STAFF REPORT

TO: Environment & Planning Committee

FROM: Trevor James, Resource Scientist

REFERENCE: C301

SUBJECT: **AIR QUALITY IN RICHMOND - AN UPDATE 2010 - REPORT REP10-09-05 -** Report prepared for meeting of 23 September 2010

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1. PURPOSE

The purpose of this report is to present results for air quality monitoring for the 2010 year-to-date and compare these results to previous years.

2. BACKGROUND

The overall aim of the Tasman District "State of the Environment" air quality monitoring programme is to determine the condition of ambient air for the purpose of understanding potential effects on human health. More specifically, the programme aims to determine the concentration of fine particulate (PM_{10}) and determine trends over time. At present we are not in a position to report trends with any confidence as specialists advise us that we will only have sufficient record to undertake trend analysis after another year's worth of data.

The Richmond air emission inventory shows 89% of PM_{10} is caused by domestic home-heating appliances (Environet, 2010). Diurnal patterns of PM_{10} concentration measured in Richmond Central are typical of those in an air-shed dominated by wood smoke with peak PM_{10} concentrations occurring in the evening (from 7.00 pm to 1.00 am) and morning (a smaller peak about 9.00 am) and very low concentrations from late morning to late afternoon. The evening peak is most-often double-crested with the first peak at about 7.00-8.00 pm with the second peak (usually the highest) occurring at about 10.00 pm when people go to bed and damp down the fire.

Rules requiring upgrading of domestic wood burners at the point of property sale came into effect in January 2007. All owners of houses with a wood burner who have bought from this date to the present have been visited to ensure compliance. No combustion burners other than pellet fires can be installed in Richmond in new houses or existing houses without already installed burners. Existing householders are able to upgrade their existing burner to one of the complying burners as listed on the MfE site (www.mfe.govt.nz).

3. METHODS

24-hour average PM_{10} concentrations above 50 µg/m^3 are termed "exceedences" under the National Environmental Standard. Data above 50.5 µg/m^3 was rounded up, but data less than this number was not considered an exceedence. As for previous years the BAM data has been adjusted upwards by approximately 16% upon the recommendation of Wilton, 2007.

The continuous particulate monitor in Richmond Central (the BAM) continues to perform reasonably well, but not as well as previous years, with 18 days in the year with more than 30 minutes of lost record and this was due to the need to shut down during calibration routines and a problem with an unknown cause. Of these 13 days were during the Christmas holiday period when the problem was not detected. Fortunately only two of these problematic days were within the winter air pollution season.

4. RESULTS AND DISCUSSION

At the Richmond Central site there were seven measured exceedences of the standard for 24-hour average PM_{10} this last winter (see Figure 1 and 2), the lowest ever recorded, by a considerable amount. Figure 1 shows a plot of 24-hour average PM_{10} for the year to date. The highest recorded maximum concentration (69 µg/m^3) this winter was on the 13 July.

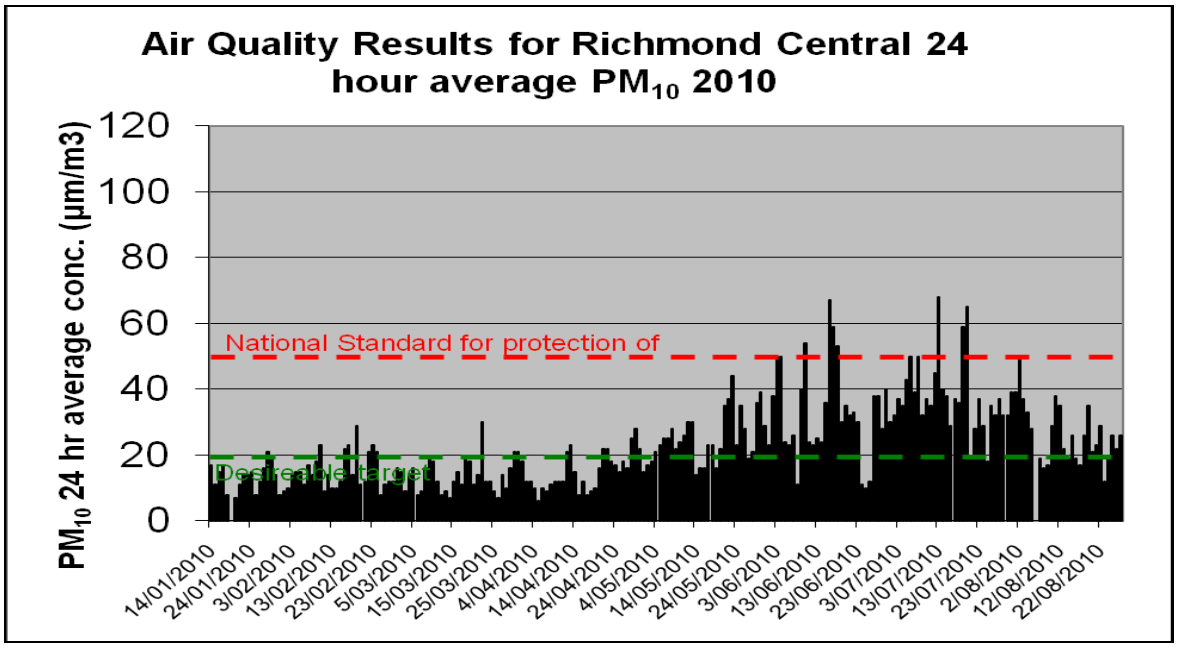


Figure 1: PM_{10} 24-hour Average for Richmond Central – 2010 year to end of August

While the weather played a part in the lower air pollution as this winter, trend analysis taking wind speed and air temperature into account (normalised trends) confirm the trend to reducing PM_{10} (40-50% of that in 2000). The Richmond air emissions inventory produced this winter shows emissions have reduced by a similar amount, confirming the validity of the trend analysis. This winter was generally wetter and slightly windier than long term average. July was drier and warmer. Rain clears the air like an industrial scrubber, wind blows the pollution away and warmer temperatures mean that people light their fires for shorter periods and less often and in the warm air pollution is more likely to rise. However, temperatures were cooler

than average, for most of May and June, and a third of July, and these are the conditions when we normally get high pollution nights. People who operate home fires in Richmond need to be congratulated for their good efforts

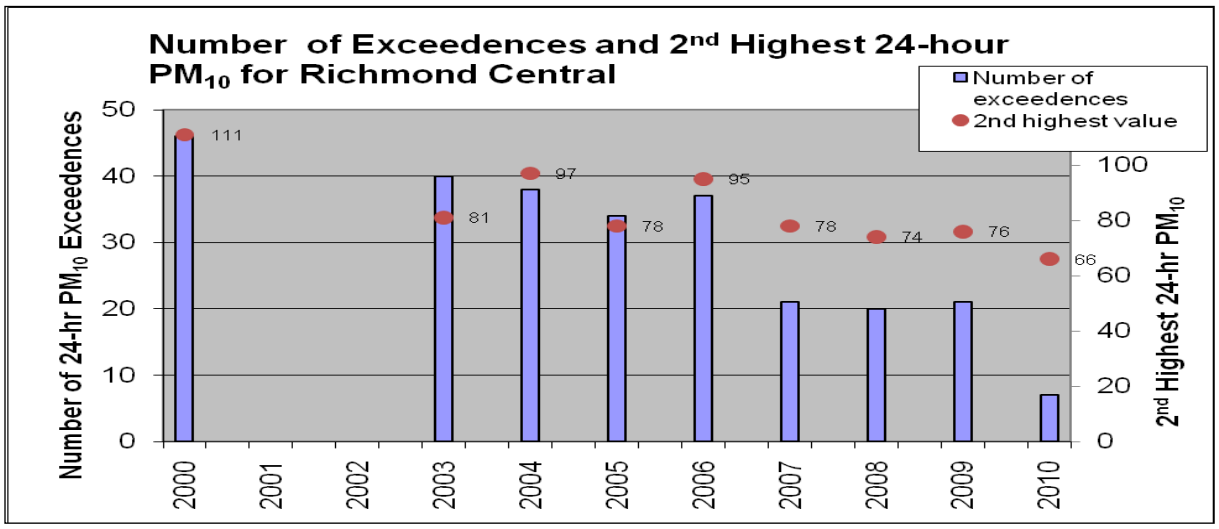


Figure 2: Total number of days per year that the NES was exceeded and second-highest exceedence.

Nelson's St Vincent Street site recorded only seven exceedences which is also well down last year (28). The Tahunanui site recorded six exceedences and was down 40% on last year.

The mean PM_{10} 24-hour average for days when there was an exceedence was 61 and very similar to the past three years. This analysis includes only those days when there was an exceedence. These days are generally amongst the coldest and most calm of the winter period. Another way of representing the data is shown in Appendix 1 where data is grouped into the following categories: good, acceptable, alert and exceeding the NES limit.

The annual average 24-hour average concentration for 2010 was still above guidelines (20 µg/m^3; Ministry for the Environment). Over the eight years of record, there appears to be a slight downward trend (see Figure 3). Note that annual averages are not part of the national standard for assessing PM_{10}.

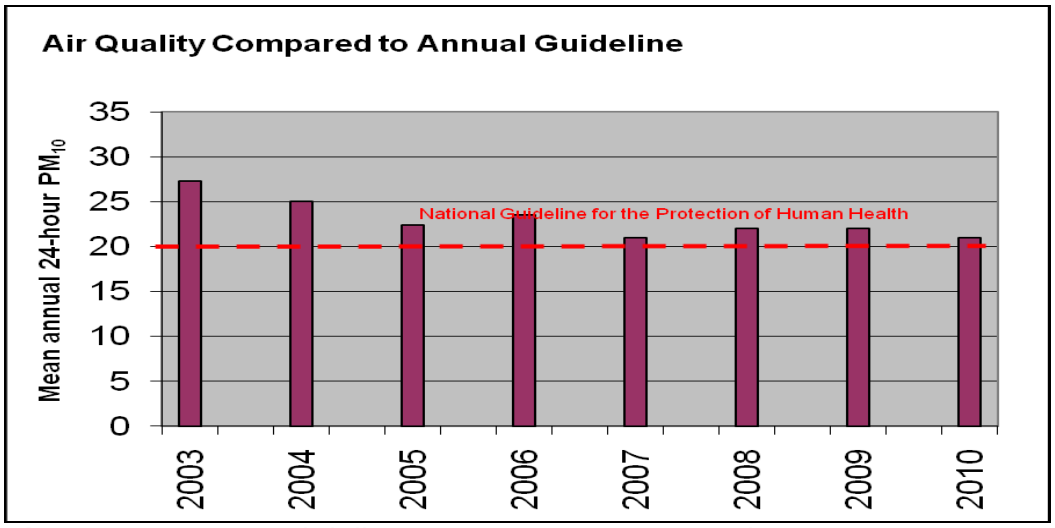


Figure 3: Year-round daily average PM_{10} concentration

Deviations from the National Standard Straight Line Path for Richmond

In September 2005 the National Environmental Standard (NES) for air quality was introduced. This sets out a path for compliance with the standard by 2013. Any of the second-highest 24-hour average PM_{10} results above this line after 2005 must be highlighted. The second-highest value is plotted in respect of this standard because the NES allows for one breach each year. For the Richmond Central site all results were below the straight line path (see Figure 4).

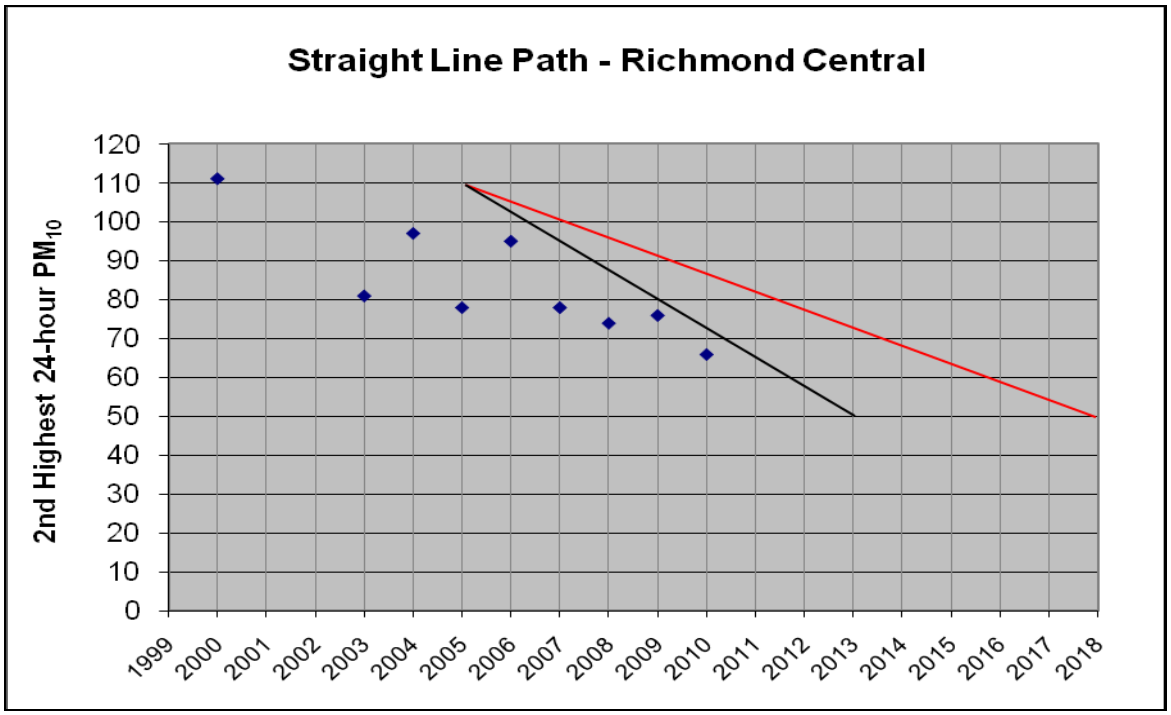


Figure 4: Second highest 24-hour concentrations as plotted on the straight line path set down by the NES (based on second-highest concentration)

5. CONCLUSION

Air quality in Richmond for the last winter continued to exceed national standards but to a much less degree. The 24-hour average standard for PM_{10} was exceeded seven times. This result is below the straight-line path as required by the NES.

6. RECOMMENDATION

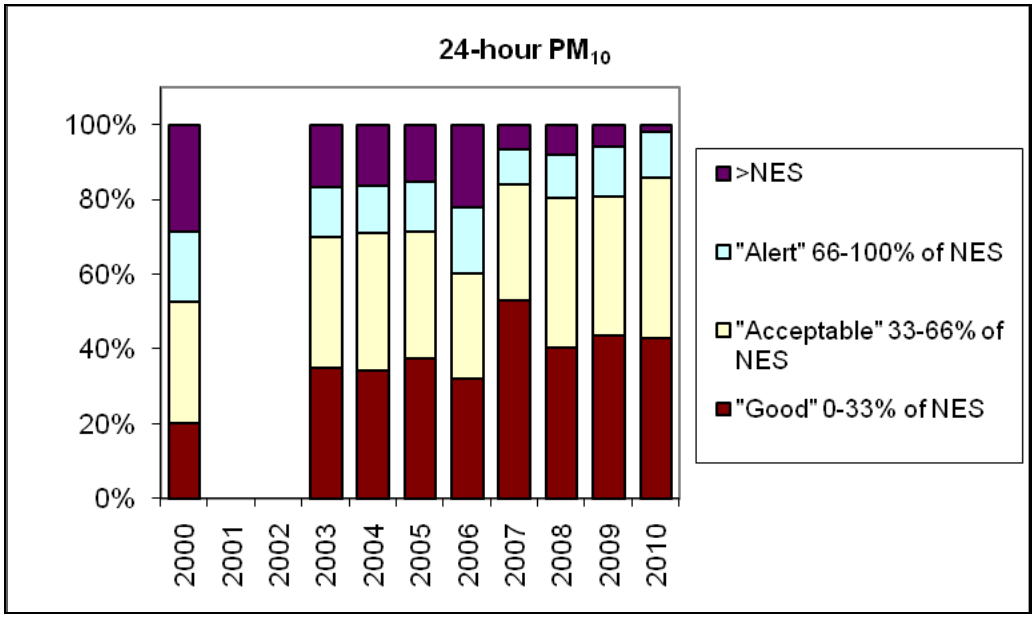
That the Committee receives report REP10-09-05.

Trevor James
Resource Scientist

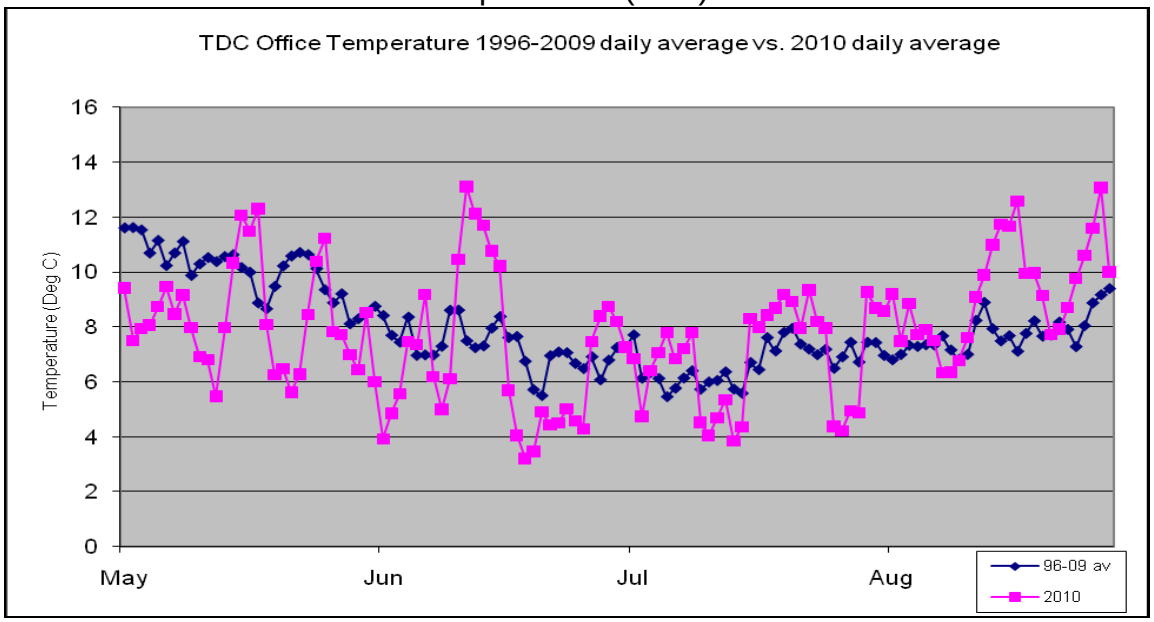
References:

Ministry for the Environment 2002; Ambient Air Quality Guidelines
Wilton, E. 2007. PM10 Monitoring Method Comparison: 2005-2007
Wilton, E; 2010. Air Emissions Inventory: Richmond 2010

APPENDIX 1:
Ministry for the Environment Indicator Categories Comparing to the National Environmental Standard for Air Quality (NES)



APPENDIX 2:
Daily Average Temperatures for 2010 (Pink) Compared To Long-term Average Daily Temperatures (Blue). Data is from TDC Richmond office site.



APPENDIX 3:

Number of Rain Days for Winter Months in 2010 (red) compared to long-term averages (Blue). Data is from TDC Richmond office site (rain day = >1mm rain per 24 hr period).