

Memorandum

To Emily Roberts, Job Manager
From Brian Cheyne, Scientific Officer -Air Quality
File 1093834
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Inhalable Particulates Monitoring at Port Taranaki



Figure 1 View from the monitoring site on Bayly Road towards Port Taranaki.

Background

Particles found in the air we breathe vary greatly in size. The greatest health hazard from particles comes from the smallest ones – less than 10 microns (10 μm or 10 micrometres) across – because we easily inhale these small particles into our lungs. These particles are referred to as PM₁₀ (referring to their size) or as inhalable particulate (referring to their potential effect). Health effects from inhaling PM₁₀ include increased mortality and the aggravation of existing respiratory and cardiovascular conditions such as asthma and chronic pulmonary diseases.

Fine particulates come from sources such as burning coal, oil, wood, and petrol and diesel in domestic fires, transportation and industrial processes. Natural sources of particles include sea salt, dust, pollens and volcanic activity. In terms of comparative size, a human hair is

approximately 50 microns across, while the finest beach sand is approximately 100 microns across.

This memorandum describes the fifth monitoring programme in the Taranaki region and the first monitoring run in residential/commercial area in New Plymouth to assess the impact of Heavy Goods Vehicles on surrounding residential areas for air quality purpose implemented by the Council during the period under review, and the results of that work. The monitoring site was located on the corner of Bayly Road and St Aubyn Street (Figure 1), due to its proximity to Port Taranaki and a high flow of heavy goods vehicles to and from this key transport hub. The work entailed the sampling of air on a continuous basis using 'DustTrak DRX' aerosol monitor with ability to measure aerosol concentrations corresponding to PM1, PM2.5 and PM10 size fractions simultaneously. Continuous sampling was conducted for one month in February/March 2012. This monitoring was incorporated with traffic counts (courtesy of NPDC).

Standards and guidelines

In September 2004 the Ministry for the Environment promulgated National Environmental Standards (NESs) relating to certain air pollutants. The NES for PM10 is 50 $\mu\text{g}/\text{m}^3$ (24-hour average).

World Health Organization (WHO) set a guideline for PM2.5 which is 25 $\mu\text{g}/\text{m}^3$ (24-hour average). The details of the sample runs are graphically presented in Figure 2.

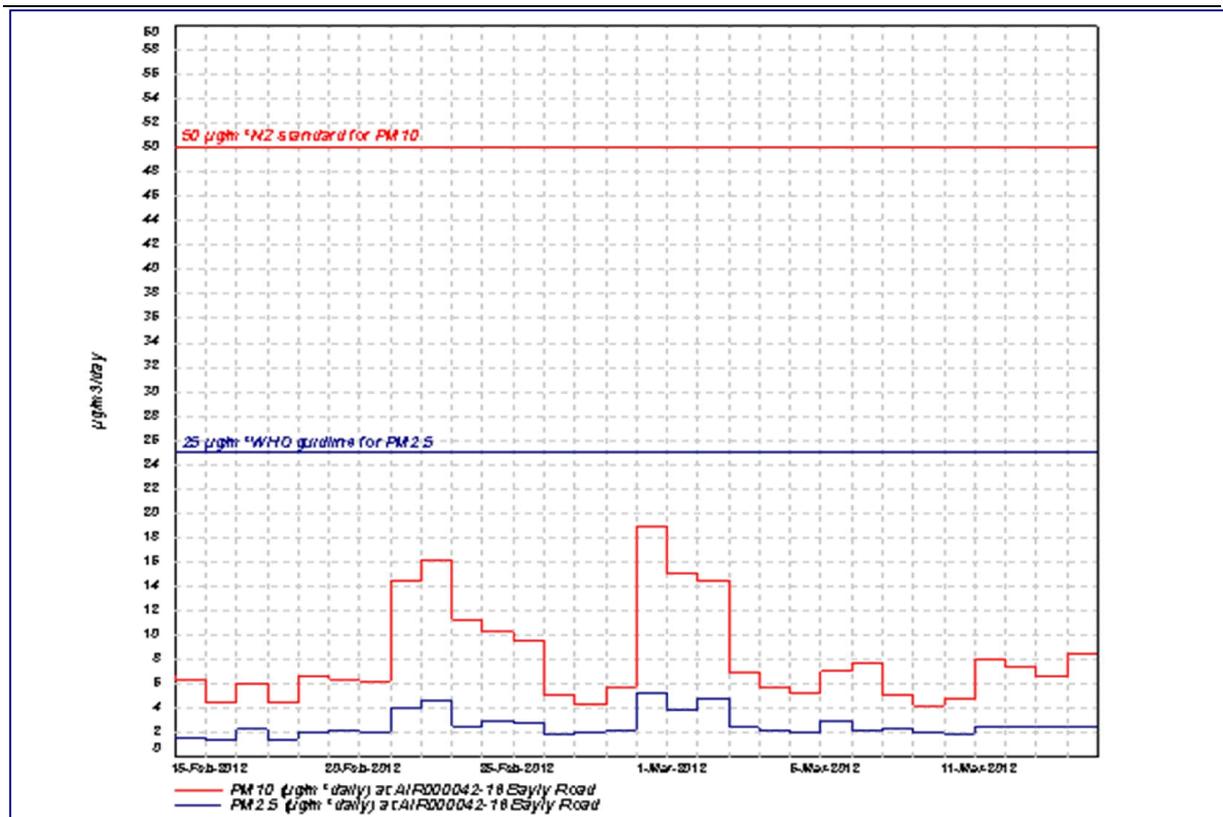


Figure 2 PM10 and PM2.5 concentrations ($\mu\text{g}/\text{m}^3$) at Bayly Road (Port Taranaki)

Findings

Overall, 96% of PM10 daily results fell into the MfE's 'excellent' or 'good' categories, and only one result was recorded within the 'acceptable' MfE category. The average PM10 concentration (24-hour average) measured across all measurements was $8 \mu\text{g}/\text{m}^3$ (microgrammes of particulate, or millionths of a gram of particulate, per cubic metre of air), or 16% of the NES, with a maximum result of $19 \mu\text{g}/\text{m}^3$ and a minimum of $4 \mu\text{g}/\text{m}^3$.

Background levels of PM₁₀ in the region have been found to be around $11 \mu\text{g}/\text{m}^3$.

Traffic counts versus PM10/PM2.5 results

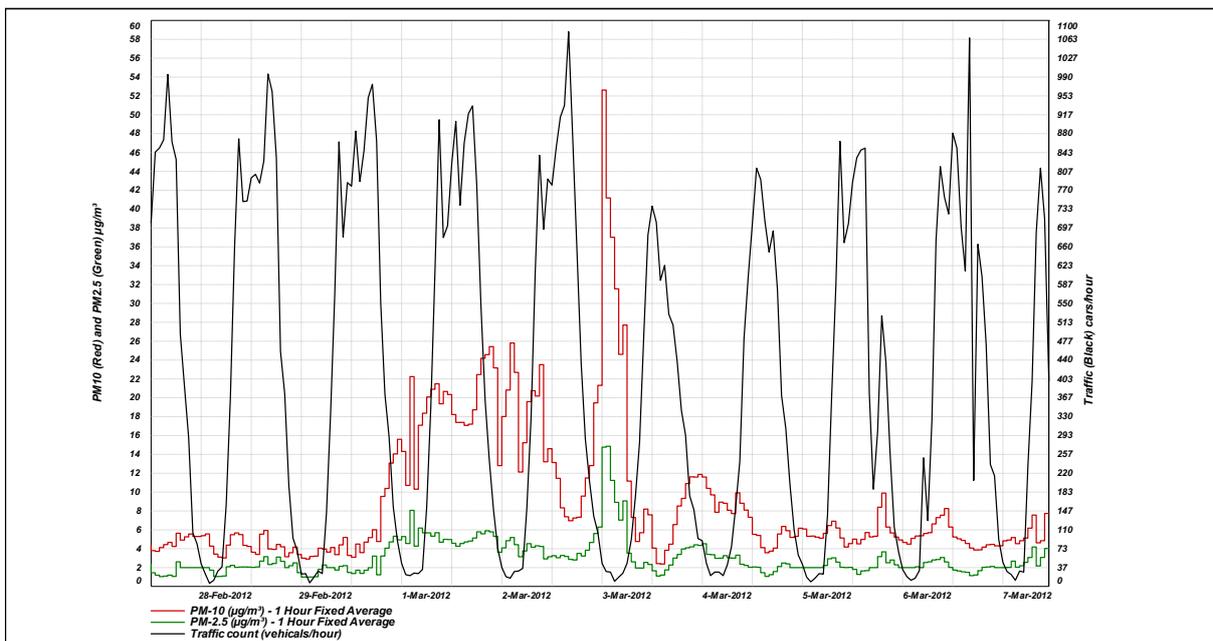
The traffic counting method at the St Aubyn Street monitoring site employed two pneumatic tubes placed on the road one metre apart. Each time an axle hits a tube a 'hit' is logged at the recorder. This counting method is accurate and allows the determination of the traffic volume as well as speed and size of the vehicles. The pneumatic counter is suitable for occasional, campaign-type monitoring.

TRC has access to the traffic data (provided by the New Plymouth District Council) over a period of ten days.

Figure 3 presents traffic volumes (cars total per hour) together with one-hour average PM10 and PM2.5 results for the period of 10 days when all three parameters (PM10, PM2.5 and traffic counting) were monitored simultaneously.

The pattern of traffic densities is generally constant. Three clear peaks in traffic volumes can be observed during week days (morning, midday and afternoon rush hours) with only one distinctive midday peak during weekends.

From the correlation analysis of the entire datasets the association between PM10/PM2.5 and traffic volumes was almost non-existent. These findings would suggest that there is no relationship between a particular traffic density event and PM10/PM2.5 values. In fact the highest PM10/PM2.5 results on 2nd and 3rd of March were recorded when the traffic density were minimal.



Conclusion

Results shows that dust concentration in ambient air around Port Taranaki are well below the NES of 50 µg/ m³ (average exposure over 24 hours) for PM₁₀ and the World Health Organization guideline of 25 µg/ m³ for PM_{2.5}. These results confirm those of monitoring within central New Plymouth.

Recommendations

In designing and implementing the state of the environment monitoring programmes for air in the region, the Taranaki Regional Council has taken into account the extent of information generated by other authorities, its relevance under the Resource Management Act, the obligations of the Act in terms of monitoring the state of the region's environment, and subsequently reporting to the regional community, the scope of assessments required at the time of renewal of permits, and the need to maintain a sound understanding of the environment within Taranaki.

For PM₁₀ monitoring, the five yearly repeat programme for Inhalable Particulate Regional Monitoring is recommended to be appropriate. It is now recommended that no further PM₁₀/PM_{2.5} monitoring is required at Port Taranaki as results of fine particulates concentrations found to be negligible.