Annual Air Quality Monitoring Report – Blenheim 2010

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MARLBOROUGH DISTRICT COUNCIL

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Executive Summary

Particles in the air less than 10 microns in diameter (PM_{10}) are the main air contaminant of concern in Marlborough and most other urban areas of New Zealand. In 2010, monitoring for PM_{10} took place at the main air quality monitoring site in Blenheim, which is situated in Redwoodtown, and at the historical PM_{10} monitoring site in Middle Renwick Road (MRR). The methods of monitoring were a Met One Beta Attenuation Monitor (BAM) at the Redwoodtown site and a gravimetric high volume sampler at Middle Renwick Road.

This report presents the results of this air quality monitoring for 2010 and compares PM_{10} concentrations to the National Environmental Standard for Air Quality (NES) of 50 µg m^{-3} (24-hour average) and to the Ministry for the Environment's air quality guidelines and indicator categories. Comparisons are made with historical data to determine the likelihood of trends in concentrations.

The NES for PM_{10} was reviewed in 2011. The outcome of the review was to retain the existing standard, which allows one exceedence of 50 µg m^{-3} (24-hour average) per year, but to extend the required compliance date from 2013 to September 2016 in areas where there are 10 or fewer breaches per year. Areas with more than 10 breaches per year have until September 2020 to comply but must reach an interim target of no more than three exceedences by September 2016. Restrictions on the granting of consents for PM_{10} discharges in non-complying airsheds have also been revised and compliance with a straight line path is no longer a requirement.

In 2010 concentrations of PM_{10} exceeded 50 µg m^{-3} (24-hour average) on two occasions at the Redwoodtown air quality monitoring site, resulting in one breach of the NES. The measured concentrations were 67 µg m^{-3} and 64 µg m^{-3}, both of which are higher than previous (post 2005) maximum and second highest concentrations. The 2010 concentrations of PM_{10} in Blenheim would have been in breach of the straight line path for compliance with the NES had this still been a requirement of the NES.

An evaluation of trends in PM_{10} concentrations in Blenheim suggests concentrations appear to have decreased since 2005, although clearly further reductions are required to meet the NES. The higher maximum and second highest concentrations for 2010 suggest that meteorological conditions more conducive to elevated concentrations than experienced since 2005 may have occurred in 2010. This sets a new bar from which reductions may need to be assessed.

The annual average PM_{10} concentration for the Bowling Club site was 14 µg m^{-3} and is less than the annual average guideline for PM_{10} of 20 µg m^{-3}.

The maximum PM_{10} concentration measured at the MRR site was 32 µg m^{-3} for 2010. Concentrations of PM_{10} in excess of the NES are not common at this site. Previously exceedences of 50 µg m^{-3} have occurred in 2000, 2003 and 2008. The annual average PM_{10} concentrations estimated for MRR for 2010 was 12 µg m^{-3}.

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1. Introduction

The main air contaminant of concern in Marlborough is particles in the air less than 10 microns in diameter, known as PM_{10}. Historically, concentrations of PM_{10} have exceeded national environmental standards (NES) in Blenheim during the winter months.

In 2010 concentrations of PM_{10} were measured at two air quality monitoring sites in Marlborough. These were the air quality monitoring site at the Redwoodtown Bowling Club and a site at 106 Middle Renwick Road (MRR).

In Marlborough, previous air quality monitoring includes historical monitoring of PM_{10} at the MRR monitoring site, intermittent monitoring of PM_{10} at the Redwoodtown Bowling Club site, survey PM_{10} monitoring in Renwick during 2000 and 2002, monitoring for PM_{10} in Picton during 2008 and 2009, visibility surveys and passive sampling for nitrogen oxides and sulphur oxides. From 2007 to early 2008, PM_{10} concentrations were measured at the Croquet Club in Redwoodtown in addition to the main monitoring site at the Bowling Club. A site on Brooklyn Street in Redwoodtown was temporarily used to measure PM_{10} concentrations during 2004.

In 2004 the Ministry for the Environment introduced National Environmental Standards (NES) for ambient air quality (MfE, 2004). Table 1.1 shows the contaminant, the concentration, averaging period and allowable exceedances as required by the NES. In 2011 the NES for PM_{10} were reviewed. The Ministry retained the target of 50 µg m^{-3} with one allowable exceedence per year but revised the compliance date from 2013 to 2016 for areas with 10 or fewer breaches per year and changed rules relating to the granting of consents for industrial PM_{10} discharges in non-complying airsheds. For areas with more than 10 exceedences of 50 µg m^{-3} per year the compliance date was extended to 2020. However, an interim target of three exceedences by 2016 was also imposed.

Air quality monitoring data in other urban areas of New Zealand indicates that it would seem unlikely that concentrations of NES contaminants other than PM_{10} would be in breach in Blenheim. Concentrations of other contaminants even in large urban areas are typically within the NES and guideline concentrations. Because emissions of other contaminants in Blenheim are far lower than large urban areas such as Christchurch, it would seem unlikely that concentrations of other key urban air pollutants would be in breach of the NES or air quality guidelines. The exception to this may be benzo(a)pyrene concentrations, which appear to occur well in excess of guideline concentrations in Christchurch. The NES includes specifications for monitoring PM_{10} in areas such as Blenheim where breaches are likely.

The Ministry for the Environment also provides guidelines for ambient air quality (MfE, 2002). Table 1.2 shows the ambient air quality guidelines and Table 1.3 details the air quality indicator categories to assist in the presentation and management of air quality in New Zealand. Air quality monitoring data in this report are presented relative to air quality guidelines and these indicator categories. These categories provide a useful perspective on the overall air quality and provide a valuable tool for evaluating trends in concentrations over time.

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

Contaminant	NES values		
	Concentration	Averaging Period	Allowable exceedences per 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[a]	Averaging Period
Carbon monoxide	30 mg m^{-3} 10 mg m^{-3}	1-hour 8-hour
Particles (PM_{10})	50 µg m^{-3} 20 ¤g 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-month moving, calculated monthly
Benzene (year 2002) Benzene (year 2010)	10 µg m^{-3} 3.6 µg m^{-3}	Annual Annual
1,3-Butadiene	2.4 µg m^{-3}	Annual
Formaldehyde	100 µg m^{-3}	30-minutes
Acetaldehyde	30 µg m^{-3}	Annual
Benzo(a)pyrene	0.0003 µg m^{-3}	Annual
Mercury (inorganic) d Mercury (organic)	0.33 µg m^{-3} 0.13 µg m^{-3}	Annual Annual
Chromium VI d Chromium metal and chromium III	0.0011 µg m^{-3} 0.11 µg m^{-3}	Annual Annual
Arsenic (inorganic) d Arsine	0.0055 µg m^{-3} 0.055 µg m^{-3}	Annual 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

In 2005 an emission inventory was undertaken in Blenheim to determine the sources of PM_{10} and other contaminant emissions (Wilton, 2005b). The results of the survey indicated that domestic home heating was the main source of PM_{10} emissions, contributing to around 85% of the daily wintertime PM_{10} (Wilton, 2005b). Motor vehicles contributed to 7% of PM_{10} emissions, outdoor burning contributed to 6% and industry contributed to 2% of total wintertime emissions.

2. Methodology

During 2010, two air quality monitoring methods were used to measure PM_{10} concentrations in Marlborough. At the Redwoodtown Bowling Club site in Blenheim, a Met One beta attenuation monitor (BAM) was used. This method is NES compliant and provides continuous hourly average PM_{10} concentrations.

A gravimetric high-volume sampler, a method compliant with the MfE (2002) reference method specifications, was used at the MMR site. High-volume sampling was carried out on a one day in three sampling regime with samples collected over a 24-hour period from midnight to midnight.

Meteorological data, including wind speed, wind direction were obtained from a NIWA site on the outskirts of Blenheim. Ambient temperature data was collected at the Bowling Club site in Redwoodtown.

2.1. Air quality monitoring sites

There are two permanent air quality monitoring sites in Blenheim, the Redwoodtown Bowling Club site and the Middle Renwick Road (MRR) site. Figure 2.1 shows the MRR site, which provides a historical record of PM_{10} in Blenheim and is located to the north-west of Blenheim, the Redwoodtown Bowling Club site which has been operational since 2002, and the metrological monitoring site.

In 2007 a site at the Croquet Club was established for the purposes of evaluating the relationship between Brooklyn Street area PM_{10} and PM_{10} concentrations measured at the Bowling Club. This was considered important because PM_{10} concentrations of the magnitude measured during 2004 at Brooklyn Street had not been measured at the Bowling Club and because the reductions required in PM_{10} concentrations in Blenheim had been dependent on the Brooklyn Street results. The results from work undertaken in 2007 and reported in the '2007 Air Quality Monitoring Report' (Wilton, 2008) indicated that the Brooklyn Street site was likely to be affected by localised sources of PM_{10} and should not be used for air quality management purposes. Details of the Croquet Club site are outlined in '2008 Air Quality Monitoring Report' (Wilton and Baynes, 2009).

Figure 2.1: Location of air quality sites and metrological site in Blenheim for 2009

2.1.1. Middle Renwick Road (MRR) monitoring site

The MRR air quality monitoring site was established in 2000 at the back yard area of a Council site at 106 Middle Renwick Road. An aerial picture of the MMR site and its surrounds are shown in Figure 2.2, and Figure 2.3 shows the high volume sampler located at the MRR monitoring site. Table 2.1 provides site details for the site.

Figure 2.2: Aerial photo of the MRR air quality monitoring site (note: red dot depicts monitoring site). The site has been redeveloped since this photo was taken (as shown below)

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	Open grassed 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 1678180 N 5404326 (NZTM)
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 – Bowling Club Monitoring Site

In 2010 air quality monitoring took place at the main air quality monitoring site at the Blenheim Bowling Club on Weld Street in Redwoodtown. 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 – Bowling Club air quality monitoring site (note: red dot depicts monitoring site).

Figure 2.5: PM_{10} monitor at the Redwoodtown – Bowling Club air quality monitoring site.

Table 2.2: Site summary details for the Redwoodtown – Bowling Club air quality monitoring site.

Site name	Redwoodtown – Bowling Club
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	E 1679764, N 5402324 (NZTM)
Date of site installation	Monitoring from 2000-2003. Permanent site since 2005.
Meteorological characteristics of area	Low wind speeds occur regularly during the winter months. Temperature inversions are likely.
Sample frequency	Hourly
Inlet height	1.5 metres
Averaging period	24-hour

2.2. Quality assurance

Marlborough District Council staff operated the high volume PM_{10} samplers, including filter changing.

Flow calibrations were carried out every month, normally during the morning. Filters were couriered to Environmental Laboratories Services (ELS) Ltd, who undertook filter weighing in accordance with the New Zealand and Australia standard for high volume sampling. ELS Ltd hold IANZ accreditation, for high volume 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 ELS Ltd.

Operation of the BAM is also carried out by MDC staff. Hourly data is recorded by the instrument and logged by an iQuest iRIS 320 datalogger. Results are telemeted hourly to MDC and stored in the hydrotel database. Maintenance and calibration of the monitor are carried out in accordance with the operating manual.

3. Air quality monitoring in Blenheim

3.1. PM_{10} concentrations at the MRR site

Figure 3.1 shows the daily average PM_{10} concentrations measured at the MRR site in 2010. The maximum and second highest PM_{10} concentrations recorded by the high volume sampler were both 32 µg m^{-3} (24 hour average). Concentrations of PM_{10} have exceeded 50 µg m^{-3} at this site on only a few years. In 2008 the maximum concentration recorded was 51 µg m^{-3}. The only other years that concentrations above 50 µg m^{-3} have been recorded at this site are 2000 (56 µg m^{-3}) and 2003 (75 µg m^{-3}).

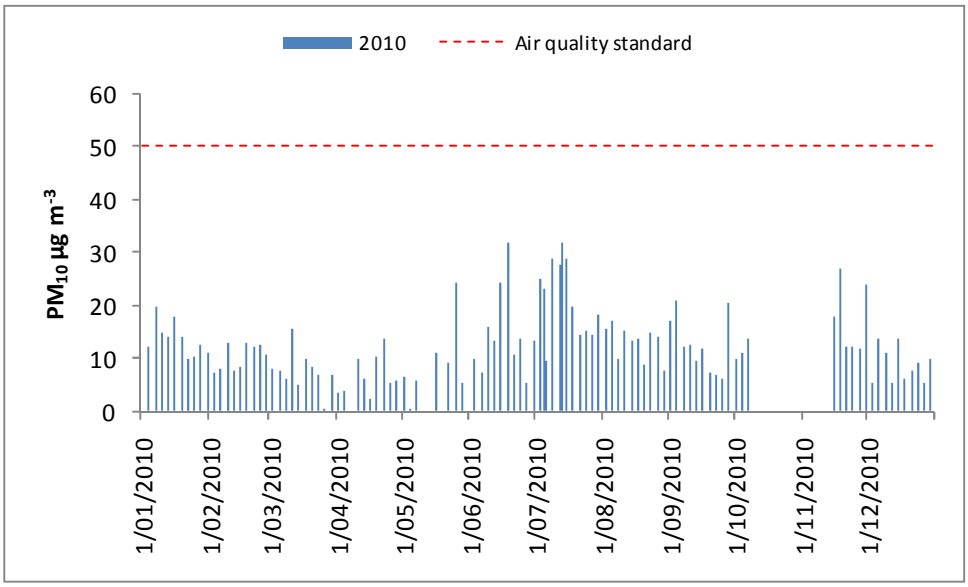

Figure 3.1: Daily winter PM_{10} concentrations measured at the MRR site during 2010.

Figure 3.2 shows changes in PM_{10} concentrations relative to MfE air quality indicator categories (shown in Table 1.3) at the MRR site from 2000 to 2010. All of the PM_{10} concentrations measured in 2010 were less than 66% of the air quality guideline, that is, within the "acceptable" and "good" air quality categories. Monthly variations in PM_{10} concentrations compared to air quality indicators for 2010 are shown in Figure 3.3. No data are reported for May, October and November because there was not enough monitoring conducted during these months to report a monthly average concentration. Figure 3.4 shows the number of days when the NES was exceeded, the maximum concentration and the second highest concentration for 2010 and for previous years.

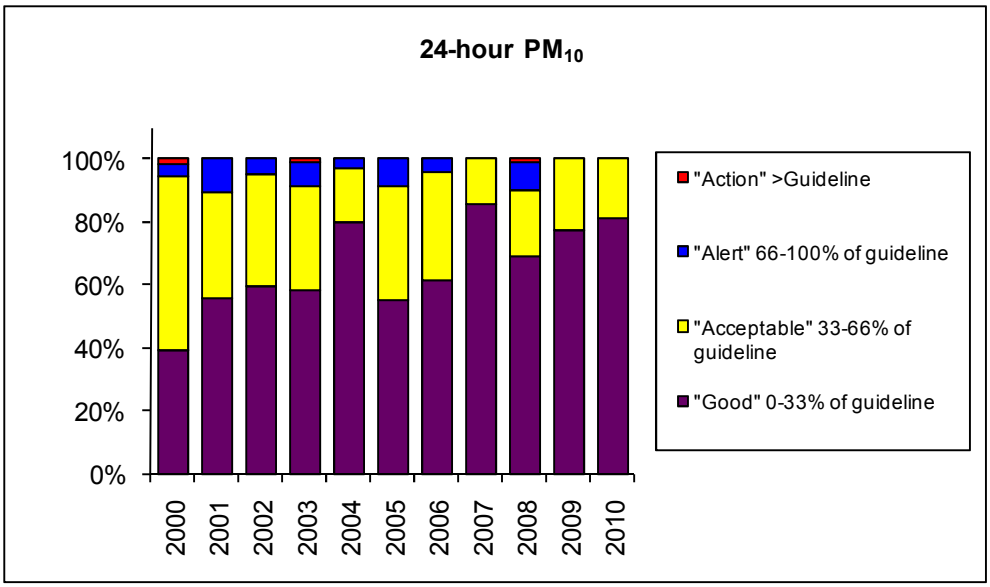

Figure 3.2: Comparison of PM_{10} concentrations measured at the MRR site from 2000 to 2010 to air quality indicator categories.

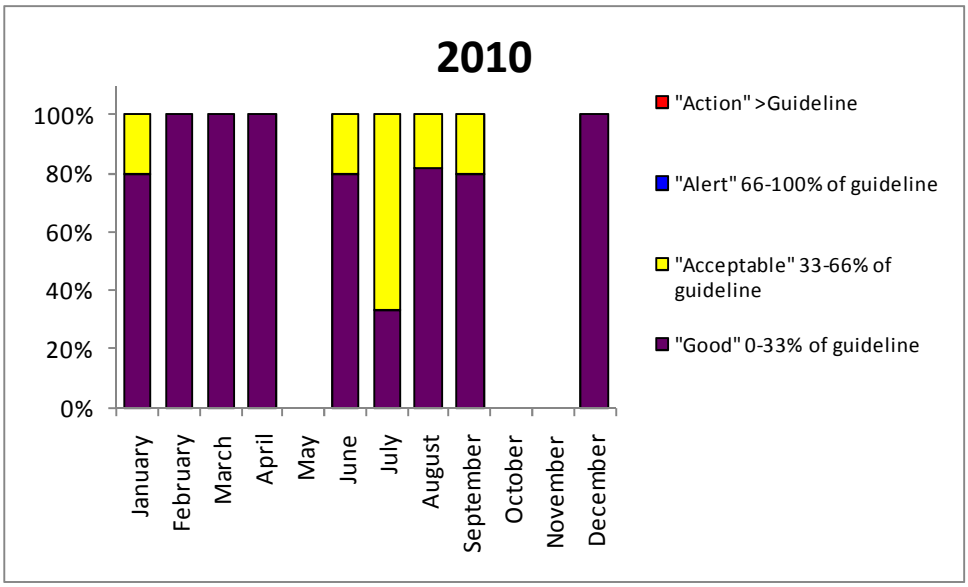

Figure 3.3: Comparison of daily PM_{10} concentrations each month during 2010 to air quality indicator categories at the MRR site.

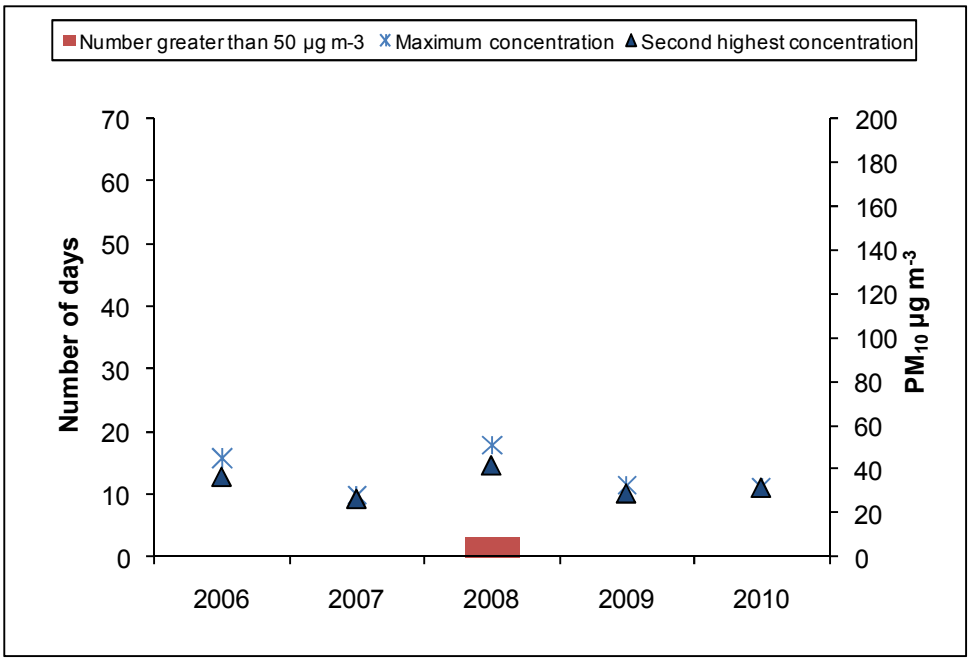

Figure 3.4: Number of days when the NES was exceeded, the maximum concentration and the second highest concentration from 2006 to 2010 at the MRR site.

The estimated annual average PM_{10} concentration for the MRR site for 2010 is 12 µg m^{-3}. This is similar to other years but lower than the annual average PM_{10} concentration for 2008 of 16 µg m^{-3} Some higher annual average concentrations were also estimated for 2000 and 2001 (Table 3.1). The Ministry for the Environments annual average PM_{10} guideline is 20 µg m^{-3}. There is currently no NES for annual average PM_{10} concentrations.

Table 3.1: Summary of PM_{10} concentrations measured at the MRR monitoring site from 2000 to 2010

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
"Good" 0-33% of guideline	39%	55%	59%	58%	80%	55%	61%	85%	69%	77%	81%
"Acceptable" 33-66% of guideline	56%	34%	36%	33%	17%	37%	35%	15%	21%	23%	19%
"Alert" 66-100% of guideline	4%	11%	5%	7%	3%	9%	4%	0%	8%	0%	0%
“Action” >Guideline	2%	0%	0%	1%	0%	0%	0%	0%	1%	0%	0%
Percentage of valid data	15%	20%	22%	22%	16%	25%	33%	32%	31%	32%	29%
Annual average (µg m^{-3})	18	16	15	16	13	17	14	11	16	12	12
Measured PM_{10} concentrations above 50 µg m^{-3}	1	-	-	1	-	-	0	0	1	0	0
Extrapolated PM_{10} concentrations above 50 µg m^{-3}									3	0	0
99.7 %ile concentration (µg m^{-3})	53	46	40	67	46	47	42	27	48	31	32
Annual maximum (µg m^{-3})	56	48	41	75	49	49	45	28	51	32	32
Number of records	54	74	81	81	60	93	121	116	113	118	106

3.2. PM_{10} concentrations at Redwoodtown – Bowling Club

In 2010 there were two exceedence of 50 µg m^{-3} at Redwoodtown air quality monitoring site (Figure 3.5). These occurred on 15 and 17 June when concentrations of 64 µg m^{-3} and 67 µg m^{-3} were measured. As the NES allows one exceedence of 50 µg m^{-3} per year, only one breach of the NES occurred in Blenheim during 2010. The Blenheim airshed was compliant with the NES during 2009 but prior to this it had been non-compliant since the NES was introduced.

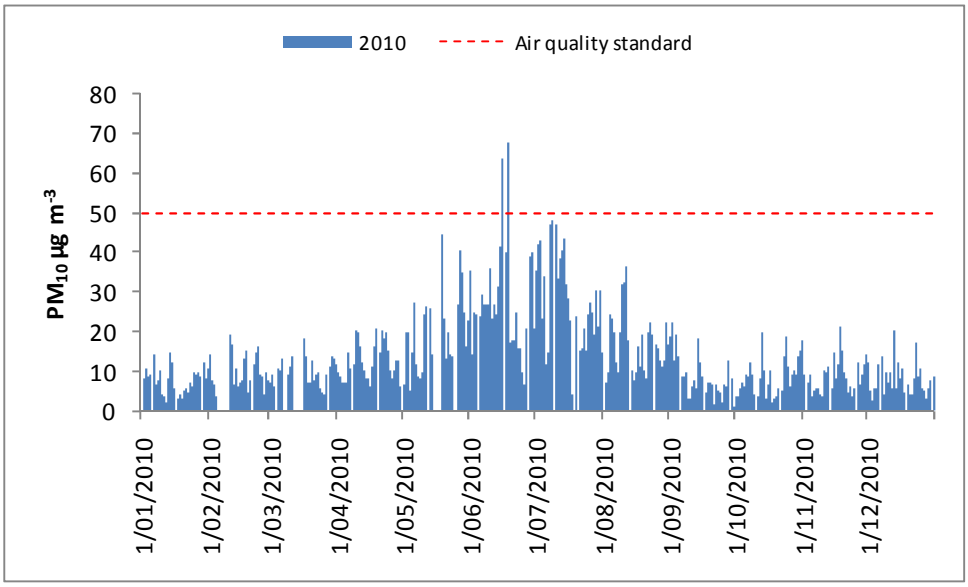

Figure 3.5: 24-hour average PM_{10} concentrations measured at the Redwoodtown – Bowling Club site during 2010.

Figure 3.6 compares daily PM_{10} concentrations measured from 2006 to 2010 to the MfE air quality indicator categories (shown in Table 1.3). 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. The proportion of PM_{10} concentrations in the alert or action categories for 2010 was 7% compared with 11% and 9% in 2008 and 2009 and 7% in 2007.

Monthly variations in the distribution of PM_{10} concentrations for 2010 are shown in Figure 3.7. Figure 3.8 shows the number of days when the NES was exceeded, the maximum concentration and the second highest concentration for 2010 and for previous years. The maximum and second highest concentrations suggest no significant changes in PM_{10} concentrations since 2006. However, this comparison does not take into account year to year variations in the impact of meteorology. This issue is examined further in section 4 of this report.

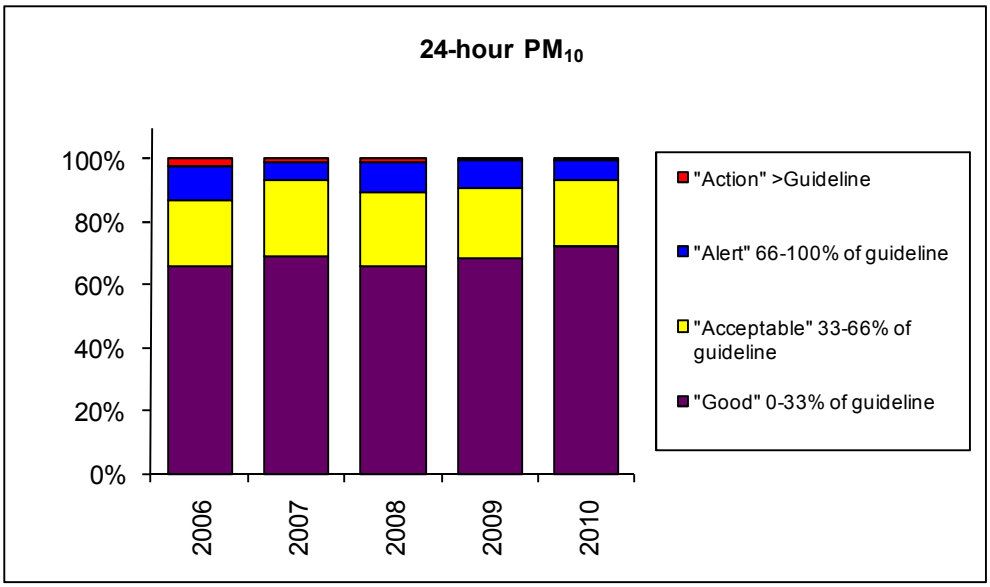

Figure 3.6: Comparison of PM_{10} concentrations measured at Redwoodtown - Bowling Club site during 2006 to 2010 to air quality indicator categories.

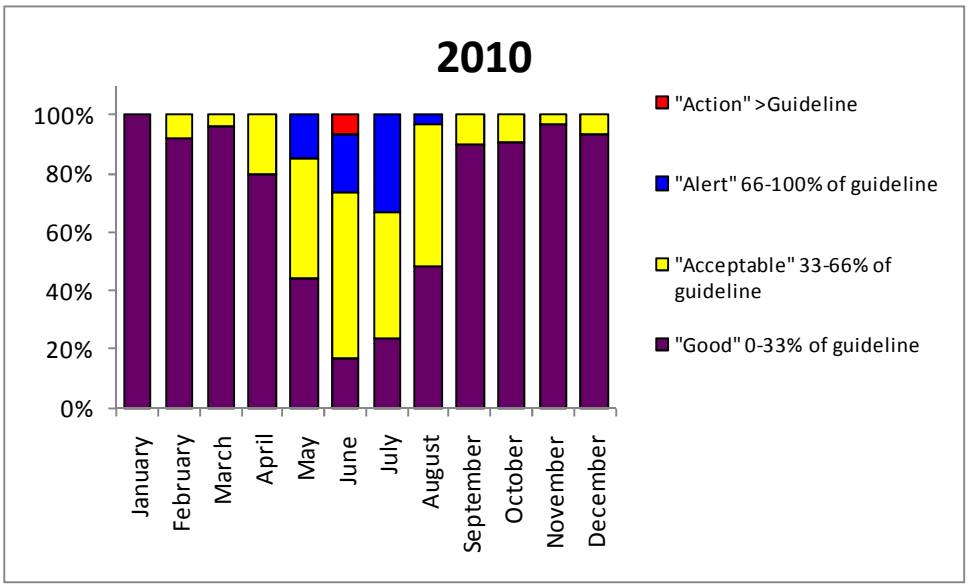

Figure 3.7: Comparison of daily PM_{10} concentrations each month during 2010 to air quality indicator categories.

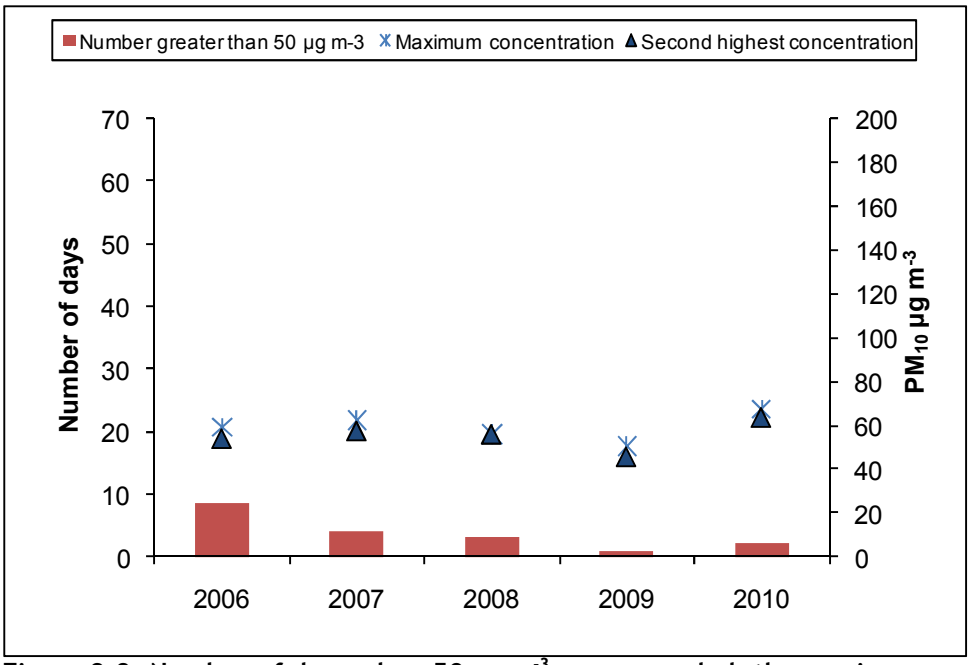

Figure 3.8: Number of days when 50 µg m^{-3} was exceeded, the maximum concentration and the second highest concentration from 2006 to 2010.

In 2010, the annual average PM_{10} concentration was 14 µg m^{-3}. The Ministry for the Environment specifies an annual average guideline for PM_{10} of 20 µg m^{-3}. The NES does not currently include an annual average concentration for PM_{10}.

Summary statistics for PM_{10} monitoring results from the Redwoodtown Bowling Club site since monitoring commenced in 2002 are provided in Table 3.2. It is noted that the monitoring period has varied from year to year. From 2005 monitoring was conducted from January to December and in 2004 air quality monitoring took place at a site in Brooklyn Street.

Table 3.2: Summary of PM_{10} concentrations measured at Redwoodtown – Bowling Club site from 2002-2010

	2002	2003	2004	2005	2006	2007	2008	2009	2010
Monitoring method	Hi-vol	Hi-vol	Hi-vol	Hi-vol	BAM	BAM	BAM	BAM	BAM
"Good" 0-33% of guideline	18%	22%	46%	63%	66%	69%	66%	68%	72%
"Acceptable" 33-66% of guideline	62%	30%	22%	17%	21%	24%	23%	22%	21%
"Alert" 66-100% of guideline	10%	26%	20%	17%	10%	6%	10%	9%	6%
“Action” >Guideline	10%	22%	12%	3%	3%	1%	1%	0%	1%
Percentage of valid data	14%	7%	22%	32%	68%	99%	99%	98%	96%
Annual average (µg m^{-3})	-	-	22	18	17	15	17	15	14
Measured PM_{10} concentrations above 50 µg m^{-3}	5	6	10	3	6	5	3	1	2
Extrapolated PM_{10} concentrations above 50 µg m^{-3}	16	34	31	9	10	4	3	1	2
Second highest PM_{10} concentration (µg m^{-3})					54	58	56	46	64
Annual maximum (µg m^{-3})	58	60	81	58	59	62	56	46	67
Number of records	50	27	82	115	247	360	363	357	352

3.3. PM_{10} and meteorology in Blenheim

Figure 3.9 shows variations in meteorological conditions and hourly average PM_{10} concentrations on days when the 24-hour average exceeded 50 µg m^{-3} at the Redwoodtown air quality monitoring site.

The daily variations in PM_{10} concentrations on both days are typical of a high pollution event in Blenheim. These often occur when wind speeds are low and the wind is from a westerly direction. On the 17 June, when the highest 24-hour average PM_{10} was recorded, concentrations were low for most of the day but increased around 4pm to peak at around 300 µg m^{-3} at 9pm. On the 15 June concentrations were elevated from the previous evening until around 4am, peaked again around 9am and then increased again from 5pm. Concentrations were lower than on the 17 July with hourly peaks around 150 µg m^{-3} compared with around 300 µg m^{-3}.

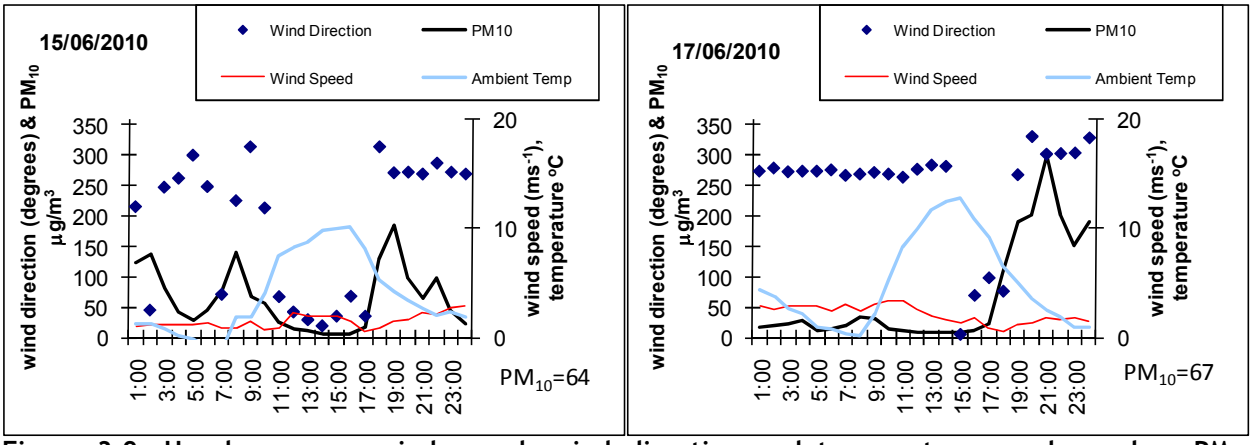

Figure 3.9: Hourly average wind speed, wind direction and temperature on days when PM_{10} concentrations exceeded 50 µg m^{-3} (24 hour average) at Blenheim.

4. Trends in PM_{10} concentrations in Blenheim

Prior to the 2011 review, the NES required that Councils develop a straight line path (SLiP) to assist with achieving compliance with the NES by 2013. The reductions required in PM_{10} concentrations to meet the NES and the starting point of the SLiP had been estimated based on monitoring data (Wilton et. al., 2008).

The recommended approach for developing the SLiP where there are sufficient monitoring data is to exclude the maximum PM_{10} concentration measured each year and to then evaluate the reduction based on the highest remaining concentration. The maximum concentration is excluded because the NES allows for one breach of 50 µg m^{-3} (24-hour average) per year.

The starting point for the SLiP for Blenheim was re-evaluated in 2007 (Wilton, 2007) and was set at 66 µg m^{-3}. This was based on the highest measured concentration for 2007 adjusted for the difference between the BAM and gravimetric sampling methods. The more conservative approach of using the highest measured concentration was used because at the time only a few years of monitoring data for the Redwoodtown site were available.

As a result of the NES review, the SLiP is no longer required. However, progress towards achieving compliance with the NES by 2016 requires assessment and to this end, the plotting of the second highest PM_{10} concentration per year is useful.

Figure 5.1 shows that the second highest PM_{10} concentration measured in Blenheim during 2010 was above the SLiP and indicates that further progress towards achieving compliance with the NES is required.

Figure 4.1: Comparison of PM10 concentrations measured from 2007 to 2010 to the straight line path to compliance with the NES

To further assess the likelihood of changes in PM_{10} concentrations since 2005, data for 2010 were integrated into a tool developed as a part of an evaluation into trends in PM_{10} concentrations in Blenheim (Wilton et. al., in 2009). The objective of that work was to identify meteorological conditions giving rise to concentrations of PM_{10} in excess of the NES and to provide a tool for comparing year to year PM_{10} concentrations whilst minimising the impact of variability in meteorological conditions. Figure 4.2 shows that when PM_{10} data are adjusted for meteorological conditions median PM_{10} concentrations support the probability of a reduction in PM_{10} concentrations

The higher maximum and second highest concentrations recorded for 2010, combined with these indications that emissions may be reducing suggest that meteorological conditions more conducive to elevated concentrations (than experienced since 2005) may have occurred in 2010.

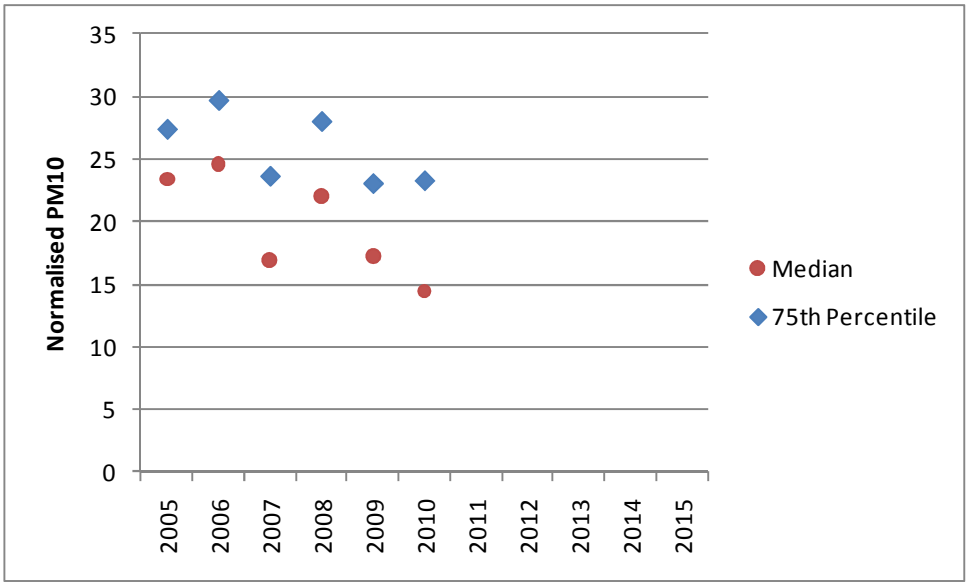

Figure 4.2: Median and 75th percentile PM10 concentrations after adjusting for meteorological conditions

5. Summary

The main air quality monitoring site in Blenheim is located at the Redwoodtown Bowling Club. During 2010 concentrations of PM_{10} measured at this site exceeded 50 µg m^{-3} (24-hour average) on two occasions. The maximum concentration of 67 µg m^{-3} and the second highest concentration of 64 µg m^{-3} were both the highest recorded in Blenheim since 2004.

Concentrations of PM_{10} were also measured at the historical Middle Renwick Road monitoring site. In 2010 there were no exceedences of 50 µg m^{-3} at this site. This is consistent with historical monitoring of PM_{10} in this location.

The NES for PM_{10} was reviewed by the Ministry for the Environment in 2011. A new date of 2016 was given for compliance with 50 µg m^{-3} (24-hour average, one allowable exceedence) for areas with fewer than 10 breaches. Blenheim is required to meet this target date. Compliance with the straight line path is no longer required. Prior to 2010 PM_{10} concentrations appeared to be in compliance with the straight line path suggesting a reduction in worst case PM_{10} concentrations. However, the 2010 concentration does not comply with the SLiP.

An evaluation of trends in PM_{10} concentrations in Blenheim suggests that concentrations have decreased slightly in Blenheim since 2005. It is therefore probable that the high maximum and second highest PM_{10} concentrations measured during 2010 occurred as a result of very conducive meteorological conditions rather than being a reflection on an increase in emissions in Blenheim.

Annual average PM_{10} concentrations measured or estimated (in the case of gravimetric sampling) at the two sites for 2010 were 14 µg m^{-3} (Redwoodtown – Bowling Club) and 12 µg m^{-3} (MMR site). These are both well within the annual air quality guideline for PM_{10} of 20 µg m^{-3} (MfE, 2002).

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