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Report to the Regional Land Transport Committee
From Tony Brennand, Manager, Transport Policy

Vehicle Air Pollution In Wellington and Its Health Effects

1. Purpose

To advise the Committee on a possible response to a report produced for the Ministry of Transport and an editorial comment in the Dominion.

2. Background

A report, dated 20 January 2002, titled "Health effects due to motor vehicle air pollution in New Zealand" has been produced for the Ministry of Transport. This report was co-authored by representatives of NIWA, Kevin Rolfe and Associates Limited, University of Auckland, Wellington Medical School and University of Canterbury. The executive summary of this report is provided in **attachment 1**.

The report states that the most likely number of people from Wellington above 30 years of age who experience premature mortality due to exposure to emissions of PM₁₀ particulates from vehicles is 56 people per year. Wellington is defined in this report as the four cities of Wellington, Lower Hutt, Upper Hutt and Porirua and does not include the Kapiti Coast District and the Wairarapa.

This figure of 56 people per annum compares with 399 nationwide and is the second largest mortality rate for an urban area. This figure is only for the PM₁₀ particulates from vehicles and does not include deaths related to carbon monoxide, nitrogen oxides, hydrocarbons, sulphur oxides, other particulates or ozone.

The release of this report was followed by an editorial comment in the Dominion dated 26 April 2002 which advocated a campaign similar to the 0800 SMOKEY campaign conducted in Auckland. A copy of the Dominion article is provided in **attachment 2**.

The 0800 SMOKEY campaign encouraged members of the public to report drivers of vehicles that produced excessive exhaust fumes. Vehicle owners who were reported received information packs and an invitation for a free exhaust check. This was largely an education programme that proved successful.

The Chairman of the Committee responded to the Dominion article by way of a letter to the paper that was published 7 May 2002. A copy of this letter is provided in **attachment 3**.

3. Comment

3.1 Health effects of vehicle emissions

Vehicle emissions are hazardous to human health and will lead to premature death. **Attachment 4**, which was also sourced from the report to the Ministry of Transport, gives a useful summary of the principle vehicle emissions and their impact on human health.

3.2 Policy background

Air quality is an issue that is considered in the Regional Land Transport Strategy and is a subset of the objective of sustainability. Pages 49 to 52 of the Regional Land Transport Strategy which deal with this issue are reproduced in **attachment 5**. In particular the Strategy states:

“Theme 5.1: Minimise the impact of transport on the environment

Policy 5.1.1: Promote environmentally benign transport mechanisms

Policy 5.1.2: Make cycling and walking more attractive

Policy 5.1.3: Price at peak times on the road network to mitigate adverse impacts of road use”

In particular policy 5.1.1 identifies the following mechanisms:

- encourage the use of efficient and environmentally friendly vehicle technology in our vehicle fleets, for example well tuned engines, small engine sizes, light weight vehicles, efficient aerodynamic designs and catalytic converters
- encourage the use of environmentally friendly fuels, for example electric vehicles, dual fuel engines, hydrogen fuel cells, CNG and LPG
- reduce congestion where it occurs – this reduces exhaust emissions from idling vehicles
- ensure that private cars, where they are used, are used efficiently, for example carpooling
- encourage the use of public transport and slow mode, including walking and cycling.

It is clear that an 0800 SMOKEY campaign is consistent with, but is not the only means of achieving, efficient and environmentally friendly vehicle technology by encouraging vehicles to be well tuned.

3.3 The meaning of health guidelines

The Regional Land Transport Strategy was developed by, amongst other issues, directly considering air quality issues. In developing the Strategy the Transport Policy Department commissioned a programme of carbon monoxide monitoring throughout the region. In petrol motor cars carbon monoxide levels are also an indicator of PM₁₀ levels.

This monitoring produced very few sites where regional air quality guidelines were exceeded. The exceptions were at the corners of Vivian and Victoria Streets and Manners and Willis Streets. These exceedences were at the 8 hour levels. This monitoring suggested that high volume, narrow canyoned streets may be a problem on still days. It should be acknowledged in the four years since air quality monitoring took place at these sites that traffic has continued to grow, and assuming all other things remain equal, the risk of exceedences of air quality guidelines have increased.

The air quality guidelines establish a threshold for exposure which is judged to be acceptable. These thresholds are not establishing a level below which there will be zero premature deaths. These thresholds indicated at the particular site in question, the level of premature deaths associated with an emission are at a level that is small and judged by the community's representatives as acceptable but certainly not zero.

This means that the small number of sites where exceedences of the guidelines has been detected is not evidence that premature death due to vehicle emissions is a minor issue. The guideline only tells us about the contribution of a specific site and does not address the issue of health effects resulting from the accumulated effect for a person travelling within an area, even if the whole area is made of sites with low numbers of exceedences.

In Wellington city, for example, exceedences of guidelines at the Victoria/Vivian intersection, which is a point site, will be an issue for people who live or work nearby that site. However, people moving around the whole of the CBD over a number of sites or generally residing in the CBD will be accumulating impacts on their health which will also in some cases lead to premature death.

3.4 Analysis of emission levels

On an urban road network the quantity of emissions effecting air quality is a function of mean vehicle speeds, total vehicle kilometres travelled, levels of congestion, make up and age of vehicle fleet, fuel quality, engine efficiency and other factors.

The weekday daily cumulative vehicle emissions estimated for the Wellington region, this being the full extent of the Wellington region defined in local government terms, for each of the emission types using the transport model are:

- Carbon monoxide 83 tonnes
- Hydrocarbons 10 tonnes
- Nitrogen oxide 5.4 tonnes
- PM₁₀ 0.81 tonnes

Assuming that there are no changes to vehicle or fuel technology it can be expected that future vehicle emissions will follow the curves shown in **attachment 6** if the transport network and current trip patterns remain unchanged. Tonnages of vehicle emissions increase at a rate faster than traffic growth rates because emission levels increase with trip length and congestion levels as well as traffic volumes.

The effect of undertaking a campaign such as the 0800 SMOKEY can be understood by considering **attachment 7**. If the 0800 SMOKEY campaign is successful in Wellington it would have the benefit of raising community awareness and may encourage the population to maintain their vehicle engines and keep them well tuned. An optimistic estimate of the benefits would suggest that total emissions might show a one off decline of say 10 percent. If this campaign continued to persuade the public to operate well maintained and tuned vehicle engines then future emission levels would follow the pattern shown in attachment 7.

Attachment 7 indicates that community awareness that leads to ongoing well maintained and tuned vehicles produces emission curves that are better than not doing anything. However, this is seen to be only a short term solution as ongoing traffic growth and congestion will see emission levels reaching present day levels and then continuing to worsen.

An 0800 SMOKEY campaign, if successful, would be worthwhile but ultimately ongoing traffic growth would undermine its benefits. The real issue that needs to be addressed is traffic growth.

The Government has developed its Vehicle Fleet Emissions Control Strategy (VFECS). This strategy argues that a number of mechanisms can be used to improve air quality impacts of vehicle emissions.

VFECS suggests that removing major congestion points should result in significant reductions in vehicle emissions. In the Wellington network our analysis shows that there is a dynamic response to congestion relief. The removal of a bottleneck can exacerbate downstream bottlenecks, can lead to increased trip making and can lead to increased average trip lengths. This net result is that the removal of major bottlenecks is unlikely to lead to significant air quality improvements as VFECS contends but at best lead to marginal improvements.

Our analysis shows that improved passenger transport, walking, cycling and travel demand management techniques such as rideshare and teleworking are likely to show marginal improvements to air quality while there is an underlying environment of growth in car use.

VFECS also argues that improved vehicle and engine technology and improved fuels will lead to improved air quality outcomes. Forecasting the rates at which vehicle and engine technology or fuel quality will improve is very difficult but unless it exceeds the rate of the combined effect of traffic growth, trip length growth and congestion growth then air quality conditions will deteriorate. Our judgement is that it is unlikely that technology improvements will occur at a sufficient rate to address the underlying issue of traffic growth, congestion and trip length increase.

A long term solution to air quality issues will need to address the underlying issue of traffic growth which also is the primary cause of increasing congestion. Improved air quality outcomes will require strategies that seriously attempt to deal with growing

car ownership and seek to implement traffic restraint measures such as road pricing and parking restraint.

Car ownership levels in New Zealand is the second highest in the world. Levels continue to increase through importation policies that do not appear to recognise the consequences of such actions. There is also an underlying cultural issue in the management of many organisations which links status with the provision of a motor vehicle as part of the salary package. Long term relief from air quality problems in our urban areas will require rethinking these mechanisms.

In the development of the Regional Land Transport Strategy road pricing was found to be a very effective tool in dealing with air quality issues. This is why policy 5.1.3 (price at peak times the road network to mitigate adverse impacts of road use) and needs to be thought of as a key tool in dealing with air quality issues resulting from motor vehicle use.

3.5 Other issues

Information received from the Auckland Regional Council indicates that a six month 0800 SMOKEY campaign in Wellington would cost approximately \$700,000 (refer **attachment 8**).

It should be noted that an 0800 SMOKEY campaign would also assist as a compliance tool which would assist the LTSA with its responsibilities with commercial vehicles.

4. Communications

There are no relevant communication matters.

5. Recommendations

1. *That the Committee note that an 0800 SMOKEY campaign may have useful benefits for improving air quality in the Wellington region but that this can only be seen as an interim measure.*
2. *That the Committee note that an 0800 SMOKEY campaign is an educational or community awareness measure rather than a transport planning measure and should be referred to an appropriate party for consideration.*
3. *That the Committee recognise that a long term solution to motor vehicle induced air quality problems requires measures to deal with the underlying growth in car ownership in this country and that Government be approached to develop a strategy to deal with this issue.*
4. *That the Regional Land Transport Committee continue its investigations into road pricing and parking restraint.*

5. *That the Committee seek to develop policies and measures that encourage organisations within the Wellington region to review the practice of providing motor vehicles as part of staff remuneration packages.*

Report prepared by:

Approved for submission by:

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Attachments:

- 1- **Executive summary of report titled “Health effects due to motor vehicle air pollution in New Zealand”**
- 2- **Dominion Editorial dated 26 April 2002**
- 3- **Letter to the Dominion from WRC dated 7 May 2002**
- 4- **Summary of principle vehicle emissions and their impact on human health**
- 5- **Extract from Regional Land Transport Strategy**
- 6- **Daily vehicle emissions**
- 7- **Daily vehicle emissions**
- 8- **Costs to run an 0800 SMOKEY campaign**