



Report 07.32  
Date 2 February 2007  
File ENV/06/08/01

Committee Environment Committee  
Author Tamsin Mitchell, Air Quality Scientist

## Implementation of the national environmental standards for air quality

### 1. Purpose

To update the Committee on Greater Wellington's progress towards implementing the National Environmental Standards for Air Quality (NES-AQ) and to advise the Committee of the implications for expenditure, resourcing and for the granting of resource consents.

### 2. Significance of the decision

The matters for decision in this report do not trigger the significance policy of the Council or otherwise trigger section 76(3)(b) of the Local Government Act 2002.

### 3. Background

The implementation of the NES-AQ in the Wellington region is an ongoing exercise that has been the subject of two prior council reports. In February 2005 the Committee was informed of the issues and implications surrounding the implementation of the NES-AQ (report 05.18) and in May 2005 the Policy and Finance Committee ratified the region's eight air quality management areas or "airsheds" (report 05.201).

This report outlines the progress towards meeting the ambient air quality standard for fine particulate (PM<sub>10</sub>) in the region, identifies further work required and discusses the implications for industry seeking resource consents to discharge particulates.

#### 3.1 National environmental standards for air quality (NES-AQ)

The NES-AQ are regulations<sup>1</sup> made under the Resource Management Act 1991 by the Minister for the Environment. These regulations contain a package of

---

<sup>1</sup> The Resource Management (National Environmental Standards Relating to Certain Air Pollutants, Dioxins, and other Toxins) Regulations 2004

standards designed to address and prevent adverse health effects caused by poor outdoor air quality.

The standards in force are:

- ambient air quality standards for carbon monoxide (CO), fine particulate (PM<sub>10</sub>), nitrogen dioxide (NO<sub>2</sub>), sulphur dioxide (SO<sub>2</sub>) and ozone (O<sub>3</sub>);
- activity standards that ban various activities that discharge unacceptable quantities of dioxins and other toxics into the air;
- an emission and design standard for new small-scale domestic wood-burning appliances; and
- a design standard for the collection and destruction of landfill gas at large landfills.

### **3.2 Ambient air standard for fine particulate (PM<sub>10</sub>)**

The key air pollutant of concern in New Zealand is fine particulate matter or PM<sub>10</sub> (particles less than 10 microns in diameter). These particles are produced by combustion processes (car exhausts, domestic fires, industrial boilers) and quarrying, as well as arising naturally from sources such as wind-blown dust and sea salt. These particles are small enough to be breathed into the lungs and are associated with premature death, respiratory disease, asthma attacks, reduced immunity, coughs and wheezing.

The ambient air standard for PM<sub>10</sub> is a concentration in air of 50 µg/m<sup>3</sup> measured as a 24-hour average. The standard allows for one exceedence of this limit during a 12 month period. The standard applies in open air and anywhere people may be exposed, including roads, footpaths, residential areas, central business districts, parks, beaches etc, but not inside houses, tunnels or vehicles.

## **4. Comments on the implementation of NES-AQ**

The NES-AQ requires all regional councils to demonstrate that by 2013 that they will meet the standard for PM<sub>10</sub> in all their airsheds. Our research and monitoring shows that Wairarapa, Upper Hutt and Wainuiomata are at-risk airsheds, and under a business-as-usual approach may not achieve the standard in 2013. Therefore, we are required to develop strategies and control resource consents so that there is an incremental year on year improvement in air quality until the standard is met in 2013.

There are five stages to the NES-AQ implementation process:

- Stage 1 – Identify and Gazette regional airsheds;
- Stage 2 – Install air quality monitoring stations in all Gazetted airsheds;
- Stage 3 – Define “straight line paths” to show how at-risk airsheds will meet the standard for PM<sub>10</sub>;
- Stage 4 – Develop strategies to reduce PM<sub>10</sub> emissions in airsheds where needed; and

- Stage 5 – Monitor effectiveness of strategies in reducing PM<sub>10</sub> emissions in airsheds.

#### 4.1 Stage 1 : Regional airsheds

Greater Wellington’s airsheds were Gazetted on 1 September 2005 by the Minister for the Environment. There are eight airsheds located in valleys or areas separated by steep hills, ridges or mountains. Each airshed has its own microclimate, meteorological conditions and emissions profile.

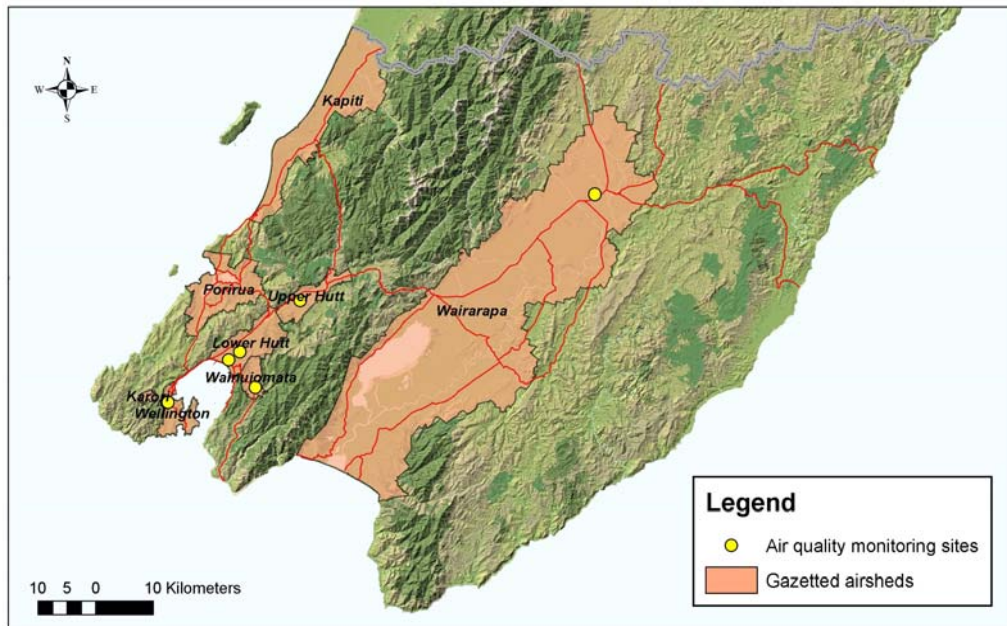


Figure 1: Gazetted airsheds for the Wellington region

#### 4.2 Stage 2: Regional air quality monitoring programme

##### Monitoring network

The NES-AQ require regional councils to monitor at locations which are likely to have the poorest air quality and publicly report any exceedences of the ambient air standards. PM<sub>10</sub>, CO and NO<sub>2</sub> are the contaminants of regional concern and are monitored in accordance with the NES-AQ.

We have monitoring stations in five of our eight airsheds. Stations will be installed in the Porirua, Karori and Kapiti Coast airsheds by 30 June 2009. We won’t know the impact of the NES-AQ on these airsheds until a representative period of monitoring data is obtained.

Monitoring pollutants using real-time, continuous monitoring in accordance with the requirements of the NES-AQ uses highly specialised and expensive equipment. The task of operating the current network to the appropriate standard is significantly increasing the workload of our air quality staff. Additional resources will be required as the monitoring network is expanded into all eight airsheds. Furthermore, monitoring equipment has a limited life span and components will need replacing over time.

## Monitoring results

Our monitoring results show PM<sub>10</sub> levels can become elevated at night during cold, calm weather spells when pollutants become trapped within valleys. Last winter the limit for PM<sub>10</sub> was exceeded three times at both the Masterton and Wainuiomata monitoring stations, and was close to exceeding in Upper Hutt. Our research shows that emissions from domestic fires are almost solely responsible for the PM<sub>10</sub> exceedences during winter.

Weather patterns have a huge influence on the levels of PM<sub>10</sub> that are measured in air. During windy spells pollutants are readily dispersed and so the concentrations measured in air are lower. However, during cold and calm periods emissions from domestic fires increase and dispersion is poor so the level of PM<sub>10</sub> in air becomes elevated. Therefore the number of exceedences depends largely on how mild the winter is. Other factors also contribute, such as increasing electricity prices making burning wood more economically attractive, thus increasing emissions in the airshed.

### 4.3 Stage 3 “Straight line paths” to compliance with PM<sub>10</sub> standard in 2013

We anticipate that Wairarapa, Wainuiomata and Upper Hutt may fail to meet the PM<sub>10</sub> standard in 2013. The NES-AQ requires us to produce “straight line paths” to compliance for the purpose of deciding resource consent applications for discharges likely to significantly increase PM<sub>10</sub> concentrations in the airshed. “Straight line paths” are the framework for managing and for assessing improvements in airshed air quality.

The “straight line path” is a way of showing how emissions of PM<sub>10</sub> in an airshed will steadily reduce from present levels, so that by 2013 there will be no more than one exceedence of the standard in any 12 month period.

The starting point for the straight line path is derived by working out how many exceedences could be expected during a particularly severe winter under current levels of emissions. We then model the reduction in emissions required to ensure we have no more than one exceedence, should we have another severe winter after 2013.

Airshed emissions are determined through emission inventories - essentially an accounting exercise to quantify the emission of air pollutants (e.g. kilograms per day of PM<sub>10</sub>) from the domestic, industry and transport sectors in a community. The contribution from natural sources, such as wind-blown dust and sea salt, can be assessed from source apportionment studies, which analyse particulates collected on filters. The NES-AQ does not discriminate between natural and anthropogenic (‘man-made’) sources of fine particulate, therefore we need to know how much natural sources contribute to exceedences as there is little we can do to reduce natural background levels of PM<sub>10</sub>.

To find out which intervention measures will be the most effective and cost efficient we can model the effects of various emission reduction options, such

as banning domestic open fires or requiring households to upgrade to NES–AQ compliant woodburners.

Developing a straight line path is a significant exercise. It involves conducting emission inventories, modelling pollutant dispersion and analysing past and present air quality monitoring results and meteorological data. Like most councils, we do not have the expertise or resources to prepare our “straight line paths” in-house and much of the underpinning work will need to be outsourced.

#### **4.4 Stage 4 : Reducing emissions in airsheds**

Strategies and intervention measures to reduce airshed emissions will need to be devised once we set the “straight line path”. For instance, ways to address poor air quality caused by unregulated activities like domestic fires and vehicle use are being developed for the Regional Policy Statement.

Achieving emission reductions within the home-heating sector can be costly, depending on the magnitude of the pollution problem. For example, Environment Canterbury’s Clean Heat Project provides subsidies and interest-free loans to households wanting to switch to less polluting forms of heating and install insulation.

#### **4.5 Stage 5 : Tracking compliance with the straight line path**

Emissions reduction strategies and intervention will need periodic review to assess their effectiveness in reducing airshed emissions. As well as continued ambient air quality monitoring, this will involve repeating emission inventories to ensure that emissions are decreasing in accordance with the straight line path.

### **5. Implications for Greater Wellington**

The NES-AQ requires standards for air quality to be met by 2013. There are three airsheds, Wairarapa, Upper Hutt and Wainuiomata where we suspect the PM<sub>10</sub> standard will not be met in 2013. Further work is required to quantify emissions reductions needed and the most cost-effective way of achieving these reductions.

The consequences of not meeting the PM<sub>10</sub> standard are:

- Health costs of preventable premature death and lost productive days from air pollution; and
- Restrictions on industry – no resource consents for any activities that discharge PM<sub>10</sub> within a gazetted airshed, regardless of their size.

#### **5.1 Regional “straight line path” development**

NIWA have prepared a report to help us develop a “straight line path” for the Wairarapa airshed. Preliminary findings indicate that domestic home heating emissions in Masterton need to reduce by 50% over the next six years to give

the best chance of meeting the standard consistently from 2013 onwards. Under business-as-usual (no intervention), we expect emissions to fall by 20% leaving a short-fall of 30% - a target that will not be achieved without active intervention.

Further work is needed to finalise the Wairarapa “straight line path”. This work includes commissioning a detailed emissions inventory, predicting changes in emissions; and assessing management options for reducing emissions.

Further work is also needed to develop “straight line paths” for Wainuiomata and Upper Hutt. This work includes predicting changes in emissions; assessing management options for reducing emissions and completing a particulate analysis study for Wainuiomata. Emissions inventories for both airsheds were completed last financial year.

Ideally the Wairarapa, Wainuiomata and Upper Hutt “straight line paths” will be ready for council approval and ratification by March 2008. Strategies to achieve the necessary emissions reductions will be described in the next Regional Policy Statement.

“Straight line paths” must be developed without undue delay, firstly to ensure there is enough time to implement any necessary emission reduction measures by 2013, and secondly to provide certainty for resource consent applicants seeking approval to discharge PM<sub>10</sub> or to renew existing consents.

## **5.2 Resource consents for discharges to air**

The NES-AQ places constraints on granting consents to discharge contaminants to air, depending on the nature of the discharge and existing ambient air quality. Before 2013, councils must not grant consents for significant discharges of fine particulates to air in a non-compliant airshed where the discharges are likely to cause the air pollution to rise above the “straight line path” to meeting the standard, unless the discharge can be “offset” by reducing emissions from another equivalent source in the airshed. For Greater Wellington, this may constrain the issue of consents in the Wairarapa, Upper Hutt and Wainuiomata airsheds.

After 2013, resource consents (including renewals of existing consents) to discharge fine particulates cannot be granted to industries (regardless of the significance of their discharge) located in non-complying airsheds. This is the situation even though domestic home heating emissions are the major contributor to high pollution nights when exceedences can occur.

Resource consent applicants now need to include with their assessment of environmental effects, an assessment of how their discharge will impact on existing levels of PM<sub>10</sub> in the surrounding airshed. More sophisticated modelling and expert assessment may be required and this cost must be borne by the applicants. Resource consent officers will need to develop assessment criteria and guidance so that applicants understand the level of information required and that all applications are subject to consistent assessment criteria.

## 6. Communication

No further public communication is required for this report. Public notifications of the exceedence of the PM<sub>10</sub> standard were published in the Wairarapa Times Age last winter.

## 7. Recommendations

*It is recommended that the Committee:*

1. ***Receive the report; and***
2. ***Note the contents.***

Report prepared by:

Report approved by:

Report approved by:

**Tamsin Mitchell**  
Air Quality Scientist

**Ted Taylor**  
Manager, Environmental  
Monitoring and Investigations

**Nigel Corry**  
Divisional Manager,  
Environmental Management