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Report to Environment Committee
from Perry Davy, Air Quality Scientist

Sources of Air Particulate Pollution in the Wellington Region

1. Purpose

This report summarises the results of a research project that investigated the composition and the sources of air particulate pollution in the Wellington Region.

2. Background

The source apportionment project was a collaboration between the Wellington Regional Council and the Institute of Geological and Nuclear Sciences Ltd (GNS).

The principle purpose of the monitoring was to collect airborne particulate matter (dust) with a GENT sampler and use special analysis techniques to determine the sources of the dust, such as motor vehicles, industry, domestic fires, seasalt or soils. The major contributors to dust pollution levels in each monitoring area were then assessed.

The information on the relative contributions of each particular source to local air pollution levels can then be used to target the major contributors where pollution levels may be a problem.

3. Monitoring Sites

The GENT sampler was located at various sites in the Region, these are shown in Figure 3.1. The results from dust samples collected at Baring Head, Lower Hutt and Masterton are available to date. The sampler is currently located at Trentham fire station inside the mobile ambient air quality monitoring unit.

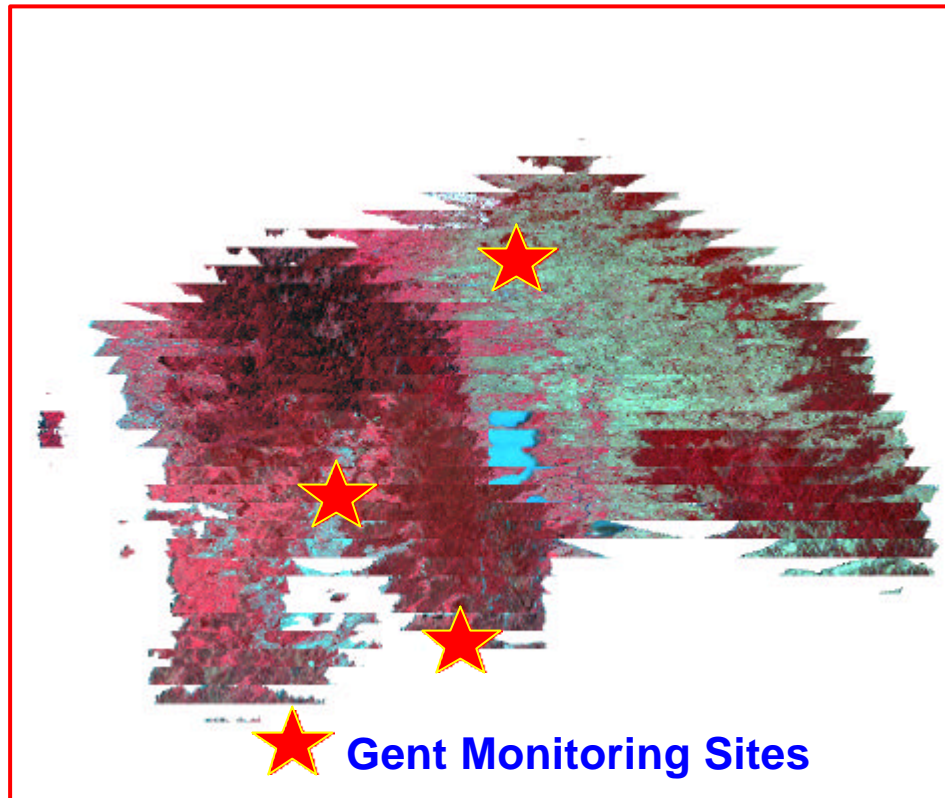


Figure 3.1 GENT Sampler Monitoring Locations in the Wellington Region

4. Monitoring Results

A considerable amount of information can be derived from this air quality monitoring technique and only a brief summary of the major results are covered in this report. The collaborative research between WRC and GNS continues to refine our understanding of the interactions between sources of airborne particulate matter, the concentration of air pollutants and other environmental factors such as local meteorology.

Two particulate matter size categories were included in the monitoring programme. The particulate size categories are 'coarse' (particulate matter between 2.5 and 10 micrometers in diameter) and 'fine' (particulate matter less than 2.5 micrometers in diameter).

4.1 Baring Head

Baring Head is an isolated coastal location that is used as part of a global background air quality monitoring station. The results from monitoring at Baring Head are shown in Figure 4.1.

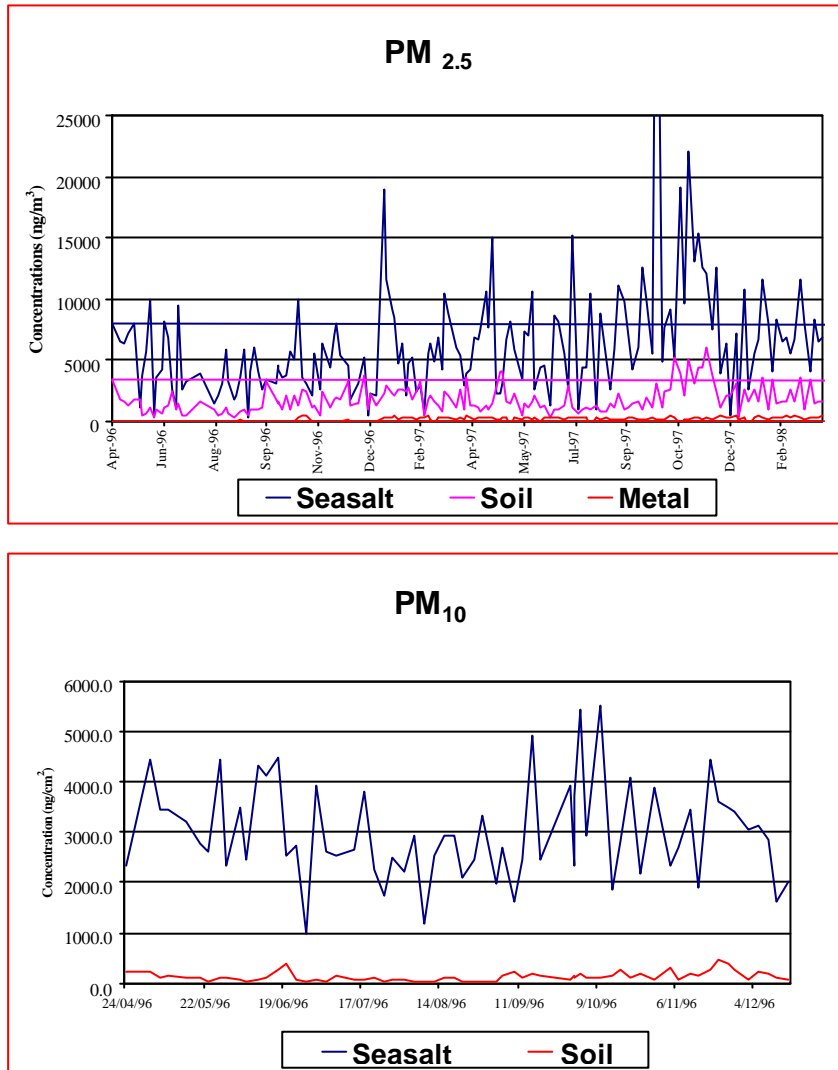


Figure 4.1 'Fingerprint' Analysis of Particulate Matter Collected at Baring Head

Unsurprisingly, the results show that the predominant source of particulate matter at Baring Head is seasalt. There is some trace particulate matter that appears to correspond to anthropogenic emission sources and we suspect that it is carry over from the city areas to the north and northwest of Baring Head (i.e. Porirua, Wellington and Hutt cities).

4.2 Lower Hutt

The GENT sampler was located in the mobile air quality monitoring station while it was at Huia Pool in Lower Hutt between June 1998 and June 1999. The Huia Pool site is surrounded by residential properties and there is also a significant amount of local traffic. The Seaview industrial area is 4 km to the south and the Lower Hutt City CBD is 1 km to the north of the monitoring site. The results from monitoring at Huia Pool are shown in Figure 4.2.

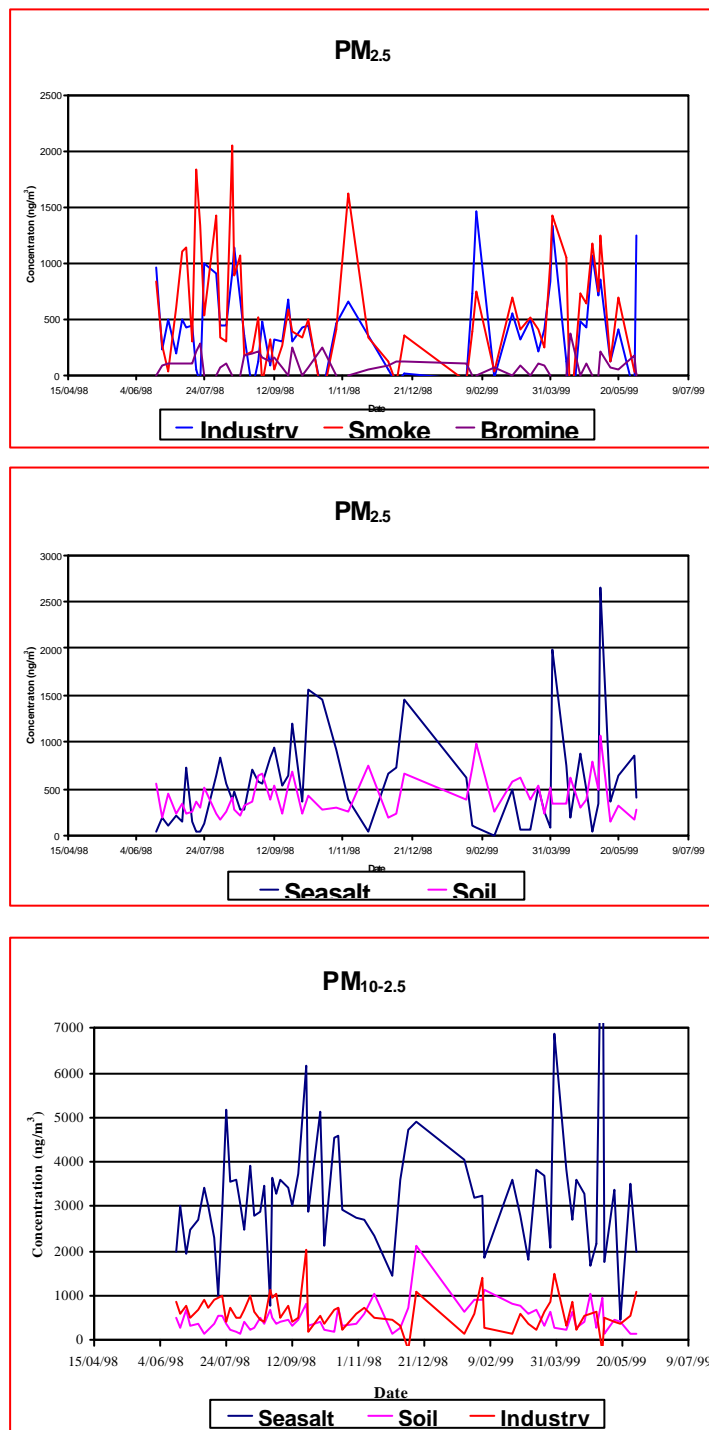


Figure 4.2 Fingerprint' Analysis of Particulate Matter Collected at Lower Hutt

The Lower Hutt results show that seasalt still dominates the coarse fraction, but the fine fraction is dominated by anthropogenic sources such as industrial, motor vehicle and domestic fire emissions.

4.3 Masterton

The GENT sampler, along with the mobile air quality monitoring station, was located at Memorial Park in Masterton from June 1999 until June 2000. The Masterton site was predominantly surrounded by residential properties. Figure 4.3 illustrates the monitoring results.

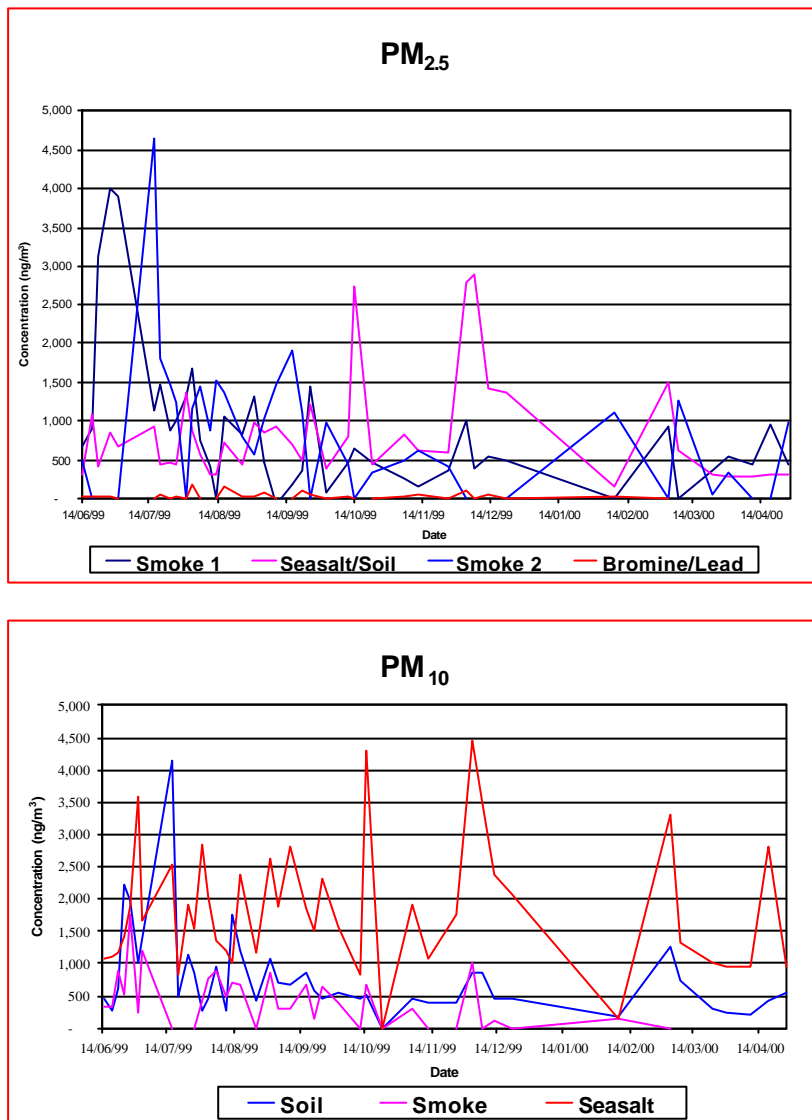


Figure 4.3 Fingerprint' Analysis of Particulate Matter Collected at Masterton

Domestic fires dominate the fine fraction during the winter. Peak source concentrations for smoke coincided with exceedences of the ambient air quality guideline value for PM₁₀ recorded by other monitoring equipment in Masterton during June and July 1999. (These guideline exceedences were previously reported in the *Annual Air Quality monitoring Report 1999*, Publication No. WRC\RINV-T-99/33).

Seasalt and soil derived particulates predominate in the coarse fraction with smoke particulates only featuring in the winter.

5. Conclusion

Using a new air quality monitoring technique for airborne particulate matter, we were able to positively identify which source was responsible for guideline exceedences in Masterton during the winter, i.e. domestic fires. With this evidence available we should be able to formulate and implement appropriate policies and methods to target the predominant pollution sources and ensure that ambient air quality guidelines are met.

The collaborative research project between WRC and GNS is ongoing, with current work focussing on new sampling locations, refining analysis techniques and source identification (a sampler is currently located in Mt Victoria tunnel specifically for monitoring motor vehicle emissions).

Considerable interest in the research has been shown by other regional councils, particularly Canterbury and Auckland, which have air quality problems to deal with but also require the scientific evidence of the sources of that air pollution so that appropriate action can be taken to reduce pollution levels.

6. **Communications**

As the source apportionment work is part of an internationally coordinated research project, progress reports and results have been presented at meetings of the participating countries (Singapore in September 1999 and Manila in November 2000). Additionally, two research papers on the Wellington results were presented at the Clean Air and Environment Conference in Sydney in November 2000. A Resource Investigations Technical Report (WRC\RINV-T-01/08) on the results to date has been produced and sent to interested parties within New Zealand.

7. **Acknowledgement**

I would like to acknowledge the collaboration of the Institute of Geological and Nuclear Sciences Ltd in this project; in particular the time, energy and enthusiasm put in by Dr Andreas Markwitz and Bill Trompeter. Their expertise has helped this work to develop as leading edge research within New Zealand.

8. **Recommendation**

That the report be received and its contents noted.

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