4 AIR POLLUTION: INTRODUCTION

New Zealand has a low population density, a close proximity to the sea, a lack of major industry and is isolated from pollution from other countries. As a result the majority of New Zealand experiences good air quality. However, air pollution levels in some urban areas can be elevated. In New Zealand fine smoke, or PM_{10} (particles that are 10 micrometres or less in diameter) is the main pollutant of concern in urban areas. The main source of smoke is from domestic open fires and old, poorly perfoming woodburners particularly in the winter during low wind conditions. In Auckland air quality is also affected by high traffic density with air quality issues not being restricted to the winter period.

4.1 Integrated approach to addressing air pollution and atmospheric problems

Addressing in an integrated manner sources and impacts of air pollution/atmospheric problems – indoor and ambient air pollution; ozone depletion, etc – at the local, regional and transboundary levels

National environmental standards

Having clean air in places where people live is an important goal in the Government's environmental policy. For this reason, 14 standards for the prevention of toxic emissions and the protection of air quality were introduced in October 2004 through The Resource Management (National Environmental Standards Relating to Certain Air Pollutants, dioxins and other Toxics) Regulations 2004. This included:

- Seven standards aim to prevent the emission of dioxins and toxics by a ban on certain activities (such as burning tyres) that emit hazardous pollutants to air.
- Five standards are for ambient (outdoor) air quality, to keep the air outdoors clean and safe. These standards deal with pollutants like PM_{10}, sulphur dioxide, carbon monoxide, nitrogen dioxide and ozone.
- A standard for the design of new domestic wood burners in urban areas to minimise emissions of smoke and soot.
- A standard requiring landfills (over one million tonnes) to collect and destroy landfill gas to help reduce greenhouse gases.

Ambient air quality

The sixteen regional councils and unitary authorities in New Zealand are responsible for monitoring and controlling air pollution. In September 2005 forty-two areas (representing a little under 8% of the country) were identified where air quality is likely, or known, to exceed national environmental

standards. These areas are known as airsheds. The airsheds and their boundaries were drawn by councils using existing knowledge of air quality in the region, the location of significant sources and the effects of topography (hills and valleys) and climate on the dispersion of pollution. All of the airsheds were drawn on the basis of expected PM_{10} exceedences with sulphur dioxide exceedences being also identified in one airshed.

The 2004 regulations aim to minimise breaches of national standards air quality standards by 2013. Between September 2005 and 2013, an annual steady improvement in air quality in polluted areas is required. This steady decrease in pollution levels is known as the straight line path – the straight line between current peak levels and compliance with the standards by 2013. After this date no resource consent to discharge PM_{10} may be granted if the airshed concerned breaches the air quality standard, or is likely to breach as the result of granting the consent.

The use of dispersion modeling has grown has grown rapidly in NZ over the past 10 years and is now commonplace in many resource consent applications for discharge permits.

Vehicle emissions
(Refer also to section 2.2)

Fuel Specifications
New Zealand phased out the use of lead in petrol in 1996. Since this time annual lead levels have fallen considerably and there is no longer a health risk from lead when living next to a busy road. Since 2002 sulphur levels in diesel have decreased from 3000ppm to 50ppm in January 2006. Suphur levels in regular grade petrol have been reduced from 350 to 150 ppm. Further reductions in sulphur levels are proposed (10ppm in diesel by 2009 and 50ppm in petrol by 2008).

Import restrictions
The Vehicle Emissions Rule for new vehicles requires that light petrol and heavy diesel vehicles manufactured after January 2006 meet Euro 3 emissions standards, and light diesel vehicles meet Euro 4 from January 2007. Imported used vehicles manufactured after 1989 must have been manufactured to an approved vehicle emissions standard applicable at the date of manufacture. A visible smoke check at border entry, warrant of fitness and certificate of fitness is to be introduced this year.

0800 Smokey Campaign
The Auckland Regional Council ran a report in smokey vehicle campaign over a 15-week period. The Council provided a free phone number for the public to report smokey vehicles. Over the 15 week period 20,000 different people reported 23,000 different smokey vehicles. 62% of the vehicles reported were aged between 10 and 20 years. One vehicle was reported 67 times. 45% of the vehicles reported were fixed.

Ozone Depletion

New Zealand's unique location in the southern hemisphere, as close as any country can get to the Antarctic, means that when the winter ozone hole over

the Antarctic begins to break up in early spring it spreads out over New Zealand. As a consequence New Zealand experiences high levels of UV radiation particularly during spring and summer. As a country reliant on agriculture and fishing resources we depend on good plant growth, a clean marine environment and a healthy atmosphere.

Ozone depletion is a global issue and therefore New Zealand turned its initial attention to international efforts to preserve the ozone layer. New Zealand ratified the Vienna Convention for the Protection of the Ozone Layer in June 1987 and was the 6th country to ratify the Montreal Protocol on Substances that the Ozone Layer.

Implementation of the Vienna Convention and Montreal Protocol through domestic Legislation

- Time frame – 1990
- Status - Ongoing
- Objective - To phase out ozone depleting substances
- Lead agency - The Ministry for the Environment administers the Ozone Protection Act 1996 and the Ministry of Economic Development administers the Ozone Layer Protection Regulations 1996.
- Domestic Legislation - The Ozone Layer Protection Act was passed in 1990. A new Ozone Layer Protection Act plus accompanying regulations came into force in 1996. The present Act aims to phase out ozone depleting substances "as soon as possible" for all but essential uses. It prohibits the import, export and manufacture or sale of controlled ozone-depleting substances and some products containing them but allows the Minister of Commerce to grant permits and exemptions.

The regulations specifically:

prohibit the import of any bulk CFC, halon, carbon tetrachloride, methyl chloroform, HBFC, bromochloromethane, HCFC or methyl bromide (but make some exceptions for genuine recycled substances)

prohibit the export of any bulk CFC, halon, carbon tetrachloride, methyl chloroform, HBFC, bromochloromethane, HCFC or methyl bromide, except to countries that comply with the Protocol, and restrict the export of other controlled ozone-depleting substances (not sure what you mean here)

provide for the use of methyl bromide for non quarantine and preshipment applications to be phased out by 2005, though the Minister of Commerce can allow exemptions and also the continued import for quarantine and preshipment uses.

provide for the use of HCFCs to be phased out by 2015

provided for wholesalers who held permits to import CFCs in 1995 to convert them to permits to import HCFCs, and provide for use of HCFC permits by those permit-holders to be phased out by 2006

prohibit the manufacture of any controlled ozone-depleting substance

prohibit the import, manufacture or sale of aerosol sprays containing controlled ozone-depleting substances other than methyl bromide, or plastic foam manufactured using CFCs, of dry-cleaning machines using controlled ozone-depleting substances as solvents, and of fire extinguishers containing controlled ozone-depleting substances.

prohibit the import of stand-alone dehumidifiers, refrigerators, freezers, air-conditioners, supermarket display cases, heat pumps, and water coolers that contain any CFC, and prohibit the import of these and certain other products containing any controlled ozone-depleting substance unless the import is from a country that complies with the Protocol

provide some exceptions, including certain uses to protect human health and safety or uses allowed under the Protocol.

- Key features - In practice the legislation allows for phase-out of HCFC's and non quarantine and pre-shipment methyl bromide while banning imports and most uses of other ozone-depleting substances except if an exemption is provided for. Imports and exports of quarantine and preshipment methyl bromide are controlled.

As New Zealand is not a manufacturer of ozone depleting substances the phase-outs are based on a system of tradable import permits. Specific entitlements were issued to individual users based on their permited consumption in a special year (1991 for methyl bromide and 1991, 1992 or 1993 for HCFC's). Entitlements decrease over time towards the scheduled phase out dates.

New Zealand has been able to incorporate considerable flexibility in the legislation by including much of the detail in the regulations. This has allowed New Zealand to respond more easily to changing obligations under the Montreal Protocol. The regulations have been amended on several occasions since 1996, either in response to amendments to the Protocol or to clarify issues. For example, the phase out period for methyl bromide was introduced by a 1997 amendment, and the conditional ban on import and export of HCFC's was introduced in 2000.

- Obstacles to the phase out of ozone depleting substances in NZ - The primary obstacle is the availability of technically and economically feasible alternatives to uses of ozone depleting substances. This is especially evident in the phase out of non quarantine and pre-shipment methyl bromide, but recent research also points to potential difficulties for easy replacement of HCFC technologies.

- Outcomes - The speed and effectiveness of international efforts to reduce ozone depletion is unprecedented in global environmental forum. The total amount of ozone depleting substances in the lower atmosphere peaked in 1994. In 2003, NASA data showed for the first time that the rate of ozone depletion was slowing and that if this trend continued we can expect the ozone

layer to fully recover by 2050.

In New Zealand **bulk CFC's have not been not been sold** since 1991, exceeding the Protocol deadline by three years. In the order of 90% of metered dose inhalers used in New Zealand were CFC-free.

Bulk halons have not been imported since 1990 with the exception of small amounts for essential health and safety uses. New Zealand has also decommissioned many hand-held fire extinguishers containing halons. To date this programme has lead to the collection for safe destruction of more than 30,000 kg of halons (ie. equivalent to the destruction potential of 1.6 billion kg of atmospheric ozone).

New Zealand is still on track to **phase out HCFC's by 2015**, fifteen years ahead of the phase out schedule set out in the Montreal Protocol.

New Zealand, like many countries, is finding the **phase out of methyl bromide slower than expected**. Despite research trials into soil fumigation an effective alternative to methyl bromide has not been found. New Zealand applied, and was granted, critical use exemptions for 40.5 tonnes of methyl bromide to be used for soil fumigation for strawberry beds for 2005 and 30.5 tonnes for 2006. New Zealand is committed to protection of the ozone layer and has stated that its application for critical use exemptions for 2007 will be the last.

Methyl bromide for quarantine and preshipment use is exempt under the Montreal Protocol. The **majority of methyl bromide used in New Zealand is for QPS uses** to meet New Zealand's biosecurity and other countries importing requirements. We estimate that 70% of New Zealand's QPS use is for forest produce fumigation to meet importing requirements of China, Australia and India. Successful work on a replacement (phosphine) for export log fumigation has succeeded in saving an estimated 250 tonnes/per year of methyl bromide.

Methyl Bromide

Methyl bromide is currently one of the most widespread ozone depleting substances still in use both internationally and within New Zealand. Methyl bromide is used in agriculture to kill pests including microorganisms, insects and weeds. It is mainly used by horticulturalists to fumigate soil under susceptible crops such strawberries; to fumigate infested imported goods, and as a pre-shipment treatment for some exports, including fruit and wood (e.g. logs, sawn timber). The Montreal Protocol requires methyl bromide to be phased out by 2005 for production and consumption uses other than for quarantine and pre-shipment (QPS) treatment.

Despite efforts to find suitable alternatives to methyl bromide for quarantine and pre-shipment, use has increased over recent years reflecting an increase in international trade and a growing awareness placed on the importance of effective biosecurity measures. New Zealand's use of methyl bromide has also risen in recent years (currently approximately 160 tonnes/year), due in large part to to countries requiring fumigation in New Zealand before export.

The main use of methyl bromide in New Zealand is to fumigate wood products for export. Methyl bromide is used for treating a variety of different types of export wood products; logs stowed both in ships holds below deck and on deck; sawn timber and wood packaging. The fumigation of imports to New Zealand prevents the introduction of many pests and diseases that could otherwise adversely affect New Zealand's ecosystems.

Export fumigation is carried out in order to comply with importing countries' quarantine requirements. Importing countries set the phytosanitary requirements that exporters must comply with based on their appropriate level of risk for border protection and the International Plant Protection Convention (IPPC) standards. Members to the WTO sanitary and phytosanitary measures agreement are required to use the international standards set by the IPPC unless they can show sound scientific reasons not to. Methyl bromide is one of the standard treatments recommended by the IPPC for timber products. Consequently, methyl bromide fumigation has been set as a phytosanitary regulation by many importing countries.

New Zealand is working with its main forestry trading partners to reduce the amount of methyl bromide fumigant used for quarantine preshipment use, and promote the acceptance of alternative pre-export treatment options.

Phosphine – a possible alternative to methyl bromide for quarantine and preshipment use

- Time Frame – 2003-2006 research, trials and negotiations have been taking place with final acceptance by China yet to be achieved.
- Status - Ongoing
- Objective – to reduce the use of methyl bromide for quarantine preshipment use.
- Lead agency - Biosecurity New Zealand is the ead agency for New Zealand's biosecurity system. Biosecurity New Zealand performs risk analysis, sets standards and negotiates with importing/exporting countries on phytosanitary/zoosanitary trade conditions and assurances. It also administers NZ's export certification system that includes declaration of treatments applied.
- Summary - The main use of methyl bromide in New Zealand is to fumigate wood products for export. China, India and Australia are New Zealand's main forest export destination that requires methyl bromide fumigation as a method to achieve a pest free product. New Zealand has been working with these countries to promote the acceptance of phosphine as an effective alternative treatment to methyl bromide.

  New Zealand supplies 1.1% of the worlds forest products from 0.05% of the worlds' forest resource. New Zealand's forestry industry is based on a single species of pine that was introduced to New Zealand – *Pinus radiata*. Forest products make up 3.45 of New Zealand's' gross domestic product. New

Zealand is required to fumigate 23% of log exports to meet importing countries biosecurity requirements.

New Zealand uses 124 tonnes of methyl bromide annually to fumigate logs and timber products. New Zealand has been working with China to trial phosphine as an alternative timber preshipment treatment.

Phosphine is a natural gas that is produced in anaerobic environments such as wetlands. It is hazardous to human health and also explosive at high concentrations. Phosphine gas can react with metal, including copper, brass, gold and silver. **Phosphine is not an ozone depleting substance**.

To date trials have involved log fumigation in the ships hold with phosphine and logs stowed above deck sterilization with methyl bromide. Current savings of equivalent methyl bromide during the trial are estimated to be in the order of 195 tonnes per annum. It is also cheaper than fumigation with methyl bromide.

The trial to date indicates that phosphine is an effective phytosanitary treatment, equivalent to methyl bromide, for New Zealand grown *Pinus radiata* logs destined for export to Asian markets. At 200ppm for 10 days, phosphine has achieved 100% mortality of the risk pests likely to be associated with New Zealand *Pinus radiata* logs.

Further trials indicate that using a technique of direct generation of phosphine gas has considerable promise where the target pests are on the wood surface. Following the success of the Chinese trials, India has agreed to a trial shipment of logs fumigated with phosphine. Biosecurity New Zealand is presently arranging a first shipment of phosphine treated logs to India.

New Zealand is actively seeking to reduce its use of methyl bromide and is committed to actively work with its trading partners to find acceptable alternatives.

- Outcomes – NZ's advocacy of phosphine is still in its early stages. It has, however, shown promise and to date NZ has saved in the order of 195 tonnes of methyl bromide equivalent.

One of the key lessons from our experience to date is the importance of recognising the needs of trading partners to manage their biosecurity risk at the border and to work with trading partners to ensure alternative treatments, such as phosphine and can provide effective protection against target pest. These assurances need to be supported with robust data from both laboratory and operational trials. And exporters also need cost effective ways to meet importing country requirements

RECOVERY Ozone Protection Company

Industry groups that continue to use CFC's and HCFC's have accepted their responsibility to discard the refrigerant in an environmentally acceptable way. In 1993, a Trust was formed by the New Zealand Institute of Refrigeration, Heating and Air conditioning Engineers with one objective in mind: to promote the facilitate the collection, storage and disposal of all ozone depleting substances during the phase out period. The Trust, now known as RECOVERY, also consults with environmental groups and reports regularly to government through the Minister for

the Environment.

The RECOVERY programme is funded through a wholesale levy that is placed on every kilogram of imported ozone depleting refrigerant ($1:00/per kilogram). When the phase out of ozone depleting substances concludes in 2015 funding of the Trust from the levy will also conclude. From August 1993 to March 2006 total levy receipts have exceeded $5,180,000 reflecting the sale of wholesalers of in access of 5,180,000 kilograms of CFC or HCFC or mixes thereof with an ozone depleting potential of 0.01 or more.

The RECOVERY company was formed to own units and storage tanks required to collect and store refrigerants. The process, which is provided at no charge to industry participants, includes the provided at no charge to industry participants, includes the provision of secure transfer units and storage tanks to hold unwanted refrigerants. From accredited collection depots in Auckland, Wellington and Christchurch, the refrigerants are transferred to overseas destruction facilities.

To March 2006 67,522 kilograms of refrigerants have been collected and destroyed in the facilities of Dascem Holdings Limited (Australia) with a further 3,000 kilograms awaiting destruction.

www.opc.co.nz

No-Loss Campaign

IRACE and the government have joined together to ensure that plant and equipment containing ozone-depleting substances is well-maintained by people who know what they are doing and that owners and managers know that fluorocarbon-based refrigerants can damage the ozone layer and or increase global warming.

The NO-Loss campaign is for a training programme for refrigeration and air conditioning engineers and other people handling refrigerants.

IRHACE also has a code of Practice on the reduction of the emissions of ozone depleting substances.

www.irhace.org.nz