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Report to Environment Committee
from Perry Davy, Resource Scientist

2000 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 1999.

2. Background

The Wellington Regional Council is responsible for managing air quality to protect public and environmental health. Air quality monitoring is an important part of the Council's State of the Environment monitoring programme. Since November 1997, this has involved a series of screening programmes at various locations within the Region. The information gained from the screening surveys has been used to quantify air quality around the Region and determine the most appropriate locations for permanent air quality monitoring stations.

In 1999/2000 air quality screening surveys were undertaken at Masterton and Upper Hutt. Monitoring of particulate matter (fine dust) was also undertaken at a rural Otaki site.

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 activities, both anthropogenic (from human activities) and natural.

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	Averaging Times
Particulates	70 µg/m ³	120 µg/m ³	24 hours
	40 µg/m ³	40 µg/m ³	Annual
Carbon Monoxide	6 mg/m ³	10 mg/m ³	8 hours
Nitrogen Dioxide	95 µg/m ³	300 µg/m ³	1 hour
	30 µg/m ³	100 µg/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 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.

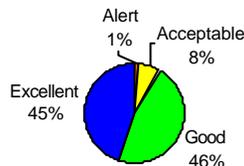
The results of the air quality monitoring have been assessed using the Regional Ambient Air Quality Guidelines and the categories described above. A full analysis of the results is provided in the 2000 Annual Air Quality Monitoring Report.

Masterton

The air quality monitoring station was located at Memorial Park, near central Masterton, from June 1999 until June 2000. The monitoring results indicate that cold calm weather in the winter can lead to a build-up in air pollutants, particularly NO₂ and PM₁₀.

Meteorological data recorded during the monitoring period indicates that, during the winter, Masterton has a high incidence of 'calm' periods (when wind speeds are less than 1 m/s). The pie charts below provide a comparison of the monitoring results with the respective MDL or, in the case of PM₁₀, with the proposed national guideline.

24 Hour Average NO₂ Concentration 8 hour Average CO Concentration 24 Hour Average PM₁₀ Concentration



It was found that the maximum PM₁₀ and NO₂ concentrations, on occasion, exceeded ambient air quality guideline levels. Source apportionment research for particulate matter has shown that the predominant source of the wintertime air pollutants in Masterton are solid fuel fires used for domestic heating.

Since the ambient air quality guideline concentrations are intended to protect human health and the environment, air quality in Masterton 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 the Masterton area during the 2002/2003 financial year.

Upper Hutt

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

24 Hour Average NO₂ Concentration



8 hour Average CO Concentration



24-Hour Average PM₁₀ Concentration

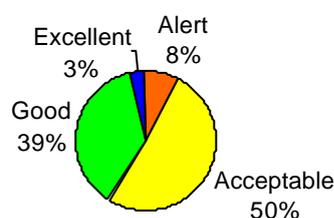


There were two exceedences of the proposed new National Air Quality Guideline for PM₁₀ during the monitoring period. Both pollution episodes occurred during cold calm winter nights. Both CO and NO₂ also peaked during the same period but did not exceed any ambient guideline values. It is suspected that domestic fires are the main cause of the PM₁₀ pollution. Further research is being undertaken to identify the predominant pollution sources in Upper Hutt.

Otaki

PM₁₀ was monitored at a rural Otaki site (WRC Otaki Depot) from September 1998 through to February 2000. None of the results from the fine particulate monitoring exceeded current ambient air quality guidelines. Comparison of the monitoring results with air quality categories show that 8% of the results fall into the 'Alert' category. Therefore air quality should be monitored in Otaki occasionally to determine trends, especially if the area undergoes significant urban development.

24-Hour Average PM₁₀ Concentration



PM₁₀ levels at Otaki are generally higher in summer than winter. This is the converse for PM₁₀ monitoring in more built up areas elsewhere (see for example Masterton and Upper Hutt results) where wintertime peaks are generally recorded. The higher PM₁₀ levels monitored occurred during the summer months under moderate to strong northerly and southerly wind conditions.

The results indicate that PM₁₀ concentrations tend to be highest during dry summer weather with moderate to strong winds. Under these conditions, the main source of PM₁₀ 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 to local ambient PM₁₀ levels.

4. Future Monitoring

The mobile air quality monitoring station will stay in Upper Hutt for the winter months of 2001. After that it is likely that the station will be placed in central Porirua. The high volume sampler has now been moved to Wainuiomata in order to monitor particulate matter during the winter period.

The Wellington Regional Council has now established the 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 local population.

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 residential and commercial heating and motor vehicle.

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 2000 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.

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