A4
air quality issues

A4-1 Introduction

A4-1.1 This chapter states the significant air quality issues affecting Nelson City. It identifies the nature and cause of issues. How these issues are addressed is set out in the objectives, policies and methods in Chapter A5.

A4-2 Nelson's air resource

A4-2.1 Good air quality is essential for the health of the community and its surrounds including flora and fauna. Areas with clean fresh air enhance the quality of life and add to overall well-being.

A4-2.2 In winter, poor air quality affects the health of the community and reduces the attractiveness of an area. It can causes premature death and affects the day-to-day lives of people through lung and respiratory complaints and may restrict people's participation in certain activities.[1]

A4-2.3 Pressures from growth and development within a city can threaten to make existing air quality worse. In Nelson, this is particularly important as the region has a history of high growth and particulate air pollution levels that exceed government guidelines.

A4-3 Iwi air quality issues

A4-3.1 This section has been written and endorsed by the following Iwi: Ngati Rarua Iwi Trust, Te Runanga o Toa Rangatira,Te Atiawa Ki Te Tau Ihu Trust, Ngati Koata No Rangitoto Ki Te Tonga Trust and Ngati Tama Manawhenua Ki Te Tau Ihu Trust.

A4-3.2 Issues for tangata whenua:

a) Reducing air pollution in Nelson in order to improve the health of the community.
b) Protection of flora and fauna from the adverse effects of air pollution.
c) Discharges of odorous or visual contaminants have the potential to cause adverse effects on sites and resources of significance to tangata whenua.
d) Retention of customary practices.

A4-3.3 The sacredness of Tawhirimatea[2] and the importance of waahi tapu/urupa means that objectionable odours and visible contaminants

[1] Health Effects of Suspended Particulate, Risk Assessment for Nelson City, Environet Ltd (for NCC) February 2002

[2] Tawhiritamea is God (supernatural being) of the air and winds (*Nga Taongo Tuku Iho ki Whakatu Management Plan* prepared by the Ngati Raroa, Ngati Toa, Te Atiawa, Ngati Koata and Ngati Tama iwi).

may cause offence to Tawhirimatea and may violate these sites or other places or features of significance to tangata whenua. It is of great importance to tangata whenua that these sites and resources are protected.

A4-3.4 Examples of potential health issues for tangata whenua include, but are not limited to:

a) Smoke emissions from domestic heating.
b) Agricultural spray drift.
c) Dust pollution.
d) Vehicle exhaust fumes.
e) Industrial/commercial emissions.

A4-3.5 Air is a taonga. It is of great importance to tangata whenua that they are involved in the maintenance and enhancement of the air quality of Nelson.

A4-4 Cross boundary issues

A4-4.1 Nelson City shares territorial boundaries with the Tasman and Marlborough Districts. For air quality, cross boundary issues are of most significance with Tasman District Council due to the close proximity of urban boundaries.

A4-4.2 Airsheds (catchments of air) are defined by topography (hills, valleys etc) and do not easily follow territorial boundaries. It is likely, especially in the Stoke area, that air pollutants will move to and from Nelson City and Richmond within Tasman District.

A4-5 Health effects of particulate pollution

A4-5.1 Of most concern are small particles that are less than 10 microns in diameter, known as PM_{10} (generally from combustion and other sources). PM_{10} is of concern due to the known serious health effects of particles when they enter people's lungs.

A4-5.2 Ambient air quality monitoring of PM_{10} in Nelson has shown that government guideline values are regularly exceeded both on peak days in winter and when daily values are averaged over a year. During winter, concentrations more than three times the Government guideline of 50 micrograms of PM_{10} per cubic metre of air have been recorded in Nelson.

A4-5.3 Health effects research shows a direct link between high PM_{10} pollution days and increases in mortality in the immediately following days (acute effects). Research commissioned by the Nelson City Council shows that approximately 8 premature deaths per year could be occurring due to PM_{10}, and about 14 hospitalisations[3]. Other recent research has also found direct links between long term exposure to PM_{10} and long term health effects (chronic effects),

[3] 'Health Effects of Suspended Particulate, Risk Assessment for Nelson City', Environet Ltd (for NCC) February 2002.

meaning the annual death rate could be four to five times higher than estimated in the Nelson City Council report[4].

A4-5.4 It is estimated that on the worst nights, just under two tonnes of PM_{10} are emitted across the whole of Nelson. The main sources of PM_{10} are:

a) Domestic heating 78%
b) Industry 14%
c) Transport 4%
d) Outdoor burning 4%

A4-5.5 The high contribution of PM_{10} from domestic heating in Nelson means that people living in the urban area are most at risk. High concentrations are unlikely to occur in rural areas where housing density is low.

A4-5.6 Particles smaller than 2.5 microns ($PM_{2.5}$) are also of concern when considering potential health impacts on the community. Research shows that particles of this size can lodge even deeper into the lungs and cause serious health effects. Due to high use of wood, it is estimated that 90% of Nelson's PM_{10} fits into the $PM_{2.5}$ category.

A4-5.7 Nelson's topography and weather conditions are part of the reason why Nelson has high PM_{10} concentrations. Downhill drainage winds bring air pollutants from hills into valleys. During calm cool days and nights an inversion layer of warmer air covers the city and traps cold air containing PM_{10} and other pollutants in the valleys and the flats.

A4-6 Other air pollutants

A4-6.1 Air pollutants including nitrogen oxides (NO_x), sulphur dioxide (SO_2), carbon monoxide (CO), volatile organic compounds (VOC), carbon dioxide (CO_2), benzene and hazardous air pollutants can cause health effects depending on concentrations and exposure.

A4-6.2 Sources of these pollutants include vehicle emissions, emissions from trade and industrial premises such as lamination using adhesives and resins, asphalt production and smelters, and other chemical production processes. The burning of some consumer goods including plastics and tyres can also release air pollutants into the atmosphere.

A4-6.3 Ambient levels of CO, NO_2 and benzene were reported in the Nelson State of the Environment Report, 2001. Taking account of the nature and number of sources of air contaminants in Nelson City, these were identified as the indicator pollutants most likely to cause adverse environmental effects in terms of ambient (i.e. non-localised) levels. That report concluded that based on the Ministry for the Environment (MfE) guideline values, CO and NO_2 are unlikely to cause adverse health effects. An ambient level of any pollutant above the level(s) specified in policy A5-1.3 is considered to be an air quality issue of concern.

A4-6.4 Winter-only monitoring of NO_2, CO and benzene was also undertaken at Victory School during the winters of 2002 and 2003.

[4] 'Health effects of PM_{10} in New Zealand – a technical report for the development of national environmental standards for air', Environet Ltd, for the Ministry for the Environment, May 2003.

In 2002 both NO2 (21% of 1 hour guideline) and CO (42% of 8 hour guideline) fell well within guideline levels. Benzene results were also well within MfE 2002 guideline levels although the guideline is for an annual average while sampling was only undertaken over the winter period (worst part of the year).

A4-6.5 In 2003 sampling showed NO_2 reached a maximum of 43% of the 8 hour guideline level and CO reached a maximum of 26% of the 1 hour guideline level. Monthly peak levels of benzene over the winter period reached 74% of the annual guideline level (not a valid comparison) and the decision was made to continue monitoring benzene for the full calendar year. Provisional results for a full calendar year ending April 2004 showed that for a full year benzene averaged 3.9µg/m^3 (39% of the MFE guideline value). The Government guideline value for benzene reduces from 10µg/m3 to 3.6µg/m^3 in 2010. Benzene (47% from domestic sources) and CO (52%) are largely associated with domestic home heating and in particular wood burners (Nelson Air Emissions Inventory 2001). The provisions in the Air Quality Plan to reduce PM_{10} emissions from home heating will also result in reductions in CO emissions. Further monitoring of ambient benzene levels will be needed to ensure these track down to comply with the lower standard of 3.6µg/m^3 in 2010.

A4-7 Localised effects

A4-7.1 As well as ambient (overall) levels there are also potential localised health and nuisance effects from the release of air pollutants. Localised effects tend to come from individual discharges, or at least a small number of discharges, and include point, area or line sources. The effects of such discharges are localised when they affect individual sites or particular areas, rather than an entire airshed (air catchment). However there can be a continuum between local and ambient effects, and a strict definition of each is not possible. A discharge may affect neighbouring properties (as a localised effect, which may include nuisance or health effects) but the same discharge may affect ambient (overall) air quality in the wider catchment after it has mixed with the wider air body. In areas of high traffic volumes or congestion, some pollutants such as NO_X and CO may increase. Households situated close to trade and industrial premises may be at risk of localised health and nuisance effects, and they may also be at risk from the localised effects of neighbouring domestic chimneys or backyard fires.

A4-7.2 Backyard burning is a major source of reported nuisance, as well as contributing to ambient PM_{10} levels. Complaints tend to relate to neighbours not being able to open their windows or go outside, soiled washing and odour.

A4-7.3 Agrichemical spray drift is an issue when the agrichemical has effects beyond the target site, for example on sensitive crops or ecosystems, or affecting neighbouring properties, residences or water supplies. In urban areas, the majority of agrichemical use is in public areas such as roads and parks, and the issue then is mainly one of public health, as

well as effects on neighbouring properties. Some people are also particularly sensitive and sensitised to agrichemical exposure.

A4-8 Synergistic effects

A4-8.1 Synergistic effects occur where the combined effects of actions of two or more pollutants is greater than the effect of each individually.

A4-8.2 This is potentially an issue for emissions from industrial and trade premises and good information is needed to determine cause and effect relationships on air quality.

A4-9 Odour

A4-9.1 Often the human brain can detect chemicals at levels that are too low to result in health effects but may still be objectionable to individuals or the community.

A4-9.2 Some people may not be affected by a certain odour, or may in fact like the smell, for example fresh silage during a visit to the country. Others, if the source of odour is not controlled, may find the smell offensive. Some odours such as those from sewage ponds and fish factories are generally offensive to most people.

A4-10 Dust

A4-10.1 Dust particles larger than 20 microns are typically a nuisance issue. It impacts on amenity values, such as the soiling of buildings and surfaces and visual impacts but is generally not a health concern due to the relatively larger particle size.

A4-10.2 Like odour, the effect of dust is difficult to measure. Tolerance can vary significantly to dust events and often depends on the nature of the source and the receiving environment. For example, people living in rural areas may have a high level of tolerance for the dust produced by activities such as soil cultivation or top-dressing, but a lower tolerance level for dust from unsealed roads. Dust from abrasive blasting processes is also an issue.

A4-11 Visual effects

A4-11.1 The protection of visibility in Nelson is important for maintaining environmental quality, and for enhancing the amenity value of the environment for the community and Nelson's important visitor industry. Visibility can be affected by natural phenomena including fog or sea spray, or can result from the discharge of contaminants.

A4-11.2 Visual effects from air pollution include localised effects, for example smoke from backyard burning. Or it can involve wider effects such as the inversion layer which traps smoke and other pollutants reducing amenity, or it may impact on views of outlying hills and mountains. These effects may alter people's perception of Nelson's attractiveness.

A4-11.3 Visible air pollution does not necessarily have adverse health or ecological effects. In some cases there may be such effects e.g. smoke discharges. In other cases, such as visible plumes from industrial

discharges, these may be only water vapour. While these plumes may be visible, they may have no adverse air quality effect (other than the aesthetics for some people, or perhaps safety issues if near an airport approach path). In each particular case – and at the particular time - the issue needs to be clearly defined. Is it a visual effect as such? Is it the health or other issues that go with the visible pollution? Or is it a combination?

A4-12 Ecosystems

A4-12.1 Ecosystems, including flora and fauna, can be harmed by air pollutants. This may include effects from the general (ambient) quality of the air, or impacts on ecosystems that are close to trade and industrial premises that emit sulphur dioxide, sulphur particulate, nitrogen dioxide, ammonia, ozone and other air pollutants.

A4-13 Monitoring and information

A4-13.1 Without good quality monitoring information, it is impossible to know how effective the Air Quality Plan provisions are at improving air quality. PM_{10} and other pollutants need to be measured to track the overall air quality within Nelson. Nelson already has good monitoring data that covers PM_{10}. Some monitoring has also been undertaken and is ongoing for CO, NO_x and benzene.

A4-13.2 As research continues into the health effects of air pollutants, guideline values may change, new standards may be introduced and some pollutants may be identified as having greater or lesser health effects than previously thought. Nelson's air quality monitoring network needs to be able to respond to such changes and to fill in gaps in knowledge of the levels of various air pollutants in Nelson.

A4-13.3 If air quality monitoring shows that certain air pollutants exceed government health guideline values then methodologies need to be established to track levels, and management options may need to be explored and implemented to reduce levels.

A4-14 Global Issues

A4-14.1 The main global air quality issues are increases in greenhouse gases and ozone depletion.

A4-14.2 Increasing emissions from industry, agriculture, motor vehicles and electricity generation, deforestation and other activities has led to a build up of greenhouse gases in the atmosphere. The main greenhouse gas is carbon dioxide (CO_2). Others are methane and nitrous oxide. These gases contribute to climate change. In order to reduce New Zealand's contribution to increasing greenhouse gases, the Government in 2002 decided to ratify the Kyoto Protocol designed to reduce the effects of climate change.

A4-14.3 The Resource Management (Energy and Climate Change) Amendment Act 2004 which came into force on 2 March 2004 prevents regional councils when making rules in plans and considering consent applications, from having regard to effects on climate change from the discharge to air of greenhouse gases, except where necessary to

implement a National Environmental Standard. An Air Quality Plan however can still include methods to address this issue through non-regulatory means e.g. by reducing transport demand through a more compact urban form, or by managing Council's own landfill to reduce greenhouse gas emissions.

A4-14.4 New Zealand has commitments under the Montreal Protocol to reduce the level of ozone depleting substances. The Ozone Layer Protection Act 1996 and the Ozone Layer Protection Regulations 1996 set targets for the phase out of ozone depleting substances including chlorofluorocarbons (CFCs).

A4-14.5 The Ozone Layer Protection Act controls the import, manufacture, sale or export of ozone depleting substances. The Ozone Layer Protection Regulations provide exemptions for the use of these substances, including methyl bromide for export quarantine use and other uses such as dose inhalers for those with asthma.

A4-14.6 The Act and its Regulations are enforced by the Ministry for Economic Development, but ozone layer protection policy is managed by the Ministry for the Environment in conjunction with other relevant government departments.

A4-14.7 The role that Nelson City Council has in reducing emissions is limited by national controls, however consideration of global effects such as ozone depletion can be made in some instances, including the use of methyl bromide for fumigation purposes.