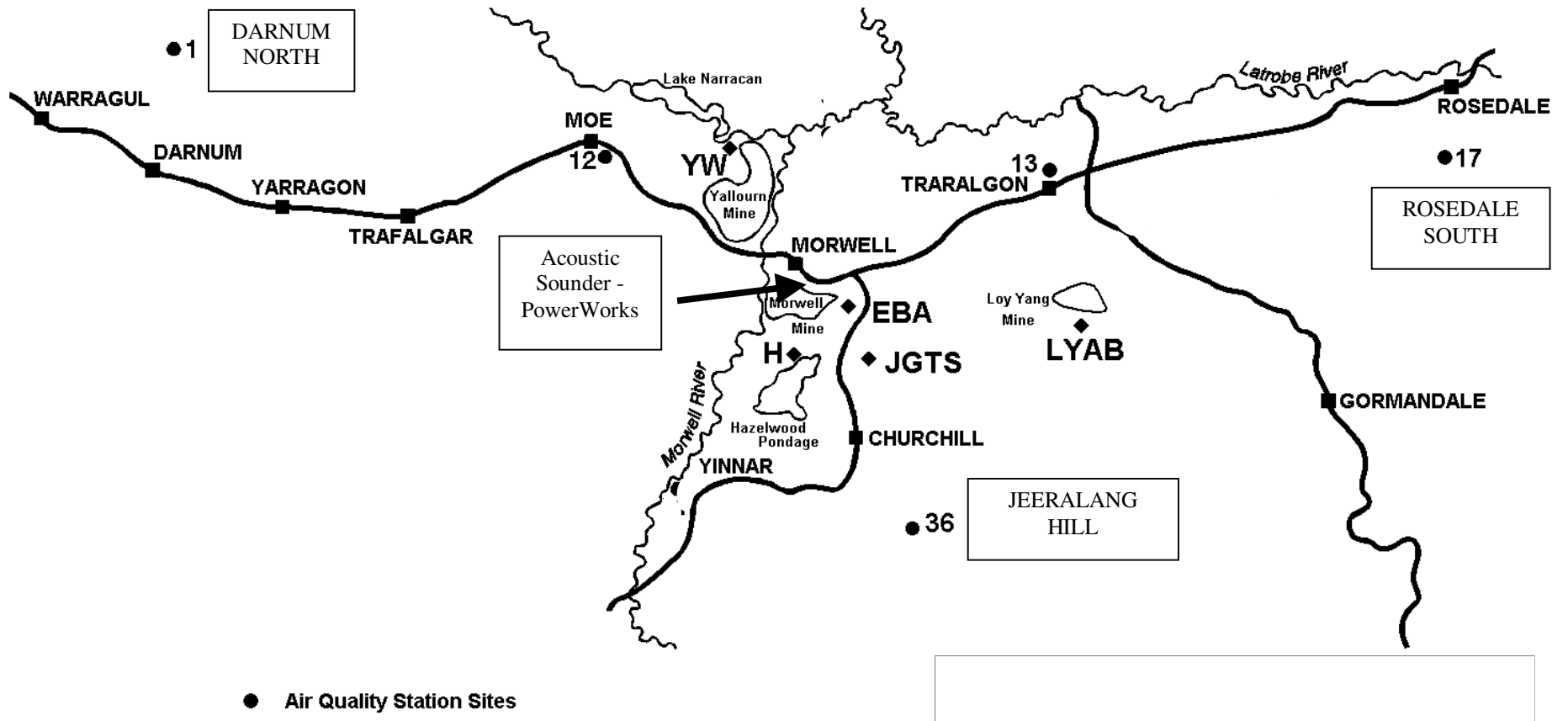


6.5 MOE WIND ROSE – 1 January to December 2004



6.6 TRARALGON WIND ROSE – 1 January to December 2004





Major sources

YW – Yallourn Energy

JGTS – AES Jeeralang (Gas Turbine Station)

EBA – Energy Brix Australia

LYAB – Loy Yang Power, Edison Mission

H – Hazelwood Power

Figure 1: Latrobe Valley Air Monitoring Network 2004