

## **Report 99.671**

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Report to the Environment Committee  
from Perry Davy, Resource Scientist

### **Annual Air Quality Monitoring Report 1999**

#### **1. Purpose**

To present the results of the air quality monitoring that has been carried out at various locations within the Wellington Region since September 1998.

#### **2. Background**

Air quality monitoring is part of the Council's State of the Environment monitoring programme and involves a series of screening investigations.

The general perception of air quality in the Wellington Region has been that air pollution is not a problem. In the past, little or no information was available to test this assumption. Internationally, air pollution and the effects on human and environmental health is one of the most major environmental concerns.

The Wellington Regional Council is responsible for managing air quality to protect public and environmental health. Its Regional Air Quality Management Plan contains policies and methods, which reflect the community's expectations of the right to clean air. The monitoring programme is contained in the Plan. It states that the Council will carry out screening surveys as a precursor to establishing a permanent monitoring network. This Plan was developed in close consultation with the community. Therefore, the community has recognised the need for air quality monitoring and expects the Council to carry out such a programme.

The primary objective of the air quality screening investigations is to monitor air pollutants known to have adverse human health effects so as to provide background information for the establishment of a permanent monitoring network.

Monitoring has been carried out at various locations that have been chosen on the basis of local pressures from air pollutant sources. The results to date indicate that there are locations in the Wellington Region where air pollution is a problem and may be a threat to human and environmental health.

### 3. Ambient Air Quality Monitoring

#### 3.1 Air Quality Indicators and Guidelines

Ambient air quality is the general quality of the air that surrounds us. Ambient air quality reflects the cumulative effects of contaminants discharged to air from all sources, both anthropogenic (from human activities) and natural.

The contaminants that are currently being monitored in the Wellington Region are particulate matter (PM<sub>10</sub>), carbon monoxide (CO), and nitrogen oxides (NO<sub>x</sub>). These contaminants are some of those identified in the Regional Ambient Air Quality Guidelines contained in the Regional Air Quality Management Plan.

The Regional Ambient Air Quality Guidelines are divided into two levels; Maximum Acceptable Levels (MAL) and Maximum Desirable Levels (MDL).

The MAL are recommended only as minimum standards of air quality to protect public health. The guidelines were developed from World Health Organisation Standards and international epidemiological research.

The Maximum Desirable Levels (MDL) are set at a level that will provide a degree of protection to the environment, (including soil, water, flora, fauna, structures, and amenity values), taking into account existing air quality, community expectations, economic implications, and the purpose and principles of the Resource Management Act 1991. Desirable levels are appropriate guidelines or targets in rural or residential areas, and in other areas where good air quality is considered a priority.

The MDL's set in the Regional Ambient Air Quality Guidelines are based on Canadian and World Health Organisation Standards. This guideline includes a factor for the protection of sensitive flora and fauna (ecosystems) as well as human health.

The Regional and Guidelines are shown in Table 3.1.

**Table 3.1 Regional and Air Quality Guidelines**

<b>Indicator</b>	<b>Maximum Desirable Level</b>	<b>Maximum Acceptable Level</b>	<b>Averaging Times</b>
Particulates	70 µg/m <sup>3</sup>	120 µg/m <sup>3</sup>	24 hours
	40 µg/m <sup>3</sup>	40 µg/m <sup>3</sup>	Annual
Carbon Monoxide	6 mg/m <sup>3</sup>	10 mg/m <sup>3</sup>	8 hours
Nitrogen Dioxide	95 µg/m <sup>3</sup>	300 µg/m <sup>3</sup>	1 hour
	30 µg/m <sup>3</sup>	100 µg/m <sup>3</sup>	24 hours

Several meteorological parameters are also being monitored, (these are wind speed, wind direction, relative humidity and temperature), as they all have a bearing on air pollutant concentrations.

### 3.2 Summary of Monitoring Results

A useful method to illustrate the significance of the results is to depict the percentage of time that the results fall into certain categories. This method is described by the Ministry for the Environment in the discussion document on Environmental Performance Indicators (Ministry for the Environment, October 1997). Table 3.2 provides a description of these categories.

**Table 3.2: Air Quality Categories**

Category	Maximum Measured Value	Comment
Action	Exceeds Guideline	Completely unacceptable by national and international standards.
Alert	Between 66% and 100% of the guideline	A warning level which can lead to guidelines being exceeded if trends are not curbed.
Acceptable	Between 33% and 66% of the guideline	A broad category, where maximum values might be of concern in some sensitive locations, but are generally at a level that does not warrant dramatic action.
Good	Between 10% and 33% of the guideline	Peak measurements in this range are unlikely to affect air quality.
Excellent	Less than 10% of the guideline	Of little concern.

The results of the air quality monitoring presented in the following sections have been assessed using the Regional Ambient Air Quality Guidelines and the categories described above. A full analysis of the results is provided in the Annual Air Quality Monitoring Report 1999.

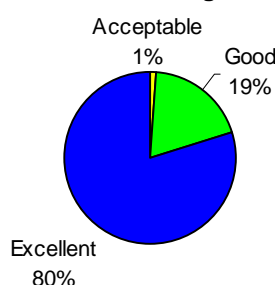
#### Lower Hutt

The air quality monitoring station was located at Huia Pool in central Lower Hutt. The monitoring results indicate that winter is the period when local air quality is likely to be under the greatest pressure.

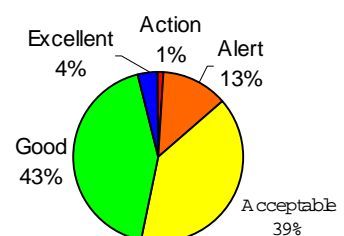
**24-Hour Average PM<sub>10</sub>**



**8-Hour Average CO**



**24-Hour Average NO<sub>2</sub>**



When the air quality monitoring results were compared with ambient air quality guidelines, it was found that the maximum PM<sub>10</sub> and CO concentrations did not reach levels that would be of concern to human or environmental health at any time during the monitoring period.

The 24-hour MAL for NO<sub>2</sub> (set to protect human health) was not exceeded at any time during the monitoring period, however, NO<sub>2</sub> concentrations were occasionally found

to reach levels that exceeded the 24-hour MDL during winter. As the MDL is set to provide a level of protection to the environment, the monitoring results suggest that some action is required to improve air quality in Lower Hutt with respect to ambient NO<sub>2</sub> concentrations.

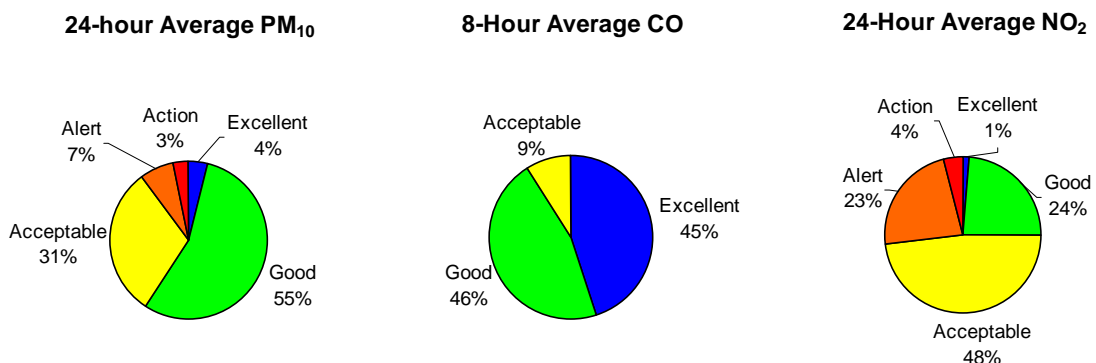
The most likely sources of air pollutants in Lower Hutt are combustion processes such as domestic fires, commercial heating and motor vehicles. Further monitoring and research is required in order to establish the exact contribution of each source to ambient NO<sub>2</sub> levels. Without this information the Regional Council will be unable to make appropriate air quality management decisions.

## Masterton

The air quality monitoring station has been located at Memorial Park, near central Masterton, since June 1999. The monitoring results indicate that cold calm weather in the winter can lead to a build-up in air pollutants, particularly NO<sub>2</sub> and PM<sub>10</sub>.

The monitoring results indicate that, on occasion, the maximum 24-hour average PM<sub>10</sub> and NO<sub>2</sub> exceeded ambient air quality guideline levels. While the ambient monitoring has only covered the winter period to date, the results suggest that there is a significant air pollution problem in Masterton. As a comparison, if Masterton was urbanised to a greater extent, air pollution problems would be similar to those experienced by Christchurch.

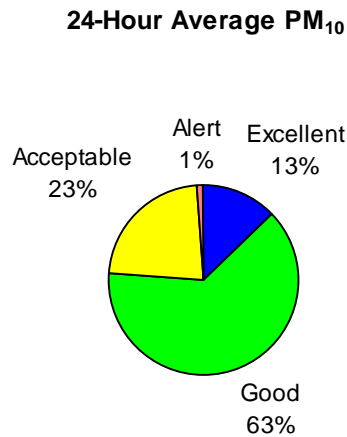
The pie charts below provide a comparison of the monitoring results with the respective MDL. Note that a new national guideline for PM<sub>10</sub> (for the protection of human health) will soon be set at a level that is lower than the MDL which would make the comparison with the air quality categories somewhat worse than is indicated below.



The most likely sources of the wintertime air pollution in Masterton are solid fuel fires used for domestic heating. The Regional Council needs to carry out source apportionment monitoring in Masterton to establish the exact cause of the problem and identify appropriate courses of action.

## Otaki

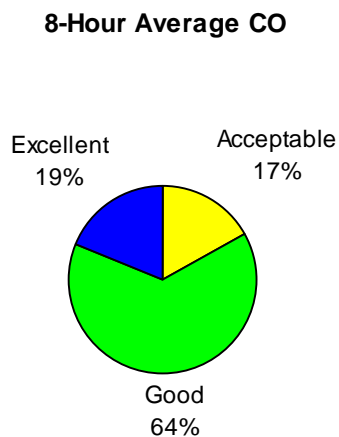
PM<sub>10</sub> was monitored at Otaki from September 1998 through to September 1999. No results from the fine particulate monitoring exceeded current ambient air quality guidelines.



The results indicate that PM<sub>10</sub> concentrations tend to be highest during dry summer weather with moderate to strong winds. Under these conditions, the likely source of the majority of PM<sub>10</sub> at Otaki is likely to be wind-blown sea salt and fine alluvial matter from the Otaki River floodplain. Local quarrying and aggregate handling activities would also provide some contribution local ambient PM<sub>10</sub> levels.

## Basin Reserve

CO monitoring at the Basin Reserve in central Wellington was undertaken from September 1998 until April 1999. The monitoring programme was designed to assess the impact of motor vehicle emissions on local air quality in terms of CO.



The CO guideline levels were not exceeded during the monitoring period. The results show that there is currently only moderate pressure on local air quality at the Basin Reserve due to emissions from motor vehicles. This may change if traffic volumes and/or congestion increases in the local area during peak periods.

Nearby buildings are used for a mixture of activities, including schooling, residential and commercial use. The levels of CO experienced within a particular building are dependent on the ventilation characteristics of that building (i.e. where that building receives its ventilation air and how far from the roadside any air intakes are). In general, the further away from the road that buildings receive their ventilation intake the less likely that indoor air quality would attain the same CO concentrations that the monitor recorded at the roadside.

At present, it is unlikely that there is any significant health risk, due to CO, for people living or working around the Basin Reserve.

#### 4. **Conclusion**

The results of the ambient air quality monitoring carried out the Wellington Region over the past year have shown that the highest concentrations of air pollutants occurred during the winter. The reasons for the higher winter time air pollution levels are periods of cold, calm weather when pollutant concentrations increase in the local air mass rather than being dispersed, coupled with a greater quantity of emissions to atmosphere from combustion sources used for residential and commercial heating.

The monitoring results indicate that, of the locations in the Wellington Region monitored to date, air quality in Masterton is the worst affected by the combination of winter meteorological conditions and the emission of pollutants to atmosphere.

The health risk to the local population from the air quality guideline exceedences needs to be explored in greater depth along with management options for improving air quality where it is degraded.

#### 5. **Communications**

The results of the ambient air quality monitoring will be reported to the community by media releases. We should also start to look at how we can more imaginatively convey our pollution information to the community.

Copies of the Annual Air Quality Monitoring Report 1999 will be sent out to constituent Councils within the Wellington Region, the Public Health Service authorities, the Ministry for the Environment, and tertiary academic institutions. Copies of the report will also be available upon request.

#### 6. **Regional Policy Implementation**

Chapter 8 of the Regional Policy Statement contains policies and methods for air quality management within the Wellington Region. The ambient air quality monitoring programme implements Policies 1-4, relating to air quality management and Methods 2 and 3 in particular.

**7. Recommendation**

*That the report be received and its contents noted.*

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