

# **Petone-Seaview Ambient Air Quality Monitoring Strategy 2001-2003**

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## 1. Introduction

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

The Wellington Regional Council has the duty to monitor the state of the environment, including ambient air, pursuant to section 35 of the Resource Management Act 1991. The Regional Council also needs to gather information on aspects of air quality so that the effectiveness of policies, objectives and rules of the Regional Policy Statement (RPS) and the Regional Air Quality Management Plan (RAQMP) can be assessed.

Since 1997 the Regional Council has undertaken a series of screening investigations of air quality and various climatological aspects that influence air pollution meteorology within the Wellington Region. Additionally, an emissions inventory of discharges to air has been completed and reported on. The Council has developed, and is in the process of implementing an ambient air quality monitoring strategy for 2000-2005 (*Wellington Regional Air Quality Monitoring Strategy 2000-2005*, Resource Investigations Technical Publication WRC/RINV-T-00-20 June 2000). The strategy focuses on key air quality management issues and the task of establishing permanent air quality monitoring stations around the Region. The aim of the strategy is to gather information on general air quality on which future air quality management decisions will be based and to check compliance with air quality guidelines.

The *Wellington Regional Air Quality Monitoring Strategy 2000-2005* does not however, include targeted monitoring of emission sources or groups of sources, such as those that occur in parts of Petone and Seaview. The Petone/Seaview area is composed largely of light to heavy industrial activities with a numerous emissions to air and also contains the highest density of air discharge permits in the Wellington Region.

For these reasons the Petone - Seaview Ambient Air Quality Monitoring Strategy 2001-2003 has been developed. The monitoring strategy provides an implementation plan for undertaking air quality monitoring in the Petone/Seaview industrial area. The strategy is intended to assess the state of air quality in the area and to provide information much needed in assessing air discharge permit applications.

The monitoring programme will be funded by the State of the Environment charges currently paid annually by air discharge permit holders within the Petone/Seaview area. A monitoring budget and implementation timetable is given in Appendix 2.

## **2. Purpose and Objectives of the Monitoring Strategy**

The purpose of the Petone - Seaview Ambient Air Quality Monitoring Strategy is to provide information on the state of background air quality in the Petone/Seaview area. The strategy should provide information about the effects on air quality from the large number of industrial activities in the area.

The lack of adequate information on ambient air quality in the Wellington Region is recognised in Issue 1 (Chapter 8) of the RPS and Issue 2.1.1 of the RAQMP. Undertaking the monitoring strategy is consistent with Policy 4.2.3 and will implement Methods 6.1.1 and 6.1.2 of the RAQMP.

### **2.1 Objectives**

The objectives of the monitoring strategy are to:

- Provide scientifically robust information on background air quality in the Petone/Seaview area on which to base sound air quality management decisions.
- Provide data that can be used for appropriate effects based decisions on air discharge permit applications.

As well as meeting the above objectives, the monitoring strategy will also need to keep within budgeted (see Appendix 2 for the monitoring budget) Regional Council resources and be in proportion to the scale and significance of any potential effects identified in the area.

### **2.2 Air Quality Issues to be Addressed**

Policies 4.2.9 and 4.2.10 of the Regional Air Quality Management Plan require consideration of a number of factors when assessing resource consent applications. These include:

- (1) *the volume, composition and characteristics of the discharge, including the maximum ground level concentration of significant contaminants in the discharge, especially hazardous contaminants identified in Appendix 1 [of the RAQMP] and any contaminants listed in Appendix 2 [of the RAQMP];*
- (2) *the potential for the discharge to be reduced at source, and in particular, the desirability of minimising the emission of any of the "Hazardous Air Contaminants" identified in Appendix 1 [of the RAQMP];*
- (3) *any actual or potential effects of the discharge on human health and safety;*
- (4) *any actual or potential effects of the discharge on amenity values, including any effects of odour or particulate matter arising from the discharge;*
- (5) *any actual or potential effects of the discharge on the health and functioning of ecosystems, plants and animals, including indigenous ecosystems and plants and animals of commercial significance;*
- (6) *any actual or potential effects of the discharge on other environmental media;*

- (7) *any cumulative effects which may arise over time or in combination with other effects;*
- (8) *any effects of low probability but high potential impact;*
- (9) *to set emission limits on a discharge, where appropriate, in order to minimise its effects on ambient air quality and the surrounding environment;*
- (10) *to require, where appropriate, that the best practicable option (BPO) be adopted to prevent or minimise the adverse effects arising from discharges;*
- (11) *to minimise the emission of any of the hazardous air contaminants identified in Appendix 1 [of the RAQMP];*
- (12) *to require appropriate effects-based monitoring, where appropriate, which may consider a wider range of air contaminants and their effects than those listed in Appendix 2 [of the RAQMP].*

It is clear from these two policies that information on local air quality is vital in order to make a full assessment of the likely effects of any proposed discharge to air. To date this information has been lacking in the Petone/Seaview area.

The issues that can be addressed using information from a well designed monitoring programme include:

- The lack of adequate data and information on ambient air quality in the industrial area;
- The cumulative effects of emissions from industrial processes.

## 2.3 Uses and Users of Monitoring Information

Information gathered about ambient air quality in industrial areas will have a number of potential uses and users, including:

### **Regional Council Users:**

- Resource Investigations Department
- Consents Management Department
- Resource Policy Department

### **and Uses:**

- Identifying the ambient condition of air at industrial locations;
- Identifying the cumulative effects of discharges to air;
- Assessing the human health impacts of degraded air;
- Providing the basis for assessing the impacts of resource consent applications for discharges to air;
- Identifying resource management issues which need to be addressed in order to achieve sustainable management of the Region's air resource;
- Monitoring the effectiveness of the management approaches (regulatory and non-regulatory) adopted by the Council through the Regional Policy Statement and Regional Air Quality Management Plan.

**Other Likely Users:**

- Industry
- Consultants
- Territorial authorities
- Health authorities
- Ministry for the Environment
- Research organisations
- Public.

### **3. Air Quality Indicators**

#### **3.1 Assessment of Monitoring Results**

Results of the Petone/Seaview ambient air quality monitoring strategy will be assessed using:

- (1) Regional Ambient Air Quality Guidelines;
- (2) National Ambient Air Quality Guidelines;
- (3) International Standards or Guidelines where there are no relevant New Zealand Guidelines.

The Regional Air Quality Management Plan contains Regional Ambient Air Quality Guidelines (see Appendix 1). The Regional Guidelines are based on National Ambient Air Quality Guidelines prepared by the Ministry for the Environment (Ministry for the Environment, June 1994). Results from the Petone - Seaview monitoring programme will be assessed as to whether these guidelines are being met and whether Regional environmental goals/outcomes are being achieved.

The Ministry for the Environment has recently reviewed the national guidelines and guideline concentrations for some pollutants have been reduced in line with recent overseas research (e.g. particulate matter). For pollutants where the new National Guidelines are set at a lower level than the current Regional Guidelines, the assessment of air quality in Petone/Seaview will use the lower national guideline value. The Regional Guidelines will eventually be changed to reflect the new National Guidelines.

It is important to note that both the National and Regional Guidelines are recommended only as minimum standards of air quality to protect public health (based on current medical and scientific knowledge) and not as maximum levels to pollute to.

A useful method to illustrate the significance of ambient air quality monitoring results is to depict the percentage of time that the monitoring results fall into certain categories. Table 3.1 provides a description of these categories.

**Table 3.1 Air Quality Categories**

<b>Category</b>	<b>Maximum Measured Value</b>	<b>Comment</b>
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 main intention of the air quality categories is to present information about the air pollutants being monitored and assists in setting goals for air quality management. This method is described by the Ministry for the Environment in the discussion document on Environmental Performance Indicators (Ministry for the Environment, October 1997).

The results of the Petone - Seaview monitoring programme will be assessed using the air quality categories described above.



## 4. Industrial Ambient Air Quality Monitoring

### 4.1 Location of Consented Industrial Premises

Figure 5.1 shows the locations of companies holding air discharge permits in the Petone/Seaview area. Table 5.1 provides the names of permit holders, the nature of the activity carried out on site and the type of pollutants discharged to atmosphere by the activities.

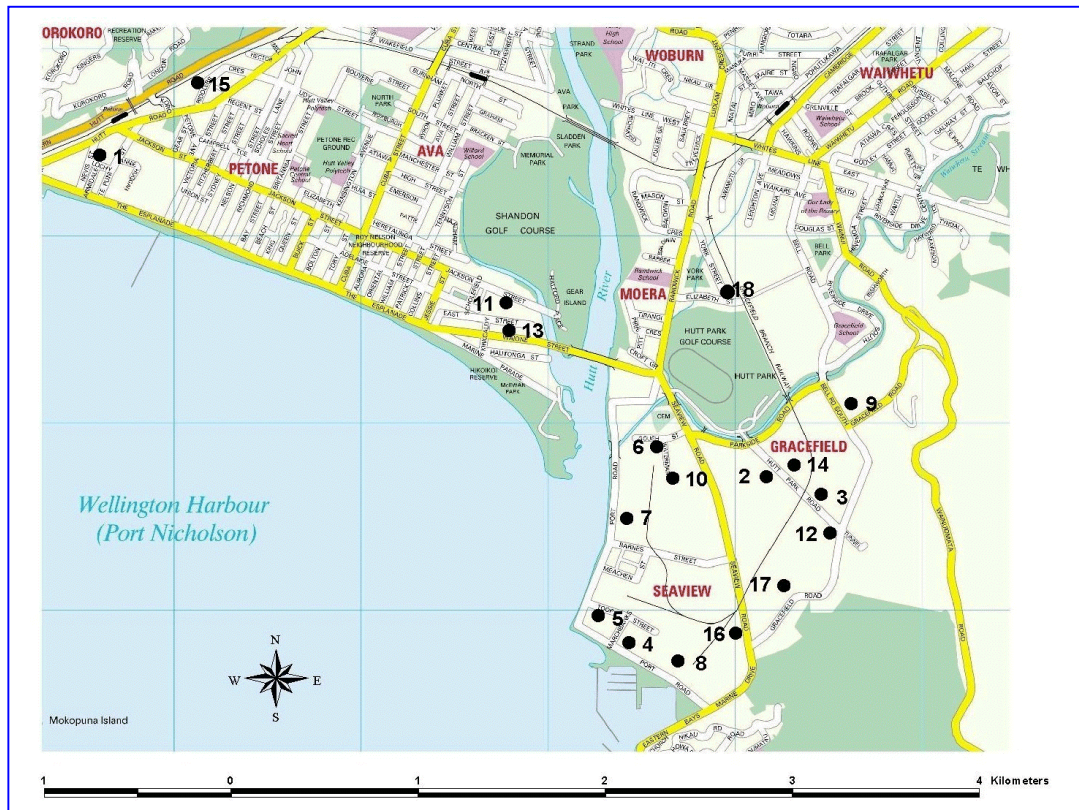


Figure 5.1 Location of Petone/Seaview Discharge to Air Permits

**Table 5.1 Petone/Seaview Air Discharge Permits**

<b>Site No.</b>	<b>Company Name</b>	<b>Location</b>	<b>Activity</b>	<b>Contaminants Discharged</b>
1	Colgate Palmolive Limited	Nevis Street	Detergent Manufacture	Particulate (soap powder), combustion gases
2	Exide New Zealand Limited	Hutt Park Road	Battery Manufacturing	Particulate, lead, combustion gases, acid mist
3	Monroe Springs Limited	Hutt Park Road	Metal Processing	Mineral oil fume, VOCs, CO
4	Seaview Wools	Port Road	Wool drying	Particulate (wool fibre), combustion gases
5	Acme Engineering Limited	Toop Street	Sand Blasting	Particulate (steel/rust/lead fines)
6	Chemwaste Industries	Gough Street	Waste Treatment Plant	Inorganic gases, VOCs
7	United Environmental	Port Road	Waste Treatment Plant	VOCs, inorganic gases, combustion gases
8	Castrol Limited	Port Road	Transformer Oil Recycling	VOCs, H <sub>2</sub> S, SO <sub>2</sub> , SO <sub>3</sub> , PAHs, CO
9	Charta Packaging	Gracefield Road	Cardboard Processing	Particulate (cardboard dust), combustion gases
10	Hutt City Council	Waterman Street	Sewage Treatment Plant	Inorganic gases, combustion gases
11	Unilever	Jackson Street	Detergent Manufacture	Particulate (soap powder), combustion gases
12	ICI NZ Paints Limited	Hutt Park Road	Paint Manufacture	Particulate, VOCs, combustion gases
13	Exide New Zealand Limited	51 Waione Street	Lead recycling from Batteries	Particulate, lead, "other heavy metals", combustion gases, acid mist
14	New Zealand Galvanising	Hutt Park Road	Galvanising	Particulate, zinc compounds, HCl, combustion gases
15	Feltex Rubber Limited	Riddlers Crescent	Carpet Underlay Manufacture	Particulate, VOCs, combustion gases
16	Mobil Oil NZ Limited	Seaview Road	Oil Product Manufacture	Particulate, VOCs, combustion gases
17	Shell New Zealand Limited	Gracefield Road	Chemical Manufacture	SO <sub>2</sub> , SO <sub>3</sub>
18	Tranz Rail	Elisabeth Street	Sand Blasting	Particulate (steel/rust fines)

## 4.2 Monitoring Site Selection

Site selection needs to be consistent with the purpose of monitoring and needs to take into consideration the following matters:

- The representative nature of the site in relation to local ambient air quality.
- Impeding objects that may restrict or influence the airflow to the monitoring equipment.
- Localised emission sources that may impact on the contaminant being monitored.
- Access to the site.
- Potential effects on neighbours of any noise associated with equipment operation.

- Power supply to the site.
- Security of the site.
- Health and safety requirements for Council staff.

The Ambient Air Quality monitoring site will comply with Australian standard 2922-1987 *Ambient Air - Guide for the Siting of Sampling Units* or the equivalent USEPA or ISO standard.

A specific air quality monitoring site has yet to be confirmed in the Petone/Seaview area. A final site will be confirmed after, the location and nature of industries within the area and the site selection criteria detailed above.

#### **4.2.1 Contaminants to be Monitored**

The industrial areas in Petone and Seaview contain numerous industries that have discharges to atmosphere. The variety of industries present results in a broad spectrum of pollutant emissions including particulate matter and various Hazardous Air Pollutants (HAPs).

In considering the nature of the industrial activities present in Petone and Seaview, ambient air will be monitored for the following contaminants:

- PM<sub>2.5</sub> (Particulate matter less than 2.5 micrometers in aerodynamic cross-section)
- PM<sub>10</sub> (Particulate matter less than 10 micrometers in aerodynamic cross-section)
- TSP (Total suspended particulate)
- NO<sub>x</sub> (Nitrogen oxides)
- SO<sub>2</sub> (Sulphur dioxide)
- Heavy metals
- VOCs (Volatile organic compounds)
- Deposited dust

#### **4.3 Air Quality Measurement Methods**

As far as practicable, measurement methods will follow USEPA approved standard methods and Australian Standard methods recommended by the Ministry for the Environment in the Ambient Air Quality Guidelines document (Ministry for the Environment 1994). These methods are also contained in the Regional Air Quality Management Plan as part of the Regional Air Quality Guidelines (see Appendix 1) and are recommended in a report prepared by the Ministry for the Environment (*Ambient Air Quality – Good-Practice Guide for Monitoring and Data Management*, December 2000)

The monitoring methods to be employed in the strategy and the contaminants to be analysed are briefly outlined below.

#### **4.3.1 Particulate Matter**

The recommended methods for particulate matter are the high volume sampler and the TEOM (tapered element oscillating micro balance). In this case it is likely that high volume sampling will be the preferred method due to costs and that the filters used can be further analysed for various pollutants such as heavy metals and PAH's (polyaromatic hydrocarbons). High volume sampling is both an Australian and USEPA standard method for monitoring particulate matter. This method is used elsewhere in New Zealand and is considered effective and appropriate.

#### **4.3.2 Nitrogen Oxides, Sulphur dioxide**

Due to budgetary constraints NO<sub>x</sub> and SO<sub>2</sub> will be monitored initially using low cost passive sampling techniques. The passive sampler techniques are only capable of achieving one month average measurements which cannot be used to compare with the New Zealand Ambient Air Quality Guidelines. The results can be used as a general indication of the relative levels of these contaminants in ambient air quality.

The passive sampling technique is used widely overseas and has recently been used in several areas throughout New Zealand. The principal limitation is that it can only produce one month averages. It is important to continue using this technique in order to obtain continuity of sampling and therefore allow accurate long term observations. If these observations reveal that pollutant levels are nearing concentrations where they may be of concern, then more accurate standard methods will need to be used to determine the true nature of the problem.

#### **4.3.3 Air Pollution Source Apportionment Monitoring of Particulate Matter**

The elemental composition of particulate matter in the atmosphere can be analysed by a special technique called Ion Beam Analysis – Proton Induced Xray Emission Spectrophotometry (PIXE). The instrument used to sample the particulate matter for the PIXE analysis collects two different size fractions, PM<sub>2.5</sub> and PM<sub>10</sub>.

The data will enable us to apportion ambient particulate matter to various sources using the elemental analysis. This will complement the air emissions inventory project and help confirm the relative contribution that each source has to ambient particulate concentrations. The ultimate outcome of the project will be to focus our attention on particular problematic sources that contribute the most to ambient pollution concentrations.

The results of the PIXE spectra will provide the Regional Council with a powerful environmental analysis and assessment tool. An additional advantage of this monitoring system is that it provides background information on elemental concentrations of heavy metals.

#### **4.3.4 Monitoring of Ambient VOC Concentrations**

An important aspect of the strategy will be to provide appropriate information on VOC concentrations in ambient air in order to assess likely effects on human health and the environment. The Ministry for the Environment has also recommended ambient air quality guidelines for specific VOCs.

Industrialised countries around the world are being increasingly affected by a growing number of pollutants that occur in the atmosphere in much smaller concentrations than the traditional air pollutants. Unlike the latter that are few in number and relatively well known, hazardous air pollutants comprise a multitude of compounds and compound classes (including VOCs), with a range of possible sources and effects. VOCs include the following:

- Aliphatic and aromatic hydrocarbons (e.g., benzene, butadiene) - most of these are formed as byproducts of combustion or as evaporative losses from paint and solvent use, fuel transfer and motor vehicles. The two examples given are carcinogenic. Most other chemicals in this class are of moderate toxicity.
- Complex organics (e.g., dioxins, polycyclic aromatic hydrocarbons) - these are also formed as products of incomplete combustion and some have been shown to cause cancer at extremely small doses.
- Halogenated organic compounds (e.g., vinyl chloride, chloroform, trichloroethylene) - these are used in industrial manufacturing processes and are used as solvents (e.g., dry cleaning industry). Compounds in this class have varying toxicity, some which are known carcinogens.

Many of these chemicals are persistent in the environment and tend to bioaccumulate up the foodchain.

VOCs will be collected by sampling ambient air and passing it through an adsorptive medium of activated carbon or some other substance in a glass tube. A sampling pump will be switched on and off by an automatic timer and a one-day-in-six sampling regime will be used.

#### **4.3.5 Dust Deposition Monitoring**

Dust deposition monitoring will determine the rate of dust deposition at various locations in the region using dust deposition gauges as a tool for assessing the environmental impacts of land use and dusts from natural sources. The use of deposition gauges provides a cost-effective method for monitoring nuisance effects.

#### **4.3.6 Meteorological Parameters**

Ideally a meteorological station should be located with the ambient monitoring instruments used in the monitoring strategy. However, due to budgetary constraints this will not be possible. The Regional Council does however, maintain a permanent meteorological station at the Shandon Golf Club, which is currently used to monitor the movement of air parcels and dispersion of pollutants in the Hutt Valley. This

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monitoring station will be used to provide the meteorological data for the Petone - Seaview monitoring strategy. The Shandon Meteorological Station data is located within two kilometres of the Seaview industrial area and is situated in similar terrain and is therefore, considered adequate to use in the strategy.

## **5. Reporting of Air Quality Monitoring Results**

The results and implications of the Petone - Seaview monitoring strategy will be reported on an annual basis or more frequently if specific issues arise (i.e. should the monitoring indicate breaches of the air quality guidelines).

A final report on the strategy will be produced in 2004. The report will include any recommendations for further monitoring and an assessment of the state of local air quality and any implications for the industrial activities in the Petone/Seaview area.

Disseminating the results will include technical reports from the Resource Investigations Department, reports and presentations to Managers and Councillors of the Regional Council, distribution to affected consent holders, local industries, the Hutt City Council, central government agencies, interested parties and members of the public. It is also intended that the monitoring results and additional educational material will be available through the Regional Council's website and that of the National Air Quality Database administered by the Ministry for the Environment.

## References

1. Wellington Regional Council, June 2000: ***Wellington Regional Air Quality Monitoring Strategy 2000-2005***. Wellington Regional Council Technical Report WRC/RINV-T-00/20.
2. Ministry for the Environment October 1997, ***Environmental Performance Indicators: Proposals for Air, Fresh Water and Land***.
3. Ministry for the Environment, July 1994. ***Ambient Air Quality Guidelines***.
4. Ministry for the Environment, December 2000. ***Ambient Air Quality – Good-Practice Guide for Monitoring and Data Management***.
5. Wellington Regional Council, May 2000. ***Regional Air Quality Management Plan***.
6. Ministry for the Environment, December 2000. ***Proposals for New and Reviewed Ambient Air Quality Guidelines***.



## **Appendix 1:**

# **Regional Ambient Air Quality Guidelines**

## Regional Ambient Air Quality Guidelines

Indicator	Maximum Desirable Level	Maximum Acceptable Level	Averaging Times	Techniques for Measurement	
Particulates	70 µg/m <sup>3</sup>	120 µg/m <sup>3</sup>	24 hours	AS3580.9.6-1990	
	40 µg/m <sup>3</sup>	40 µg/m <sup>3</sup>	Annual	AS3580.9.7-1990	
Carbon Monoxide	6 mg/m <sup>3</sup>	10 mg/m <sup>3</sup>	8 hours	AS3580.7.1-1992	
Lead		0.5-1 µg/m <sup>3</sup>	3 months	AS2800-1985	
Nitrogen Dioxide	95 µg/m <sup>3</sup>	300 µg/m <sup>3</sup>	1 hour	AS3580.5.1-1993	
	30 µg/m <sup>3</sup>	100 µg/m <sup>3</sup>	24 hours		
Fluoride	<b>Special Land Use</b>				
		1.8 µg/m <sup>3</sup>	12 hours	AS3580.1.13.1-1993	
		1.5 µg/m <sup>3</sup>	24 hours	AS3580.13.2-1991	
		0.8 µg/m <sup>3</sup>	7 days		
		0.4 µg/m <sup>3</sup>	30 days		
		0.25 µg/m <sup>3</sup>	90 days		
	<b>General Land Use</b>				
		1.8 µg/m <sup>3</sup>	3.7 µg/m <sup>3</sup>	12 hours	AS3580.13.1-1993
		1.5 µg/m <sup>3</sup>	2.9 µg/m <sup>3</sup>	24 hours	AS3580.13.2-1991
		0.8 µg/m <sup>3</sup>	1.7 µg/m <sup>3</sup>	7 days	
		0.4 µg/m <sup>3</sup>	0.84 µg/m <sup>3</sup>	30 days	
		0.25 µg/m <sup>3</sup>	0.5 µg/m <sup>3</sup>	90 days	
	<b>Conservation Areas</b>				
			0.1 µg/m <sup>3</sup>	90 days	
	Hydrogen Sulphide	1 µg/m <sup>3</sup>	7 µg/m <sup>3</sup>	30 minutes	AS3580.8.1-1990
Ozone	100 µg/m <sup>3</sup>	150 µg/m <sup>3</sup>	1 hour	AS3580.5.1-1993	
		100 µg/m <sup>3</sup>	8 hours		
Sulphur Dioxide		500 µg/m <sup>3</sup>	10 minutes	AS3580.8.1-1990	
		350 µg/m <sup>3</sup>	1 hour		
		125 µg/m <sup>3</sup>	24 hours		
		50 µg/m <sup>3</sup>	Annual		

µg - Micrograms  
 mg - Milligrams  
 AS - Australian Standard

## **Appendix 2:**

### **Monitoring Budget and Implementation Timetable**

### Budget for Seaview - Petone Monitoring Programme 2001-2003

Pollutant	Monitoring Instrument	Sampling Regime	Set-up Costs	Annual Analysis Costs	Derivation
TSP	High Volume Sampler	1 day in 6	\$800.00	Part of existing contract	
PM <sub>10</sub> , PM <sub>2.5</sub> , Metals	GENT SFU Sampler	Continuous	\$700.00	Part of existing contract	
NO <sub>2</sub> , SO <sub>2</sub>	Passive Sampler	Monthly		\$3,900.00	12 @ \$325/Sample
Dust Deposition	Deposition Gauge	Monthly	none	\$960.00	12 @ \$80/Sample
VOCs	Absorptive Tube / Pump / Gas Meter	1 day in 6	\$2,000.00	\$5,400.00	60 @ \$90/Sample
<b>Total</b>			<b>\$3,500.00</b>	<b>\$10,260.00</b>	

Site Establishment	Description	Cost	Annual Costs
Instrument Housing	Weatherproof enclosure	\$1,000.00	
Power	Connect and supply electricity	\$600.00	\$480.00
<b>Total</b>		<b>\$1,600.00</b>	<b>\$480.00</b>

Staff	Function	Time (hours)	Annual Cost
Air Quality Scientist	Reporting and Project Management	80	\$5,600.00
Resource Technician	Equipment Calibration and Maintenance	160	\$11,200.00
Resource Advisor	Reporting and Project Management	80	\$5,600.00
<b>Total</b>			<b>\$22,400.00</b>

Summary Costs	
Set Up	\$5,100.00
Annual Analysis and Monitoring	\$10,740.00
Staff Time	\$22,400.00
Repairs and Maintenance	\$1,800.00
<b>Total Cost</b>	<b>\$40,040.00</b>

Annual Breakdown	(excl. Staff Time)	(incl. Staff Time)
Year 1 (Nov 01 - June 02)	\$12,260.00	\$34,660.00
Year 2 (July 02 - June 03)	\$12,540.00	\$34,940.00
Year 3 (July 03 - June 04)	\$12,540.00	\$34,940.00
<b>Project Total</b>	<b>\$37,340.00</b>	<b>\$104,540.00</b>

### Implementation Timetable for Seaview - Petone Monitoring Programme 2001-2003

Date	Milestone
October 2001	Confirm location and set up monitoring site
November 2001	Begin monitoring programme
August 2002	Annual Report
August 2003	Annual Report
June 2004	End monitoring
August 2004	Final Report and Recommendations