

REPORT

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Prepared By: Director Engineering, Hazards and Science

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Subject: **2014 Air Quality Results**

1. Précis

Ambient air quality monitoring of PM₁₀ continued this year at nine sites throughout Otago. Year-round monitoring fulfils requirements of the National Environmental Standard for Air Quality (NESAQ) at three sites: Alexandra, Mosgiel and Central Dunedin. At the remaining six sites monitoring is performed from April-September, the typical air quality “season” in Otago.

The NESAQ sets a daily PM₁₀ threshold concentration of 50 micrograms per cubic metre of air ($\mu\text{g}/\text{m}^3$); one day a year over that threshold is allowed. The NESAQ sets a final compliance date of 1 September 2020, with an interim target of no more than three days over the threshold by 2016. Days with PM₁₀ greater than $50\mu\text{g}/\text{m}^3$ are referred to as exceedances, or high-pollution days.

Central Dunedin and Palmerston met the NESAQ this year; no exceedances have been recorded at either location. The remainder of the monitored centres have all had multiple exceedances, with Alexandra having the greatest number (51 days).

The following table shows the number of days with PM₁₀ values exceeding $50\mu\text{g}/\text{m}^3$ this year at locations around Otago.

Table 1. Number of exceedances recorded at Otago PM₁₀ monitoring sites.

Location	Number of exceedance days
Alexandra	51
Arrowtown	48
Balclutha	4
Clyde	20
Cromwell	47
Dunedin	0
Milton	14
Mosgiel	7
Palmerston	0

2. Introduction

Two air quality reports detailing Otago's air quality and its relationship to the NESAQ have been presented to Council this year. They are:

2013 Air Quality Results¹ : This paper presented results from 2013 and concluded that even with the progress that has been made in several key towns, it is unlikely that the NESAQ will be met by 2020 in Central Otago towns.

Air quality in Otago – Issues and Considerations² : This paper discussed the challenges of meeting the NESAQ in Central Otago and examined the reasons for the tension between clean air and warm homes. The paper offered eight principles for guiding the development of a new air quality management strategy.

This report presents Otago's ambient air quality monitoring results for 2014. Monitoring results are presented in Section 3 and Alexandra trends are discussed in Section 4.

3. Winter Summary

3.1 *PM₁₀ statistics*

Air quality monitors operated in Alexandra, Arrowtown, Clyde, Cromwell, Balclutha, Central Dunedin, Milton, Mosgiel and Palmerston this year.

The key indicators in the table below show that the numbers of exceedances range from zero in Central Dunedin and Palmerston to 51 in Alexandra. The table also lists the maximum one-day values along with the winter average (May – August) for each site. A spreadsheet with a wider range of descriptive statistics for each site is attached as Appendix 1.

Table 2. Annual summary statistics for daily PM₁₀ in 2014. The highest value in each category is marked in bold. (Unless noted, all units are µg/m³).

Location	Number of exceedances (days)	Maximum PM ₁₀	Winter average (May-Aug)	Second highest PM ₁₀	NESAQ threshold concentration
Alexandra	51	106	46	102	50
Arrowtown*	48	148	46	133	50
Balclutha	4	55	27	55	50
Clyde	20	84	32	65	50
Cromwell	47	112	41	109	50
Dunedin	0	40	18	37	50
Milton	14	132	32	114	50
Mosgiel	7	108	28	72	50
Palmerston	0	49	21	46	50

¹ Council Report #2013/1105; presented to the Technical Committee on 29 January 2014

² Council Report #2014/0983; presented to the Technical Committee on 24 July 2014

* NB: The Arrowtown monitor is in a new location this year and the higher PM₁₀ levels now represent the highest pollution levels in town, a requirement of the NESAQ.

3.2 2014 site highlights

The 2014 results reveal the following highlights for each centre:

Alexandra

- The maximum PM₁₀ value this year (106µg/m³) is 28% lower than the long-term maximum over the past eight years of sampling.
- Other key indicators (number of exceedances, winter average) are similar to the long-term averages recorded at the site.

Arrowtown

- The monitor is in a new location this year and it reflects higher ambient PM₁₀ levels. Results from this year cannot be compared to previous years in terms of temporal trends.
- Even with higher numbers this year for most indicators, PM₁₀ numbers were higher in 2007 at the previous site.

Balclutha

- Results were very similar to last year although hardware failures meant that data were not collected from late May – late June.
- Despite having greater PM₁₀ emissions than in Alexandra, and relatively high coal usage, only four exceedances were recorded, the highest of which was 55µg/m³. This indicates the influence of climate on PM₁₀ concentrations.

Clyde

- Clyde recorded twice as many exceedances this year as last year (20 days this year compared to 10 days last year).
- Key indicator statistics show more variability in Clyde than anywhere else in the region. The reasons for this are unknown at this point.

Cromwell

- Ranked 3rd highest number of exceedances (47 days) after Alexandra and Arrowtown.
- Recorded 2 days with PM₁₀ over 100µg/m³; one occurred in early September and was caused, in part, by a substantial burnoff outside of town.

Dunedin

- Dunedin recorded its best air quality to date with zero exceedances with a maximum one-day value of 40µg/m³.
- 97% of winter days met the Otago Air Plan's goal level of 35µg/m³, with only four days over that level.

Milton

- Milton had an unusual air quality season, with just 14 exceedances. This compares favourably to its normal number of exceedances (38 days). Likely reasons for this include a different weather pattern this year (more unsettled and windier than usual) and the fact that one of the two major industries was shut down for much of the winter season.
- All key indicators were lower than in previous years, giving Milton its best air quality year since 2008 when continuous monitoring began.

Mosgiel

- Mosgiel's air quality this year was similar to most previous years, with seven exceedances.
- There was just one day with PM₁₀ greater than 100µg/m³ and it is believed that outdoor burning contributed to those levels.

Palmerston

- Palmerston had a second consecutive year with no exceedances of the NESAQ.

4. Alexandra air quality trends

With the addition of winter 2014 data, there are now nine years of continuous PM₁₀ monitoring data.

The graph in Figure 1 shows the number of annual exceedances and the average PM₁₀ taken over all of those exceedance days.

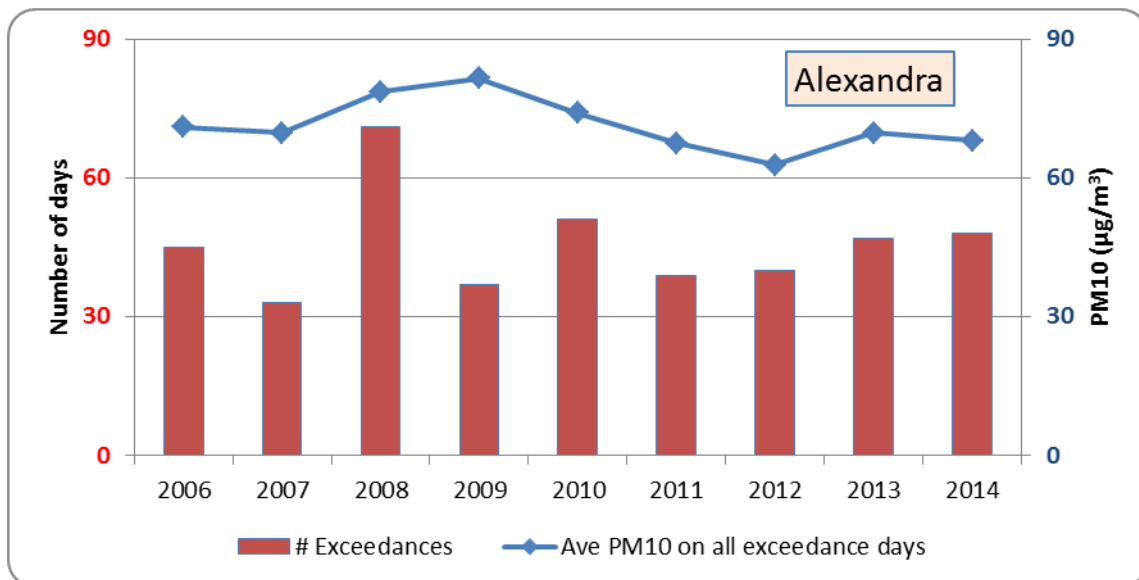


Figure 1. Alexandra exceedances and average exceedance PM₁₀ level for all years.

The majority of high-pollution days occurred during July this winter. In the 24 days from 5-28 July, there were only two days when PM₁₀ levels were *below* the NESAQ limit. The three days from 9-11 July all recorded daily PM₁₀ greater than 100µg/m³.

One key indicator in tracking progress is the average of the ten days with the highest PM₁₀. Even if air quality is improving, the number of exceedances may remain high; however, it is expected that if maximum emissions are lowering then maximum concentrations should as well.

This year in Alexandra the maximum one-day value was lower than usual, but looking at the average of the ten highest days indicates that there was no decline from last year.

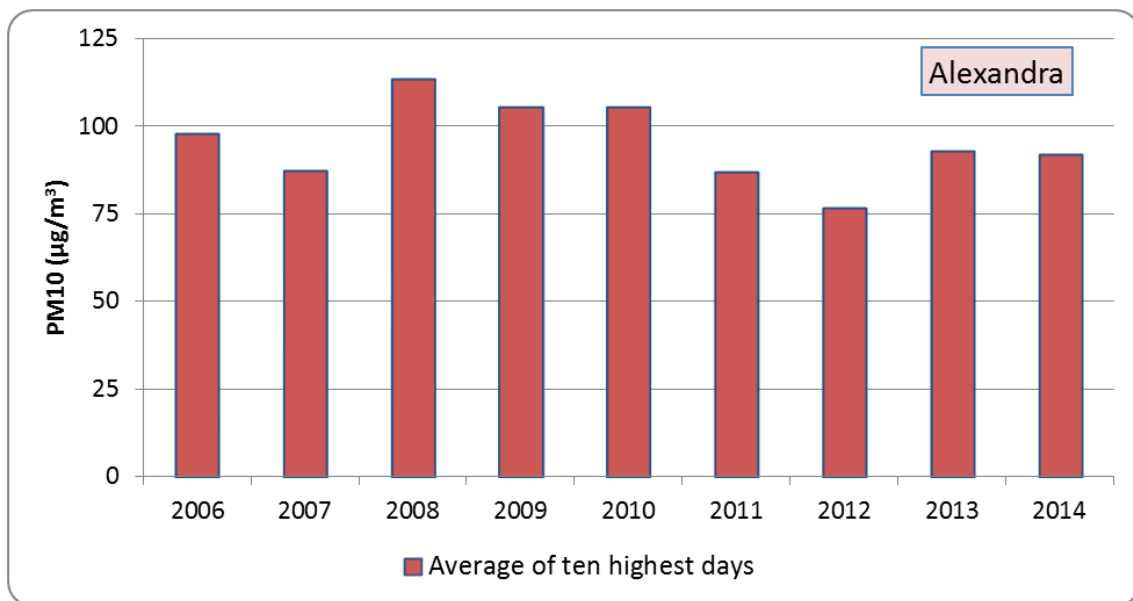


Figure 2. Average PM₁₀ for the ten highest recorded days over the last nine years.

5. Recommendations

1. That this report be received.
2. That the state of air quality in Otago be noted.

Gavin Palmer
Director Engineering, Hazards and Science

2014	Alexandra	Arrowtown	Balclutha	Clyde	Cromwell	Dunedin	Milton	Mosgiel	Palmerston	
Summary										
Winter average PM ₁₀ (May-Aug)	46	46	27	32	41	18	32	28	21	
Number Exceedances during 2014 (in days)	51	48	4	20	47	0	14	7	0	
Maximum PM ₁₀	106	148	55	84	112	40	132	108	49	
2nd highest PM ₁₀	102	133	55	65	109	37	114	72	46	
Number of Days > 100µg/m ³	3	8	0	0	2	0	2	1	0	
Monthly exceedances (days)										
January Exceedances	0					0		0		
February Exceedances	0					0		0		
March Exceedances	0					0		0		
April Exceedances	1	0	0	0	1	0	0	0	0	
May Exceedances	7	5	0	1	9	0	0	0	0	
June Exceedances	13	11	3	5	10	0	10	6	0	
July Exceedances	25	16	1	12	16	0	2	1	0	
August Exceedances	4	13	0	2	9	0	1	0	0	
September Exceedances	1	3	0	0	2	0	1	0	0	
Winter day categories (123 days in winter)										
# of days under 35	LOW POLLUTION	41	51	77	74	60	119	63	97	116
# of days between 35-50	MEDIUM POLLUTION	33	24	9	29	19	4	24	19	7
# of days > 50	HIGH POLLUTION	49	45	4	20	44	0	13	7	0
% of days under 35	LOW	33	43	86	60	49	97	63	79	94
% of days between 35-50	MEDIUM	27	20	10	24	15	3	24	15	6
% of days > 50	HIGH	40	38	4	16	36	0	13	6	0
Monthly averages										
May Average		39	38	25	26	36	22	25	27	20
June Average		49	52	36	32	43	21	44	36	24
July Average		61	54	26	40	52	14	26	25	19
August Average		35	39	26	29	33	17	27	24	20