



# clearing the air

expert analysis of air particulate matter





Vehicle emissions include particulates, carbon monoxide, carbon dioxide, nitrogen dioxide, sulphur dioxide, ozone and benzene.

# air quality standards

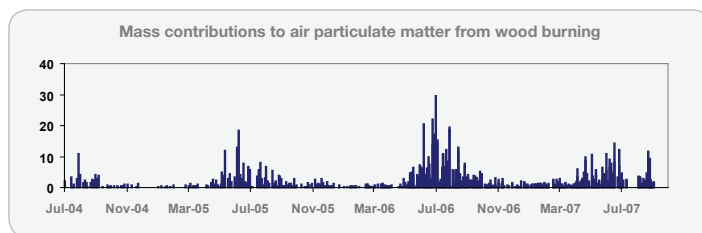
At GNS Science we offer you proven expertise in measuring the chemical composition of air particulate matter. In 2007 we analysed over 2500 samples – and provided many related services to local authorities, businesses and other organisations.

Call on us to:

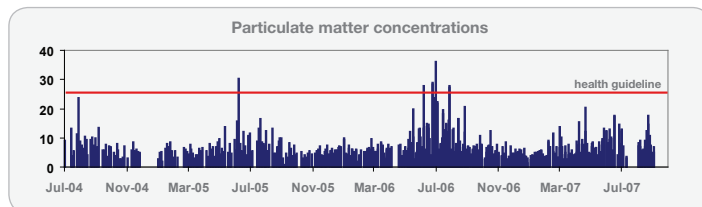
- Support your efforts in complying with national environmental standards for air quality
- Identify exact sources of PM<sub>10</sub> and PM<sub>2.5</sub> in your region
- Assess the relative contribution of different sources to air pollution
- Distinguish natural from man-made sources
- Provide key information to manage airsheds and ensure compliance with the national air quality standards
- Deliver interpretation and advice to support immediate and longer-term planning.



Air quality monitoring station in Lower Hutt, providing daily air particulate measurements



Graph showing mass contribution of domestic fire sources to ambient particulate matter concentrations determined from receptor modelling of 3 years of filter samples. Peak concentrations occur during winter.



Corresponding particulate matter concentrations for the same period illustrating the importance of domestic fire sources to winter pollution events.

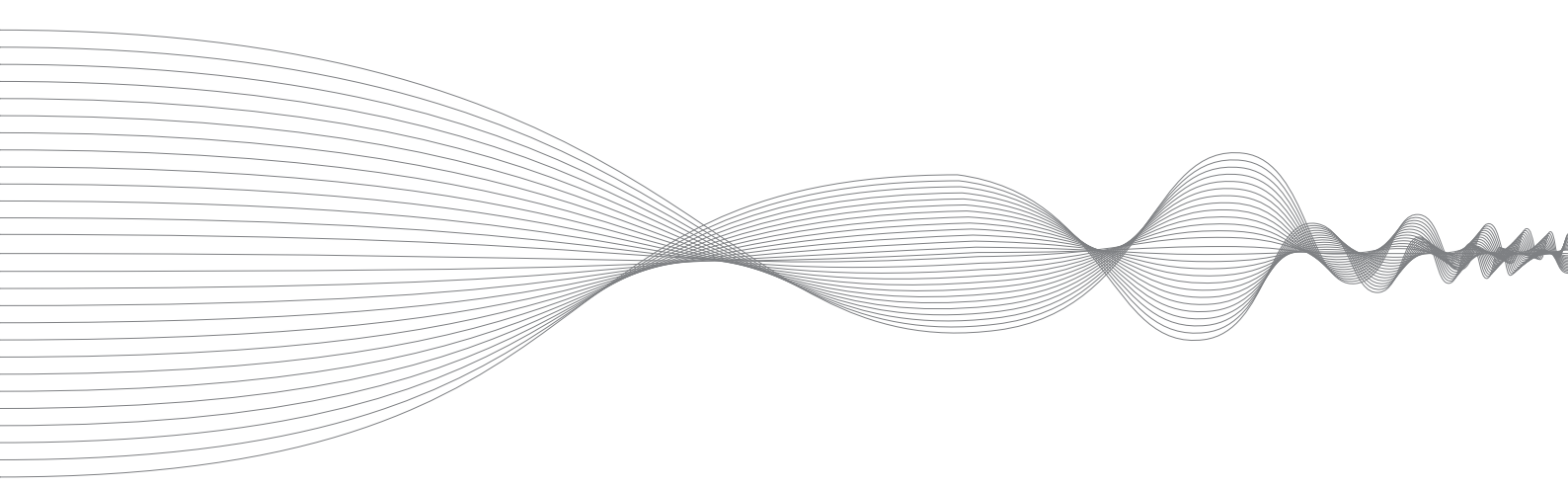
## Analysis to match your needs

GNS Science provides Streaker, ASP and GENT air samplers for hourly, daily, or monthly measurements (we service and maintain the air samplers).

Worth noting, we have designed and built specialised equipment for air filter analysis. Both our equipment and experimental techniques have been refined to improve sensitivities. We can identify the elemental composition of air particulate matter, without destroying the filter sample.

Analysis options include:

- Ion Beam Analysis (IBA) – elements include H (on teflon filters) and sodium - uranium
- Black carbon (BC) measurement
- Gravimetric analysis of air filters
- Source apportionment analysis using Positive Matrix Factorisation.



## International standards of expertise

You'll have the assurance of leading levels of expertise. We analyse air particulate matter collected from filters in locations around New Zealand and South East Asia. We also consult to several countries in South East Asia and a number of regional councils around New Zealand.

GNS Science is the New Zealand representative on the International Atomic Energy Agencies Regional Cooperation Agreement air monitoring programme for Australia, New Zealand, South East Asia and The Pacific.



GNS regularly analyses air quality in a number of South East Asian cities

## Tracking down pollution sources

All air pollution has a unique combination of chemical elements. This ensures a 'fingerprint' or 'signature', which helps in tracking down and quantifying the contributing sources.

Air particulate matter pollution sources that are biogenic (natural) can quickly be distinguished from those that are anthropogenic (man-made). This knowledge is key to making decisions on how to manage emissions.

To further support decision-making, we can provide you with complete interpretation and consultancy reports.



An Auckland suburb in the early morning

## Council responsibilities under the National Environmental Standards (NES)

The National Environmental Standards for Air Quality (NES) were introduced by the Ministry for the Environment (MfE) in 2005. They set standards for ambient (outdoor) air quality; dealing with pollutants such as sulphur dioxide, carbon monoxide, nitrogen dioxide, ozone, and airborne particles less than 10 microns in diameter (PM<sub>10</sub>).

Local councils are responsible for monitoring, managing and publicly reporting air pollution. For each council, the NES allows PM<sub>10</sub> to exceed 50 micrograms/m<sup>3</sup> of air on no more than one occasion a year.

Councils have until 2013 to manage air quality to ensure compliance with this standard. Failure to do so means they will not be able to grant consents for discharges that contain PM<sub>10</sub>.

# case study



Vehicle emissions can be a major source of air particulate matter

## Identifying PM<sub>10</sub> sources in Wellington, New Zealand

Greater Wellington Regional Council (GWRC) is proactively involved in understanding and minimising air pollution. To gain insight, in 2007, the council and GNS Science began a 'Streaker' sampler pilot project.

This project saw us take Air Particulate Matter (APM) 'Streaker' samples at a monitoring station by Ngauranga Gorge. Each streaker sample has hourly deposits of APM. We then used ion beam analysis to measure the elemental makeup of all the APM deposits.

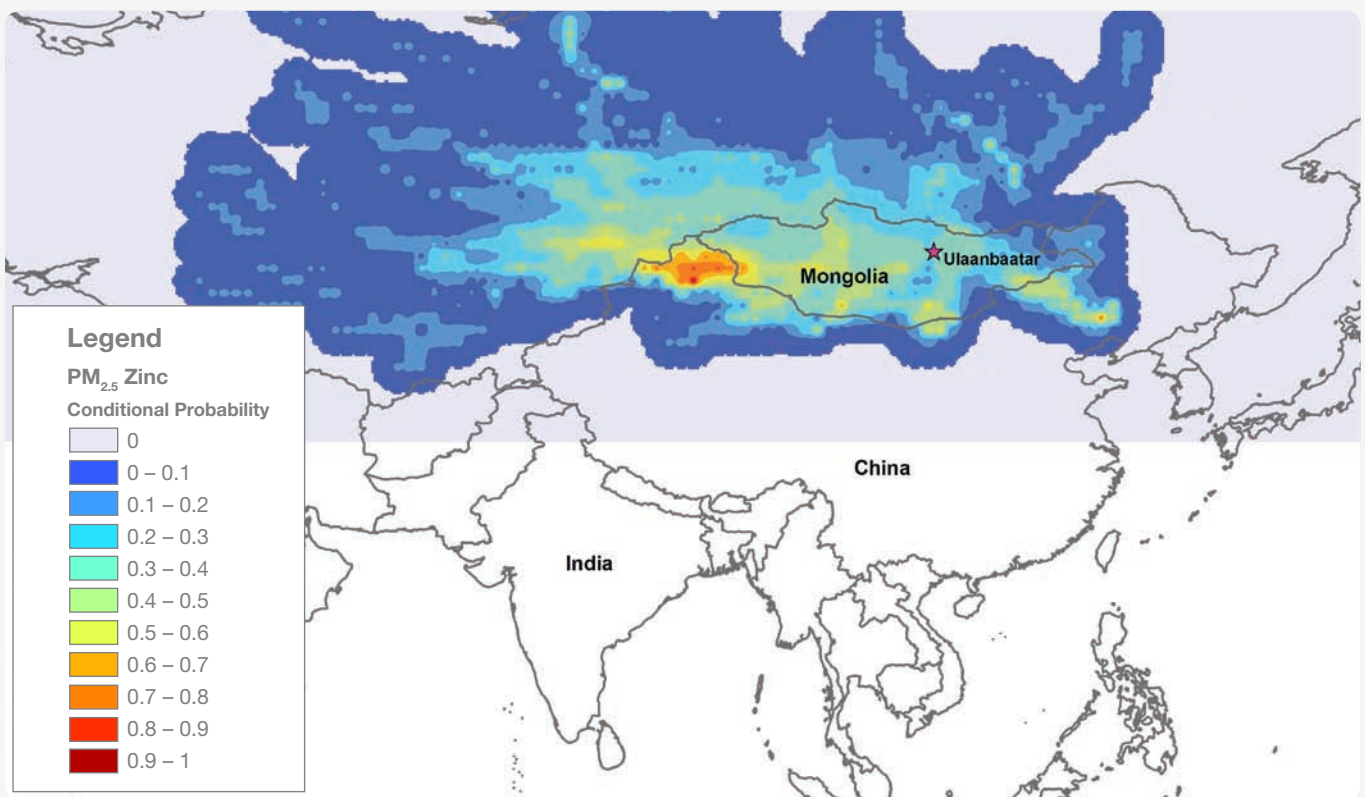
Because it is a very quick and accurate way of sampling, Streaker sampling is ideal for measuring activity of APM sources over short time periods.

This study delivered a clear picture, including the peak times and levels of pollution.

No surprise, the study showed vehicle combustion was the primary source of air particulate matter. However, when the wind is from the south-east, sea salt can be a major contributor of PM<sub>10</sub>. Soil and secondary sulphate sources were also contributors. Total PM<sub>10</sub> levels averaged 25 micrograms/m<sup>3</sup>.

Looking ahead, the study will be supported by ongoing sampling and analysis around Wellington city and the wider region.

# case study



PM<sub>2.5</sub> Zinc source locations

## Sources of air pollution in Ulaanbaatar, Mongolia

GNS Science is a member of an international research project: 'Better management of the environment, natural resources and industrial growth through isotope and radiation technology'.

In 2008, as part of that project, we collaborated with the National University of Mongolia to determine the sources of air pollution in Ulaanbaatar, the capital city of Mongolia. Ulaanbaatar has an air pollution problem due to air particulate matter, but before Mongolian government agencies can do anything about it they need to know what the sources of that air pollution are.

GNS Science advised Mongolian researchers on appropriate sampler installation and operation. We then analysed the filter samples from Ulaanbaatar to identify the sources and their mass contributions to air pollution.

The analysis results showed that dust from surrounding deserts and the urban area were the biggest contributors to air pollution in Ulaanbaatar. Coal burning by power stations and residents for home heating was found to be the major source of fine particles during winter months, a result that has significant health implications for the local population. Specialised analysis also identified long-range sources due to forest fires and industrial emissions from other countries that also contributed minor amounts of fine particles to air pollution in Ulaanbaatar.

This growing body of knowledge allows the Mongolian government to make informed policy decisions for controlling air pollution, for a cleaner future and a healthy population.



# the knowledge to clear the air

Clean air to breathe is a keystone of community health: worth striving for and protecting. Reducing particulate matter levels in polluted air delivers major health benefits, for the local community as well as the wider environment.

Just as important, high visibility through clean air builds a clean green image that makes people want to live in and visit, our communities.

But when is air clean? Where and how serious is your area's air pollution problem? And what exactly is causing the problem?

Sure answers depend on specialist analyses and expertise.

GNS Science can help you to identify, target and manage air pollution issues. Whether you work in a council, business, or other organisation, you'll be set to meet your legal obligations – and take responsible action.





# contact us

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To know more about how GNS Science can help your organisation in monitoring air quality, and in taking decisive action to reduce air particulate levels, visit:

[www.gns.cri.nz/nic/](http://www.gns.cri.nz/nic/)

or call us on

**+64 4 570 1444**

or email us at

[airparticulate@gns.cri.nz](mailto:airparticulate@gns.cri.nz)

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