Air Quality Monitoring 2005

Marlborough District Council

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Executive Summary

Air quality monitoring for PM_{10} was carried out in two urban areas of Blenheim during 2005. Concentrations of PM_{10}, the main contaminant of concern, were measured using gravimetric high volume sampling based on a one in three day sampling regime at the Redwoodtown Bowling Club site and the historical Blenheim monitoring site on Middle Renwick road.

Concentrations of PM_{10} at Redwoodtown were in excess of the ambient air quality guideline and national environmental standard (NES) for PM_{10} of 50 µg m^{-3} (24-hour average). During May to August 2005, the air quality guideline was exceeded on 3 of the 41 sample days (7%). This equates to around 9 exceedences if extrapolated to non-sample days during the period when elevated PM_{10} concentrations are most likely to occur (May-August). No guideline or NES exceedences were recorded at the Middle Renwick Road (MRR) air monitoring site.

The maximum measured PM_{10} concentration (24-hour average) during 2005 was 58 µg m^{-3} and was measured on the 27 May at the Redwoodtown site. This value is lower than the previous maximum of 81 µg m^{-3} measured at the Brooklyn Drive monitoring site in Redwoodtown during 2004. Meteorological data measured during the pollution event shows wind speeds consistently less than 2 m s^{-1} throughout the monitoring period with winds predominantly from a westerly direction.

Although no guideline or NES breaches were measured during the summer months, PM_{10} concentrations were elevated on a few occasions and in one instance got as high as 47 µg m^{-3}. High summer concentrations appear to occur when wind speeds are elevated and may be a result of wind blown dusts, although further studies would be required to confirm this.

No standard for an annual average PM_{10} concentration is currently included in the NES. However, a guideline for this time period of 20 µg m^{-3} is specified in the ambient air quality guidelines (MfE, 2002). The annual average PM_{10} concentrations at the Redwoodtown and MRR sites are estimated to be 18 µg m^{-3} and 17 µg m^{-3} respectively for the year 2005.

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1 Introduction

This report presents the results from the 2005 air quality monitoring programme of the Marlborough District Council (MDC). This monitoring focuses on measurements of PM_{10}, the main contaminant of concern in the District. During 2005, concentrations of PM_{10} were measured at two sites in Blenheim, a site in Redwoodtown and a site at 106 Middle Renwick Road (MRR).

Other air quality monitoring carried out during 2005 includes records of visibility made at the Woodbourne Airport. The MDC visibility monitoring programme was downscaled in 2004 from four sites to one (Woodbourne) by the end of 2004. The 2003 and 2004 annual air quality monitoring reports detail results of the visibility monitoring programme. Visibility observations for 2005 can be obtained from MDC but are not included in this report.

Previous air quality monitoring in the Marlborough District includes historical monitoring of PM_{10} at the MRR monitoring site, intermittent monitoring of PM_{10} at the Redwoodtown site, survey PM_{10} monitoring at Picton and Renwick during 2000 and 2002 respectively, visibility surveys and passive sampling for nitrogen oxides and sulphur oxides.

In 2005 it was decided to refocus the monitoring strategy to better reflect the main contaminant of concern. In New Zealand, concentrations of PM_{10} are most significant in terms of health and can cause impacts ranging from minor effects such as nose and throat irritation, to more serious effects such as aggravation of existing respiratory and cardiovascular disease, increased hospital admissions and school absences, and premature death. Fisher et al., (2002) estimates that around 970 premature deaths per year occur as a result of exposure to air pollution in New Zealand.

In September 2004, the Ministry for the Environment released national environmental standards (NES) for ambient air quality (Table 1.1). The NES includes specifications for monitoring PM_{10} in areas such as Blenheim where breaches are likely. As a result, a new continuous PM_{10} monitor (Met One 1020 beta attenuation monitor) was installed at the Redwoodtown monitoring site in January 2006. The high-volume samplers will continue to be used at the MRR air monitoring site and for survey type monitoring in smaller towns in the Marlborough District.

In addition to the NES, MfE provides guidelines for ambient air quality (Table 1.2) and air quality indicator categories to assist in the presentation and management of air quality in New Zealand (Table 1.3). Air quality monitoring data in this report are presented relative to air quality guidelines and these indicator categories. Compliance with the NES is also discussed.

Table 1.1: National Environmental Standards for ambient air quality (MfE, 2004)

Contaminant	NES values		
	Concentration	Averaging Period	Allowable exceedences / year
Carbon monoxide	10 mg m^{-3}	8-hour	1
Particles (PM_{10})	50 µg m^{-3}	24-hour	1
Nitrogen dioxide	200 µg m^{-3}	1-hour	9
Sulphur dioxide [b]	350 µg m^{-3}	1-hour	9
Sulphur dioxide [b]	570 µg m^{-3}	1-hour	0
Ozone	150 µg m^{-3}	1-hour	0

Table.1.2: Ambient air quality guidelines for New Zealand (MfE, 2002)

Contaminant	2002 guideline values	
	Concentration	Averaging Period
Carbon monoxide	30 mg m^{-3} 10 mg m^{-3}	1-hour 8-hour
Particles (PM_{10})	50 µg m^{-3} 20 µg m^{-3}	24-hour Annual
Nitrogen dioxide	200 µg m^{-3} 100 µg m^{-3}	1-hour 24-hour
Sulphur dioxide [b]	350 µg m^{-3} 120 µg m^{-3}	1-hour 24-hour
Ozone	150 µg m^{-3} 100 µg m^{-3}	1-hour 8-hour
Hydrogen sulphide [c]	7 µg m^{-3}	1-hour
Lead [d]	0.2 µg m^{-3} (lead content of PM_{10})	3-monthmoving, calculated monthly
Benzene (year 2002) Benzene (year 2010)	10 µgm^{-3} 3.6 µgm^{-3}	Annual Annual
1,3-Butadiene	2.4 µgm^{-3}	Annual
Formaldehyde	100 µgm^{-3}	30-minutes
Acetaldehyde	30 µgm^{-3}	Annual
Benzo(a)pyrene	0.0003 µgm^{-3}	Annual

Contaminant	2002 guideline values	
	Concentration	**Averaging Period**
Mercury (inorganic) [d]	0.33 µgm^{-3}	Annual
Mercury (organic)	0.13 µgm^{-3}	Annual
Chromium VI [d]	0.0011 µgm^{-3}	Annual
Chromium metal and chromium III	0.11 µgm^{-3}	Annual
Arsenic (organic) [d]	0.0055 µgm^{-3}	Annual
Arsine	0.055 µgm^{-3}	Annual

Notes:
[a] All values apply to the gas measured at standard conditions of temperature (0° C) and pressure (1 atmosphere).
[b] The sulphur dioxide guideline values do not apply to sulphur acid mist.
[c] The hydrogen sulphide value is based on odour nuisance and may be unsuitable for use in geothermal areas.
[d] The guideline values for metals are for inhalation exposure only; they do not include exposure from other routes such as ingestion. These other routes should be considered in assessments where appropriate.

Table 1.3: Environmental Performance Indicator categories for air quality (MfE, 2002)

Category	Value relative to guideline	Comment
Excellent	Less than 10% of the guideline	Of little concern: if maximum values are less than a tenth of the guideline, average values are likely to be much less
Good	Between 10% and 33% of the guideline	Peak measurements in this range are unlikely to affect air quality
Acceptable	Between 33% and 66% of the guideline	A broad category, where maximum values might be of concern in some sensitive locations but generally they are at a level which does not warrant urgent action
Alert	Between 66% and 100% of the guideline	This is a warning level, which can lead to exceedences if trends are not curbed
Action	More than 100% of the guideline	Exceedences of the guideline are a cause for concern and warrant action, particularly if they occur on a regular basis

2 Methodology

Air quality monitoring in the Marlborough District focuses on measurements of PM_{10}, as the main contaminant of concern in Marlborough. The monitoring method used during 2005 was gravimetric high-volume sampling, a method compliant with the MfE (2002) reference method specifications. The sampling frequency was one day in three at the Redwoodtown site. At MRR, a one day in six regime was in place until May, when a one day in three sampling regime was implemented. Samples were collected over a 24-hour period from midnight to midnight. Hourly average meteorological data, including temperature, wind speed and wind direction, were obtained from a NIWA site on the outskirts of Blenheim.

2.1 Air quality monitoring sites

There are two permanent air quality monitoring sites located in Blenheim. Figure 2.1 shows the MRR site (Air015), which provides a historical record of PM_{10} in Blenheim and is located to the north-west of Blenheim and the Redwoodtown sites (Air016 – Bowling club and Air023 Brooklyn Drive), which are located to the south and south east within the main urban area. The location of the meteorological monitoring site used during 2005 is also shown in Figure 2.1. From 2006, meteorological data will be collected at Redwoodtown monitoring site.

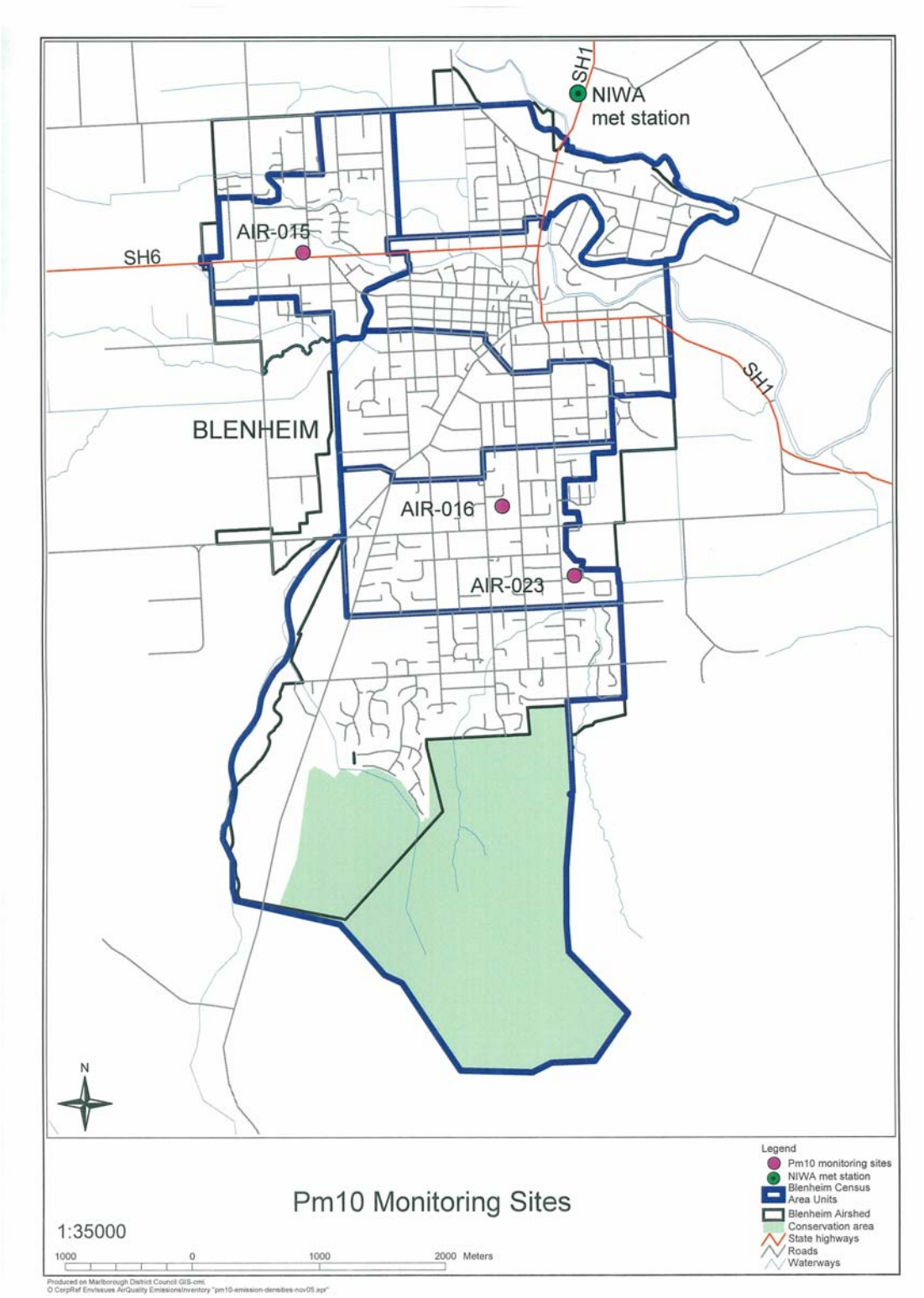

Figure 2.1: Location of air quality and meteorological monitoring sites in Blenheim for 2005.

2.1.1 Middle Renwick Road (MRR) monitoring site

The MRR air quality monitoring site was established in the back yard area of a Council site at 106 Middle Renwick Road. Figure 2.2 shows the surrounding area

and Figure 2.3 the high-volume sampler located at the MRR monitoring site. Site details are shown in Table 2.1.

Figure 2.2: Aerial photo of the MRR air quality monitoring site

Figure 2.3: PM_{10} monitor at the MRR air monitoring site

Table 2.1: Site summary details for the MRR air quality monitoring site

Site name	Blenheim – 106 Middle Renwick Road
Site contact details	Marlborough District Council
Description of site	Empty sealed back yard area
Site category	Residential neighbourhood
Purpose of site and sources	To measure ambient air concentrations of PM_{10} at the historical air quality monitoring site in Blenheim. Main source during the winter months is solid fuel burning for domestic heating.
Proposed duration of monitoring	Ongoing
Contaminants monitored	PM_{10}
Site co-ordinates	E 2589778 N 5964037
Date of site installation	January 2000
Meteorological characteristics of area	Low wind speeds occur regularly during the winter months. Temperature inversions are likely.
Sample frequency	One day in three from May 2005. One day in six prior to this during the summer and one day in three during the winter.
Inlet height	1.5 metres
Averaging period	24-hour

2.1.2 Redwoodtown Monitoring Site - Blenheim

The 2005 monitoring in Redwoodtown was carried out at the now permanent air quality monitoring site established at the Blenheim Bowling Club on Weld Street. Figures 2.4 and 2.5 show the surrounding area and the location of the monitoring site within the Bowling Club grounds. Summary site details are given in Table 2.2.

Figure 2.4: Aerial photo of the Redwoodtown air quality monitoring site

Figure 2.5: PM_{10} monitor at the Redwoodtown air quality monitoring site

Table 2.2: Site summary details for the Redwoodtown air quality monitoring site

Site name	Redwoodtown
Site contact details	Marlborough District Council
Description of site	The site is located at the Blenheim Bowling Club, which is to the south-east of central Blenheim. The surrounding area includes a bowling green, gravel petanque area and paved areas.
Site category	Residential neighbourhood
Purpose of site and sources	To measure worst-case ambient air concentrations of PM_{10} in Blenheim. The main source during the winter months is solid fuel burning for domestic heating. The site is downwind of a large residential area for meteorological conditions conducive to poor air quality.
Proposed duration of monitoring	Ongoing
Contaminants monitored	PM_{10}
Site co-ordinates	X = 2589778, y = 5964037
Date of site installation	January 2002 – intermittent monitoring until 2005
Meteorological characteristics of area	Low wind speeds occur regularly during the winter months. Temperature inversions are likely.
Sample frequency	One day in three
Inlet height	1.5 metres
Averaging period	24-hour

2.2 Quality assurance

The operation of instruments and the changing of filters were carried out by MDC staff. Flow calibrations were carried out every 3-4 months, normally during the morning. Filters were couriered to Watercare Services Ltd who carried out filter weighing in accordance with the New Zealand and Australia standard for high volume sampling. Watercare services hold IANZ accreditation, for HiVol PM_{10} sampling.

Transportation of filters occurs at the end of each month with filters stored and transported in snaplock bags at ambient temperature. Quality assurance methods include the analysis of one field blank per site per month. Field blanks outside of the "acceptable" range (± 8 mg per filter) are noted in a report from Watercare Services. During 2005 two field blanks were outside of the acceptable range with one blank in July recording 9.4 mg less than the original weight and one blank in September recording 10.7 mg more than the original weight. These corresponded with PM_{10} concentrations of -5.8 µg m^{-3} and 6.7 µg m^{-3} respectively. While a high field blank would normally indicate exposure to PM_{10} during field procedures, the presence of a negative result is unusual and may indicate some quality assurance issues, possibly in the weighing of filters.

3 Air quality monitoring in Blenheim

3.1 PM_{10} concentrations at Redwoodtown

During 2005 concentrations of PM_{10} at Redwoodtown exceeded the air quality guideline and NES for PM_{10} (50 µg m^{-3}, 24-hour average) on three occasions, all during the winter months (Figure 3.1). This compares to ten exceedences measured during 2004, although the latter occurred at a different site within the same general area. Because monitoring was not carried out every day, it is likely that a greater number of guideline exceedences than three occurred during 2005. In New Zealand elevated concentrations of PM_{10} are most common during the months May to August inclusive. Statistical extrapolation of the three measured exceedences to these months indicated that around 9 exceedences might have occurred at the Redwoodtown site during 2005.

The maximum measured PM_{10} concentration during 2005 was 58 µg m^{-3} (24-hour average) and compares to a maximum Redwoodtown concentration of 81 µg m^{-3} measured during 2004.

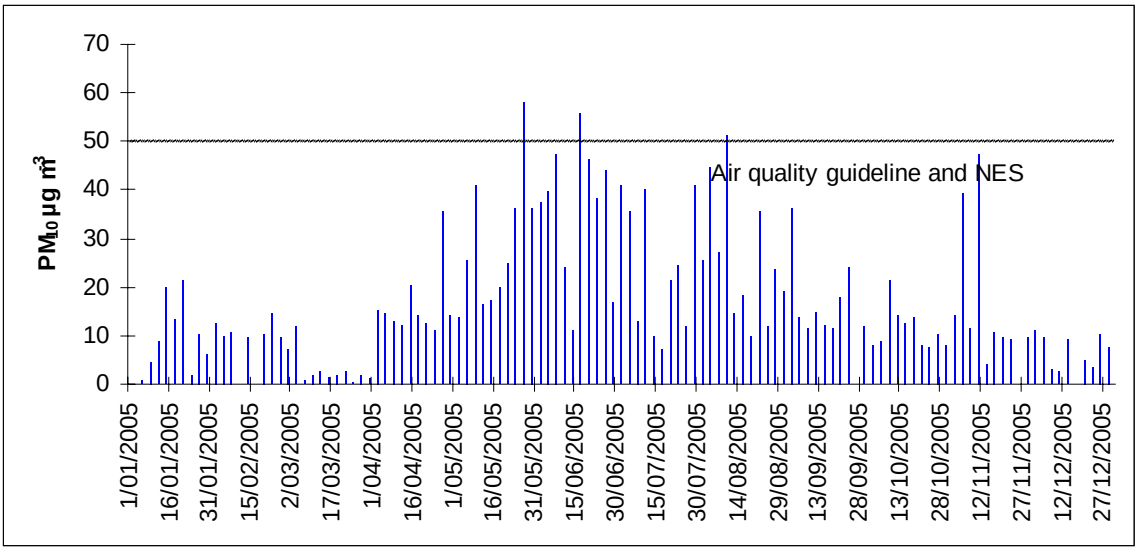

Figure 3.1: Concentrations of PM_{10} measured at Redwoodtown during 2005

Concentrations of PM_{10} measured during 2005 were compared to the MfE air quality indicator categories described previously in Table 1.2. The majority of the PM_{10} concentrations measured were less than 66% of the air quality guideline, within the "acceptable" and "good" air quality categories. Around 17% of data were within the "alert" (66-100% of the guideline) category, with 3% of data above the guideline (Figure 3.2). Seasonal variations in the distribution of PM_{10} concentrations are shown in Figure 3.3.

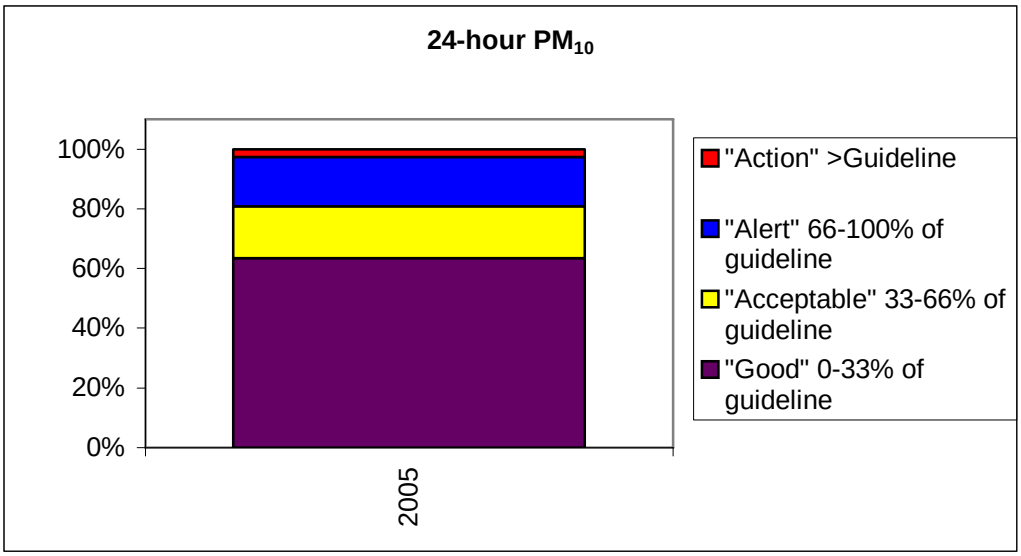

Figure 3.2: Comparison of PM_{10} concentrations measured at Redwoodtown during 2005 to MfE air quality indicator categories

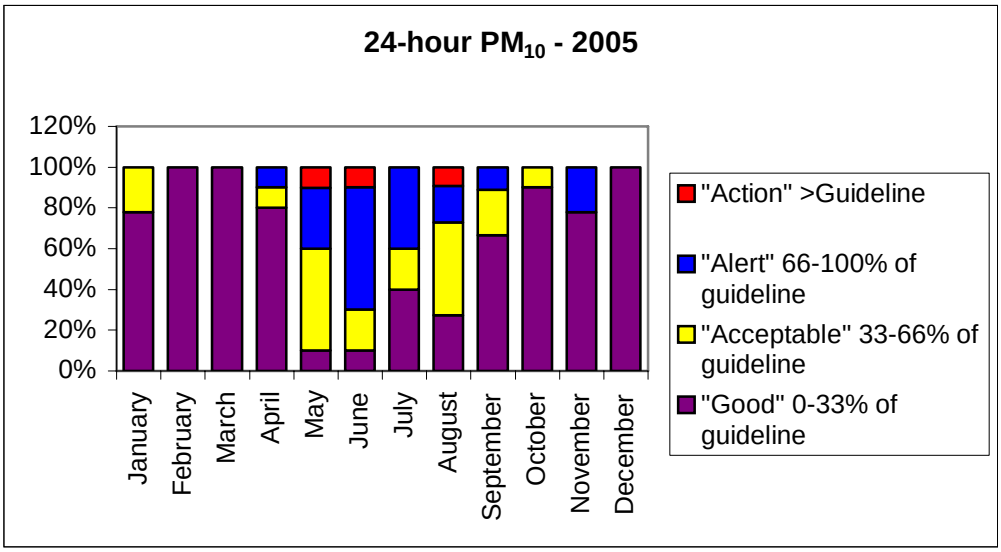

Figure 3.3: Comparison of daily PM_{10} concentrations each month during 2005 to MfE air quality indicator categories

An annual average PM_{10} concentration of 18 µg m^{-3} was estimated for the year 2005. This compares to the Ministry for the Environment's annual average guideline for PM_{10} of 20 µg m^{-3}. The NES does not include an annual average concentration for PM_{10}.

Table 3.1 shows summary statistics for PM_{10} monitoring results from the Redwoodtown site since monitoring commenced in 2002. Note however, that the monitoring period has varied from year to year with 2005 being the first complete year of monitoring. Further details of sample days for 2005 including individual results are given in Appendix A.

Table 3.1: Summary of PM_{10} concentrations measured at Redwoodtown from 2002-2005

	2002	2003	2004	2005
"Good" 0-33% of guideline	18%	22%	46%	63%
"Acceptable" 33-66% of guideline	62%	30%	22%	17%
"Alert" 66-100% of guideline	10%	26%	20%	17%
>Guideline	10%	22%	12%	3%
Percentage of valid data	14%	7%	22%	32%
Annual average (µg m-3)			22	18
Measured exceedences	5	6	10	3
Guideline exceedences (extrapolated based seasonal variations)	16	34	31	9
99.7 %ile concentration (µg m-3)	58	60	79	57
Annual maximum (µg m-3)	58	60	81	58
Number of records	50	27	82	115

An emission inventory carried out for Blenheim for 2005 indicates that domestic home heating is the main source of PM_{10} emissions contributing around 85% of the daily wintertime PM_{10} (Wilton, 2005). Other sources of PM_{10} in the urban areas of Blenheim include outdoor burning (6%), motor vehicles (7%) and industry (2%).

3.2 PM_{10} concentrations at the MRR site

Monitoring for PM_{10} was carried out at the MRR site from January to December 2005. The maximum measured concentration was 49 µg m^{-3} (24-hour average) and was measured on 4 August (figure 3.4). While this does not technically constitute a breach of the NES or air quality guideline, it is within the margin of error of the method used. A slightly lower concentration (45 µg m^{-3}) was measured at the Redwoodtown site on the same day.

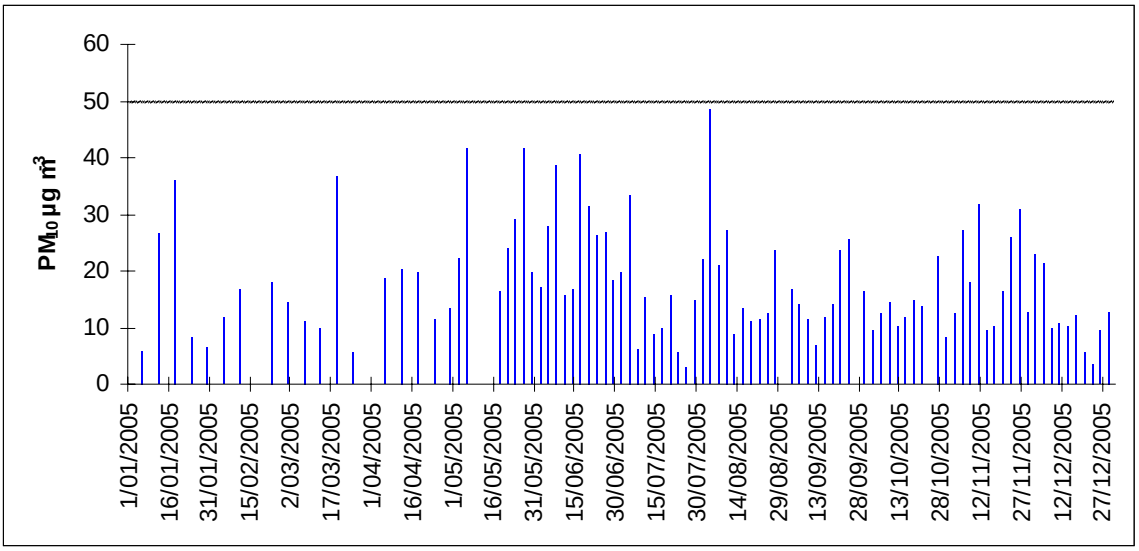

Figure 3.4: Daily winter PM_{10} concentrations measured at the MRR site during 2005.

Figure 3.5 compares concentrations of PM_{10} measured during 2005, relative to the MfE air quality indicator categories, to data for previous years. These data are shown by month to reduce bias in results associated with differences in sampling frequencies across seasons. Results suggest lower PM_{10} concentrations measured at the site during winter 2004.

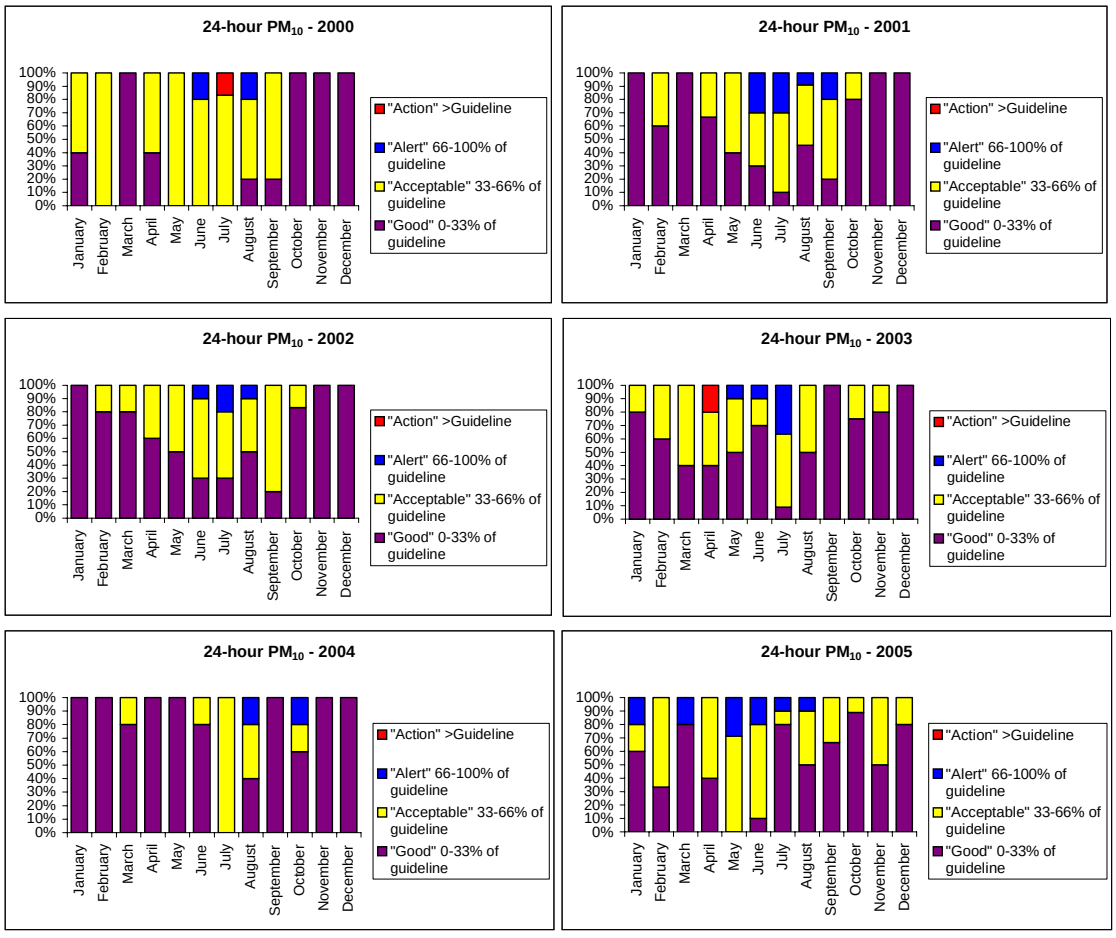

Figure 3.5: Comparison of PM_{10} concentrations measured at the MRR site from 2000 to 2005 to MfE air quality indicator categories

An annual average PM_{10} concentration of 17 µg m^{-3} was estimated for the year 2005. This estimate accounts for the lower sampling frequency from January to April 2005.

Summary statistics for PM_{10} monitoring results are shown in Table 3.2. Further details of sample days and PM_{10} concentrations are given in Appendix A.

Table 3.2: Summary of PM_{10} concentrations measured at the MRR monitoring site during 2005

	2000	2001	2002	2003	2004	2005
"Good" 0-33% of guideline	39%	55%	59%	58%	80%	55%
"Acceptable" 33-66% of guideline	56%	34%	36%	33%	17%	37%
"Alert" 66-100% of guideline	4%	11%	5%	7%	3%	9%
>Guideline	2%	0%	0%	1%	0%	0%
Percentage of valid data	15%	20%	22%	22%	16%	25%
Annual average (µg m-3)	19	18	15	16	13	17
Measured exceedences	1			1		
Guideline exceedences (extrapolated based seasonal variations)	6	0	0	6	0	0
99.7 %ile concentration (µg m-3)	53	46	40	67	46	47
Annual maximum (µg m-3)	56	48	41	75	49	49
Number of records	54	74	81	81	60	93

3.3 PM_{10} and meteorology in Blenheim

Figure 3.6 shows the hourly average wind speed and wind direction on the outskirts of Blenheim on days when the 24-hour average PM_{10} concentration exceeded 50 µg m^{-3}. On all days wind speeds were less than 2 m s^{-1} for the majority of the day. Winds were typically from the westerly direction during the nighttime and morning period, changing to either northerly or north-east during the afternoon. Temperatures ranged from as low as 2 degrees during the nighttime increasing to up to 15 degrees during the daytime.

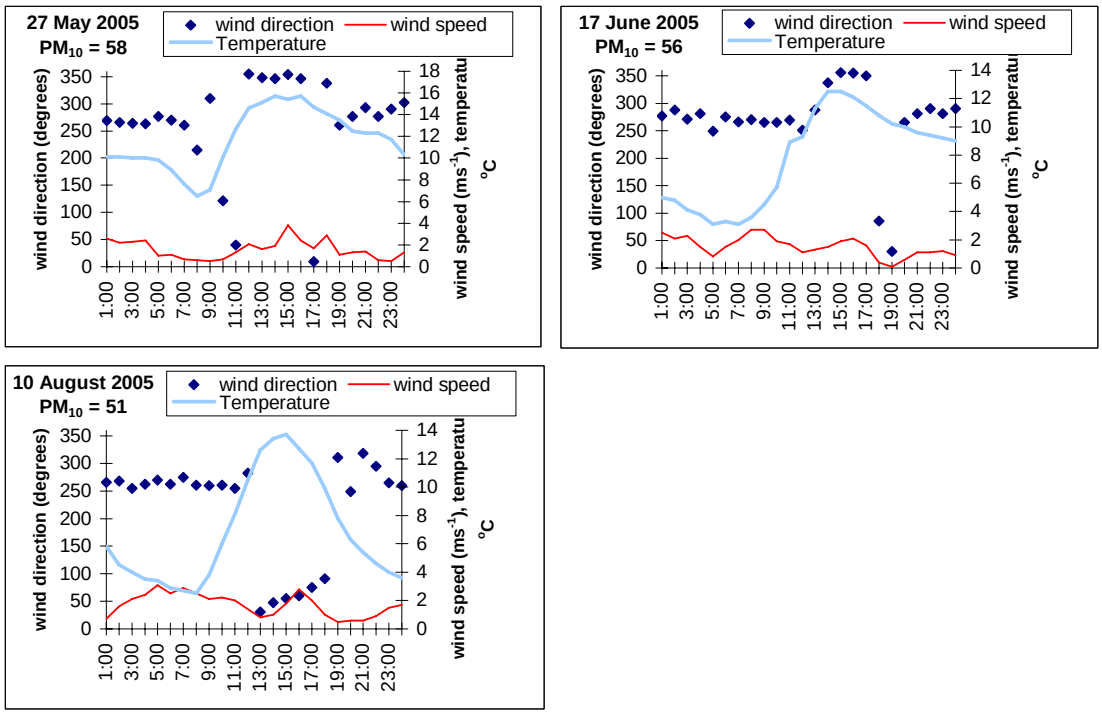

Figure 3.6: Hourly average wind speed, wind direction and temperature on days when PM_{10} concentrations exceeded 50 µg m^{-3} at the Redwoodtown site

3.4 Meteorology in Blenheim from May to August

Figure 3.7 shows the hourly wind direction and wind speed measured at the NIWA meteorological monitoring site on the outskirts of Blenheim for the months May to August 2005.

Meteorological data indicate the predominance of westerly winds during the months of May to August in Blenheim. The wind speed was greater than 2 m s^{-1} for much of the winter, although periods of low wind speeds are apparent during each month. In particular, extended periods of low wind speed occurred during June and to a lesser extent July. May and August both showed extended times when winds were elevated, although days of calm conditions also occurred during these months.

The impact of lower wind speeds during June is reflected in the PM_{10} concentrations, with a greater proportion (70%) of concentrations over 66% of the guideline occurring during this month (see Figure 3.3).

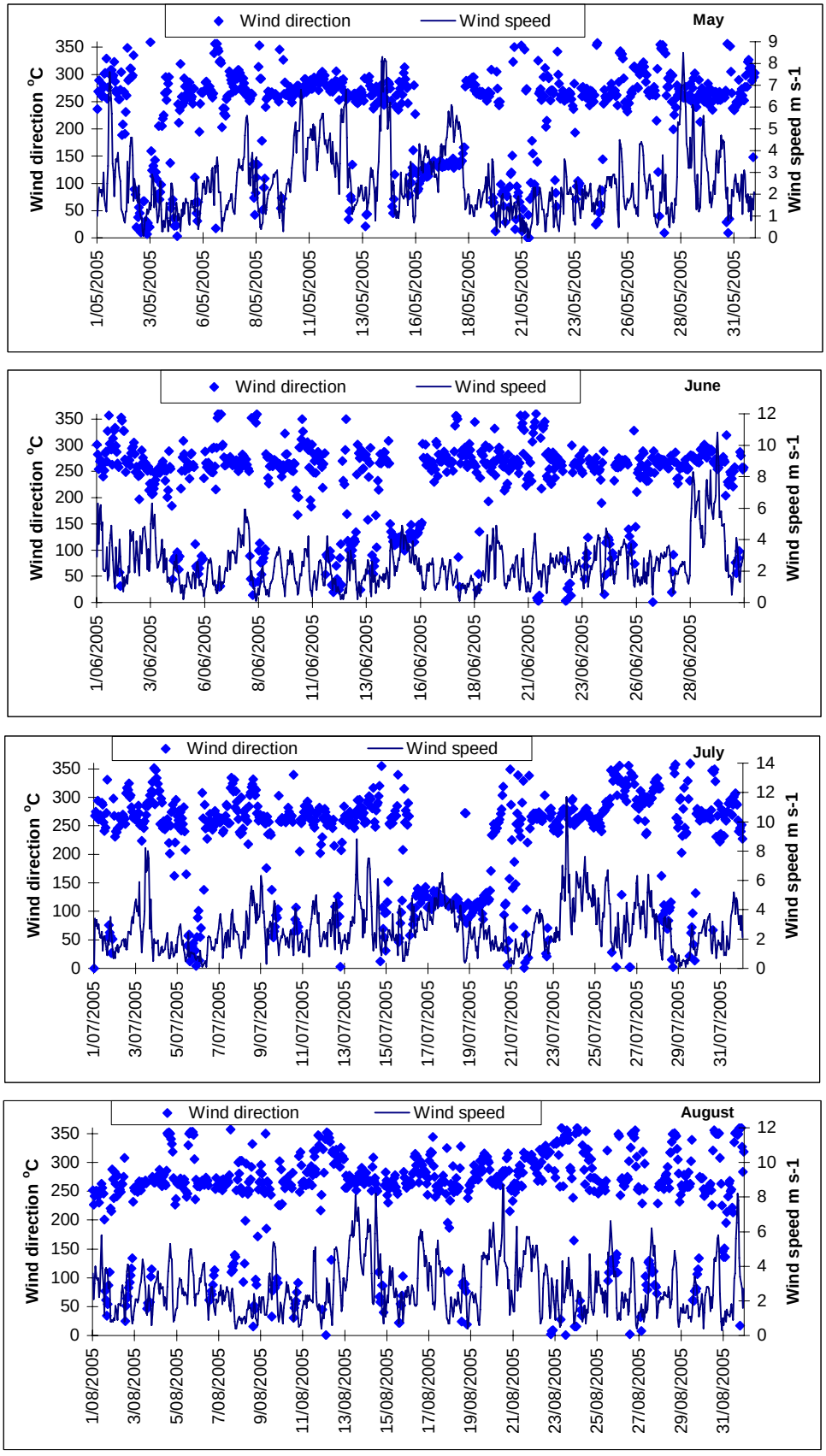

Figure 3.7: Hourly average wind speed and wind direction in Blenheim for May to August 2005

4 Relationship between PM_{10} concentrations measured at the two sites

Figure 4.1 compares PM_{10} concentrations measured at the Redwoodtown and MRR monitoring sites for the year 2005 and the winter period for 2005. The correlation between the two sites is relatively low (winter $r^2 = 0.5$) given their close proximity (<4 kilometres). This may occur because of meteorological variables or because of variations in sources contributing to PM_{10} at the different sites.

Concentrations of PM_{10} at Redwoodtown are typically higher than at the MRR site. The Redwoodtown site has more residential area to the west compared to the Blenheim site so it would be expected that concentrations would be higher at Redwoodtown because of the predominance of westerly conditions.

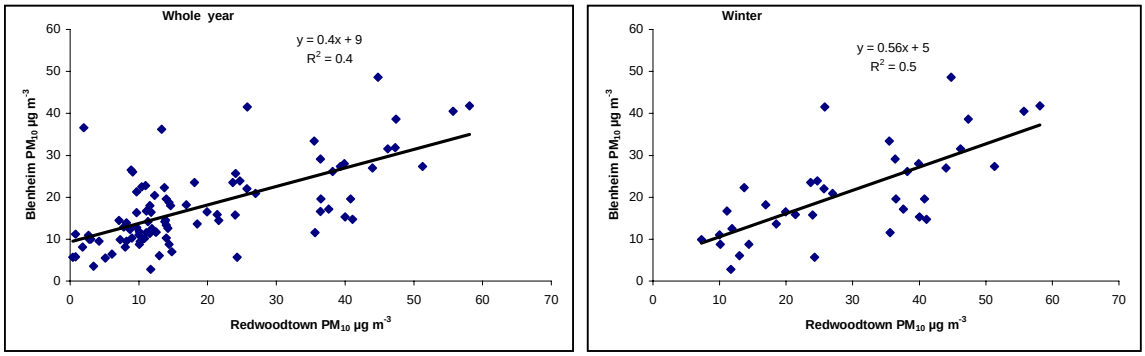

Figure 4.1: Comparison of PM_{10} concentrations measured at Redwoodtown and MRR air monitoring sites during 2005

5 Elevated PM_{10} concentrations during the non-winter months

Although no guideline breaches were recorded during the non-winter months of 2005, on occasion elevated concentrations were recorded at both monitoring sites. In particular concentrations at the Redwoodtown site reached 47 µg m^{-3} (24-hour average) on 11 November and 39 µg m^{-3} on 5 November. Figure 5.1 shows hourly average wind speed, wind direction and temperature on these two days. Unlike the winter exceedence days, the wind speed on these occasions was high, with many hourly averages greater than 4 m s^{-1}. One possible source of the elevated concentrations on these days is wind blown dusts although further studies would be required to confirm this.

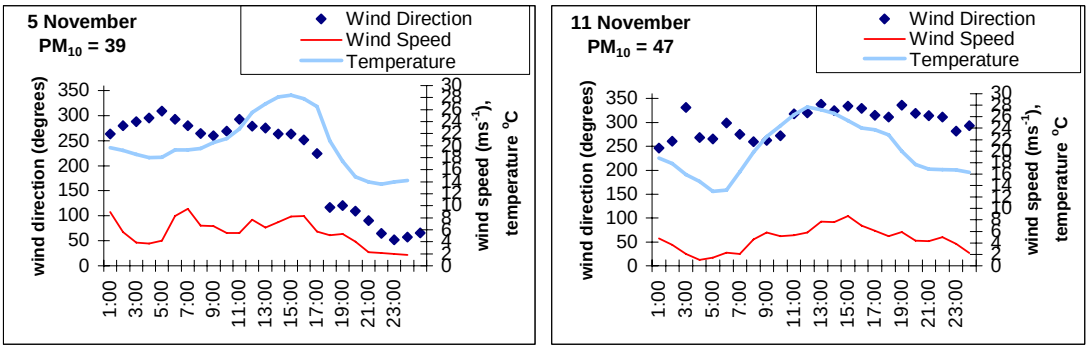

Figure 5.1: Hourly average wind speed, wind direction and temperature on two days during November when elevated PM_{10} concentrations were observed.

6 Summary

Concentrations of PM_{10} were measured at two sites in Blenheim during 2005. The monitoring method was gravimetric sampling using high-volume samplers for the period midnight to midnight. The sampling frequency was one day in three at the Redwoodtown site and one day in six at MRR until May when a one day in three sampling regime was implemented.

Air quality was good for most of the time, with PM_{10} concentrations below 66% of the ambient air quality guideline at least 80% of the time. At Redwoodtown, the air quality guideline and NES for PM_{10} of 50 µg m^{-3} (24-hour average) was exceeded on 3 of the 41 sample days (7%) during winter 2005. This equates to around 9 exceedences if extrapolated to non-sample days for the months May to August. The maximum measured PM_{10} concentration for 2005 was 58 µg m^{-3}. This compares to a previous maximum for 2004 of 81 µg m^{-3} (24-hour average).

During the winter, meteorological conditions conducive to elevated PM_{10} concentrations appear to include a light westerly wind during the evening and nighttime periods, with wind speeds of less than 2 m s^{-1} for the majority of the day. In contrast, some elevated concentrations measured during the summer months occurred on days when wind speeds were elevated. While the source of the elevated summer concentrations is uncertain, wind blown dust is a possibility given the presence of elevated winds on these days.

Annual average PM_{10} concentrations for each site were estimated based on an extrapolation for missing data. For Redwoodtown, an annual average concentration of around 18 µg m^{-3} was estimated for 2005. This compares to an estimated 22 µg m^{-3} for 2004. At the MRR site, the estimated annual average PM_{10} concentrations for 2005 was 17 µg m^{-3}. The estimated annual average PM_{10} concentrations for previous years at this site range from 13 –19 µg m^{-3}. The 2005 annual average concentrations estimates are below the annual average guideline for PM_{10} of 20 µg m^{-3} (MfE, 2002).

Appendix A: PM_{10} concentrations measured in Blenheim during 2005

	Redwoodtown µg m^{-3}	MRR µg m^{-3}		Redwoodtown µg m^{-3}	MRR µg m^{-3}
6/01/2005	1	6	8/07/2005	13	6
9/01/2005	5		11/07/2005	40	15
12/01/2005	9	27	14/07/2005	10	9
15/01/2005	20		17/07/2005	7	10
18/01/2005	13	36	20/07/2005	21	16
21/01/2005	22		23/07/2005	24	6
24/01/2005	2	8	26/07/2005	12	3
27/01/2005	10		29/07/2005	41	15
30/01/2005	6	6	1/08/2005	26	22
2/02/2005	13		4/08/2005	45	49
5/02/2005	10	12	7/08/2005	27	21
8/02/2005	11		10/08/2005	51	27
11/02/2005		17	13/08/2005	14	9
14/02/2005	10		16/08/2005	19	14
20/02/2005	10		19/08/2005	10	11
23/02/2005	15	18	22/08/2005	36	12
26/02/2005	9		25/08/2005	12	13
1/03/2005	7	15	28/08/2005	24	24
4/03/2005	12		31/08/2005	19	
7/03/2005	1	11	3/09/2005	36	17
10/03/2005	2		6/09/2005	14	14
13/03/2005	3	10	9/09/2005	12	11
16/03/2005	2		12/09/2005	15	7
19/03/2005	2	37	15/09/2005	12	12
22/03/2005	3		18/09/2005	11	14
25/03/2005	0	6	21/09/2005	18	24
28/03/2005	2		24/09/2005	24	26
31/03/2005	1		30/09/2005	12	16
3/04/2005	15		3/10/2005	8	10
6/04/2005	14	19	6/10/2005	9	12
9/04/2005	13		9/10/2005	22	15
12/04/2005	12	20	12/10/2005	14	10
15/04/2005	20		15/10/2005	13	12
18/04/2005	14	20	18/10/2005	14	15
21/04/2005	13		21/10/2005	8	14
24/04/2005	11	12	24/10/2005	8	
27/04/2005	35		27/10/2005	10	23
30/04/2005	14	13	30/10/2005	8	8
3/05/2005	14	22	2/11/2005	14	13
6/05/2005	26	42	5/11/2005	39	27
9/05/2005	41		8/11/2005	12	18
12/05/2005	17		11/11/2005	47	32
15/05/2005	17		14/11/2005	4	10
18/05/2005	20	17	17/11/2005	11	10
21/05/2005	25	24	20/11/2005	10	16
24/05/2005	36	29	23/11/2005	9	26
27/05/2005	58	42	26/11/2005		31
30/05/2005	37	20	29/11/2005	10	13

2/06/2005	38	17	2/12/2005	11	23
5/06/2005	40	28	5/12/2005	10	21
8/06/2005	47	39	8/12/2005	3	10
11/06/2005	24	16	11/12/2005	3	11
14/06/2005	11	17	14/12/2005	9	10
17/06/2005	56	41	17/12/2005		12
20/06/2005	46	32	20/12/2005	5	6
23/06/2005	38	26	23/12/2005	3	4
26/06/2005	44	27	26/12/2005	10	9
29/06/2005	17	18	29/12/2005	8	13
2/07/2005	41	20			
5/07/2005	36	33			

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