ENVIRONMENT PROTECTION & HERITAGE COUNCIL

Co-operative Studies on Priority Air Quality and Health Related Issues

Priority Research Areas

Preamble
Recognising the significant linkages between air quality and health, EPHC has initiated a process to identify priority areas for co-operative studies with the health sector. Over the past eighteen months, Council has approved important studies in this area, including an extension of previous work on links between air quality and health in major Australian cities.

Background
In May 2002, Council resolved to establish an unfunded working group, chaired by Victoria, to identify priority areas of research into the relationship between air quality and health, and to identify funding options and develop mechanisms for the delivery of priority research projects. The information generated by these studies would support decisions on future air quality standards and management strategies.

In October 2002, Council resolved to support the expansion of the Multi-City Mortality and Morbidity Study as an immediate research priority, and directed the working group to scope, in consultation with key stakeholders, a national study of air pollution and asthma. In doing this, the importance of working closely with the health sector to ensure that air pollution and health issues become a priority area for the health sector was emphasised.

In May 2003, Council approved a proposal (including New Zealand cities) for the expansion of the Multi-City Mortality and Morbidity Study, received a report on the national Asthma and Air Pollution Workshop held in January 2003, and directed the working group to report to Council in October 2003 on further priority research areas.

Priority Research Areas
Building on previous consultation, a discussion paper was prepared and used as the basis for national consultation on air pollution and health priorities. Consultation meetings with key stakeholders were conducted in all major Australian cities throughout July and early August 2003 with over 100 stakeholders attending consultation sessions nationally.

It should be noted that, given the limited time available, many of the identified key studies will not be able to be finalised in time to inform the review of the Ambient Air Quality NEPM scheduled to commence in 2005. However, consideration should be given to proceeding with such studies to ensure that data are available for future NEPM reviews and to inform other initiatives pursued by EPHC.

The high priority research areas that have been identified for consideration by Council at this time are:

- an investigation of the characterisation and composition of particles (both PM_{10} and $PM_{2.5}$);
- a cross-sectional analysis of a cohort of children investigating the impacts of air pollution on sensitive health outcomes such as lung function and respiratory symptoms;
- a cross-sectional analysis of a cohort of the elderly investigating the impacts of air pollution on symptoms of COPD and heart disease; and
- an investigation of the impact of air pollution on sensitive indicators of cardiovascular disease such as heart rate variability.

This list does not rank the research areas from highest to lowest. Rather, the particle composition study is listed first as it provides an opportunity to build on current work. The two cohort studies are considered to be of equal importance and will deliver both short-term and long-term benefits. The study of sensitive cardiovascular indicators would be a significant contribution to the international body of research but will require careful study design. If Council agrees to scope these studies by April 2004, the particle composition study and the study of sensitive cardiovascular indicators could be completed in time to inform the review of the Ambient Air Quality NEPM scheduled to commence in 2005, as could the initial cross-sectional analyses that will form the basis of any future longitudinal cohort studies.

The characterisation of particles, including determination of the composition of particles in various size fractions, has long been seen as a high priority area of research. The Four City Particle Composition Study (funded by Environment Australia) currently being undertaken in Melbourne, Sydney, Brisbane and Adelaide is investigating the composition of both $PM_{2.5}$ and PM_{10} over a 12 month period. The information generated by this study will be used to assist in the interpretation of the results of the first stage of the Multi-City Mortality and Morbidity Study. An expansion of this study to include additional cities and additional sampling in the cities currently participating in the study would provide important information for the review of the particle standards as part of the review of the Ambient Air Quality NEPM scheduled to commence in 2005.

Both cohort studies would be of longitudinal design to determine the long-term impacts of air pollution on these sensitive groups, but would contain cross-sectional and panel studies that would be conducted on an annual basis providing an evaluation of the short-term impacts of air pollution on health. To enable the development of a detailed study design, baseline cross-sectional studies need to be undertaken. These studies would recruit the cohorts for the longitudinal studies if such studies are pursued in the longer term.

The first study would involve a cohort of school-aged children and the second a cohort of the elderly (65 years and over). Both of these groups have been identified

in overseas studies as being particularly susceptible to the impacts of air pollution. If approved in April 2004, these baseline cross-sectional studies may inform the review of the Ambient Air Quality NEPM, especially if existing cohorts can be used with an air pollution component being added to these studies. These studies would provide information on the role of air pollution in exacerbating symptoms of existing disease.

The investigation of the impact of air pollution on sensitive indicators of heart disease could be conducted as a time-series analysis using routinely collected data from cardiac units within major hospitals. An alternative approach would be to conduct a further cohort study where people are recruited and followed over time. Use of existing data would provide a more cost-effective approach for conducting such an analysis and would require a shorter time frame to complete the study. If sufficient routinely collected data is available, this study may be completed in time to inform the review of the Ambient Air Quality NEPM.

Time-series studies of sensitive heart outcomes such as heart variability are being used overseas to assist in the elucidation of the biological mechanisms underlying the adverse effects associated with exposure to air pollution (in particular PM_{10} and $PM_{2.5}$) observed in population based epidemiological studies. Given the lower levels of air pollution experienced in Australia compared to overseas countries, it is important to identify whether such effects are also observed at these lower pollution levels. Such information is critical in identifying whether threshold levels exist for these effects, and is fundamental to the development of air quality standards.

The above studies will provide data on the impact of air pollution on sensitive health indicators that affect the quality of life of people that fall within these susceptible groups. They will also provide information to assist the health sector in the development and application of environmental health indicators for air pollution. Environmental health indicators are currently being developed for children with asthma and for the elderly with COPD and cardiovascular disease. The development of these indicators is a priority for the health sector and was identified as a key priority in the implementation of the National Environmental Health Strategy.

It is important that the initiatives pursued by EPHC to support the development of air quality standards in Australia be closely aligned with the environmental health indicator work currently being undertaken. The environmental health indicators will provide a measure of the impact of air pollution on public health in Australia over time and could be used to evaluate the success of actions undertaken by the environment sector to improve air quality. Securing joint sponsorship of the high priority research projects outlined above would enhance the EPHC strategic objective of strengthened relationships with the health sector.

Medium priority projects were also identified through the consultation process. These include:

- a study into the effects of air pollution on Indigenous health. This could be conducted as a panel or cohort study in urban areas with significant Indigenous

populations such as Darwin, Alice Springs, Whyalla, parts of northern Western Australia and north Queensland. This study would provide information to fulfil the EPHC charter of ensuring consideration of the impact of environmental hazards on Indigenous populations;

- a study of the relationship between indoor air pollution, personal exposure and ambient air pollution. This would enable an assessment of the contribution from indoor sources to personal exposure, and would assist in informing any exposure assessments conducted as part of the development of air quality standards;
- a time-series study investigating the association between air pollution and adverse health outcomes such as low birth weights, premature deliveries and retarded intra-uterine growth. However, given the nature of the confounding issues associated with this research, such a study requires careful design and further consideration; and
- a study to track the impact of the new fuel quality standards on air quality and health.