



caring about you & your environment

Report 01.791

14 November 2001

File: ENV/6/1/3

[Report 2001.Env01791.PD:mm]

Report to Environment Committee
from Perry Davy, Air Quality Scientist

2001 Annual Air Quality Monitoring Report

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 2000.

2. Background

The Regional Air Quality Management Plan requires the collection of information on particular aspects of air quality so that the effectiveness and appropriateness of policies, objectives and rules can be adequately assessed.

In developing its last LTFS the council provided funding for continued expansion of its air quality monitoring network. This funding provided for the establishment of:

- i) an air quality monitoring station in Lower Hutt in 2000/01;
- ii) a meteorological monitoring station in Masterton in 2001/02; and
- iii) an air quality monitoring station in Masterton in 2002/03.

During 2000/2001 an air quality screening survey was undertaken at Upper Hutt. Monitoring of particulate matter (fine dust) was also undertaken at a site in the Wainuiomata basin.

The Wellington Regional Council has now established its first permanent air quality monitoring station at a site in Lower Hutt. The monitoring station will monitor background air quality in order to assess trends in air pollution levels and the health of the air for the population of the Lower Hutt Valley.

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. It reflects the cumulative effects of contaminants discharged to air from both anthropogenic (human activities) and natural sources.

The contaminants that are currently being monitored in the Wellington Region are particulate matter (PM₁₀), carbon monoxide (CO), and nitrogen oxides (NO_x). These are some of the contaminants identified in the Regional Ambient Air Quality Guidelines contained in the Regional Air Quality Management Plan.

The Regional Maximum Acceptable Level (MAL) Guidelines (based on national guidelines) 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 defined as the level that will provide maximum 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 Ministry for the Environment has reviewed the current National Guidelines and proposed new air quality guidelines based on recent epidemiological research. Of particular significance is the new guideline for PM₁₀, which has been reduced to 50 µg/m³ and is now at a lower threshold than the Regional MDL.

The MDL's set in the Regional Ambient Air Quality Guidelines are based on Canadian and World Health Organisation Standards set in the early 1990's. This guideline includes a factor for the protection of sensitive flora and fauna (ecosystems) as well as human health. No relevant guidelines for the protection of New Zealand ecosystems are available as yet. The Regional and National Guidelines are shown in Table 3.1.

Table 3.1 Regional and National Air Quality Guidelines

Indicator	Maximum Desirable Level	Maximum Acceptable Level	Proposed National	Averaging Times
Particulates	70 µg/m ³	120 µg/m ³	50 µg/m ³	24 Hours
	40 µg/m ³	40 µg/m ³	--	Annual
Carbon Monoxide	6 mg/m ³	10 mg/m ³	10 mg/m ³	8 Hours
Nitrogen Dioxide	95 µg/m ³	300 µg/m ³	200 mg/m ³	1 Hour
	30 µg/m ³	100 µg/m ³	100 mg/m ³	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 Air Quality Indicators

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.

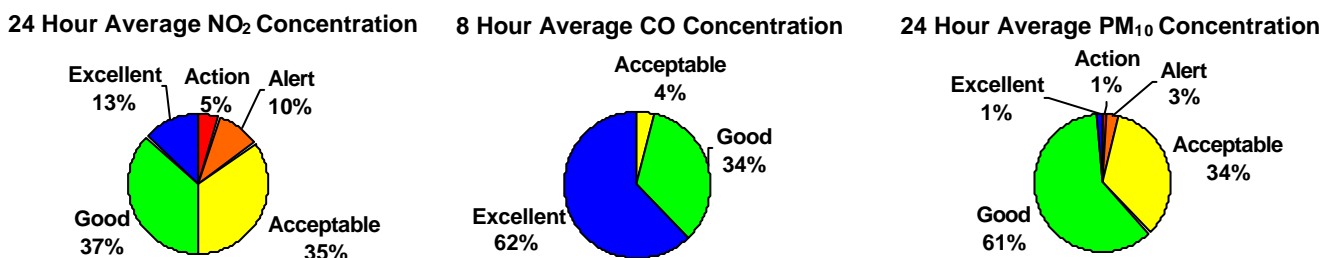
The results of the air quality monitoring have been assessed using the Regional Ambient Air Quality Guidelines and the categories described above. A full analysis of the results is provided in the 2001 Annual Air Quality Monitoring Report.

Since the ambient air quality guideline concentrations are intended to protect human health and the environment, air quality in Upper Hutt and Wainuiomata should continue to be monitored closely in order to assess the best course of action to improve air quality during the winter. The Wellington Regional Council intends to establish a permanent air quality monitoring station in Masterton during the 2002/2003 financial year.

3.3 Summary of Monitoring Results

Upper Hutt

A mobile ambient air quality monitoring station has been located at Trentham Fire Station in Upper Hutt since June 2000. The period from June 2000 through to October 2001, encompassing two winters, has been reported in this document. The monitoring data shows that the Upper Hutt area is susceptible to wintertime pollution episodes.



There were two exceedences of the proposed new National Air Quality Guideline for PM₁₀ during the winter of 2000 and four exceedences of the guideline during the past winter. All pollution episodes occurred during cold calm winter days and nights. A cold snap at the beginning of July 2001 brought a period of cold calm weather that lead to more air pollution events than the previous winter.

Both CO and NO₂ also peaked during the same period. It is suspected that domestic fires are the main cause of the PM₁₀ pollution, with motor vehicles contributing to NO₂ and CO pollution. Further research has been undertaken to identify the predominant pollution sources in Upper Hutt and will be reported early in 2002.

Lower Hutt

The Council's first permanent ambient air quality monitoring station was commissioned at Birch Lane in Lower Hutt since February 2001. This is the first in a network of air quality monitoring stations intended for the Wellington Region. Monitoring results for the period from February 2001 through to October 2001 has been reported in this document.

The results indicate that nitrogen dioxide levels are elevated during the winter in Lower Hutt, this is likely to result from motor vehicle emissions and combustion emissions from residential and commercial heating, combined with cold calm conditions. Peak levels occurred at similar times as those recorded at Upper Hutt. Unfortunately, due to instrumentation failure, PM₁₀ at Birch Lane was unable to be monitored over the winter and therefore no comparison can be made with peak particulate pollution levels at Upper Hutt and Wainuiomata. The problem has now been rectified.

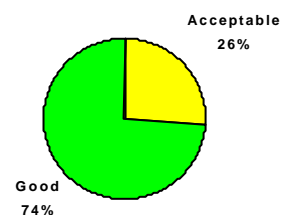
24 Hour Average NO₂ Concentration



8 hour Average CO Concentration



24 Hour Average PM₁₀ Concentration



Wainuiomata

PM₁₀ was monitored at Wainuiomata Bowling Club from September 2000 through to October 2001. Fine particulate concentrations exceeded the proposed National ambient air quality guideline on three occasions during the past winter. The breaches of the guideline occurred during the same period as those exceedences experienced in Upper Hutt, that is, during cold calm weather conditions when dispersion of air pollutants is poor.

24-Hour Average PM₁₀ Concentration



4. Future Monitoring

The mobile air quality monitoring station will be moved to Porirua early in 2002. After that it is likely that the station will be placed in central Porirua. It is intended that the high volume sampler will remain in Wainuiomata, subject to approval by the Wainuiomata Bowling Club, in order to monitor particulate matter during the next winter period due to the high levels experienced last winter.

A new air quality and meteorological monitoring station will be installed in Masterton in 2002.

5. Conclusion

The results of the ambient air quality monitoring carried out in the Wellington Region over the past year have indicated that the highest concentrations of air pollutants occurred during the winter. The higher winter time air pollution levels are the consequence of a combination of periods of cold, calm weather and a greater quantity of emissions to atmosphere from combustion sources. Cool, calm conditions restrict the dispersion of air pollutants. The major pollution sources are suspected to be residential and commercial heating and motor vehicles.

Ambient air quality monitoring at various locations within the Wellington Region shows that air quality is generally good in suburban locations. However, at times, certain areas experience degraded air quality due to a combination of meteorological conditions and local emission sources exerting pressure on the air resource to the extent that it may pose a risk to the health of local populations. The establishment of a permanent air quality monitoring network will enable a clear assessment of trends in air pollution levels and the relative risks to human and environmental health.

6. Communications

The results of the air quality monitoring will be reported to the public by media releases and work is under way to make the information available on the Regional Council's web site.

Copies of the 2001 Annual Air Quality Monitoring Report will be sent out to constituent Councils, the Public Health Service, the Ministry for the Environment, other Regional Councils and tertiary academic institutions. Copies of the report will also be available on request to members of the public.

7. **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.

8. **Recommendation**

That the report be received and its contents noted.

Report prepared by:

Approved for submission:

PERRY DAVY
Air Quality Scientist

JOHN SHERRIFF
Manager, Resource Investigations

JANE BRADBURY
Divisional Manager, Environment