

Department of the Environment and Heritage

**Air Quality Forecasting
for Australia's Major Cities**
4th Progress Report

Prepared by Project Management Committee
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The Director
Air Quality Section
Environment Protection Group
Environment Australia
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Attention Mr Paul Kesby

Dear Mr Kesby,

We are pleased to present the fourth progress report for the Australian Air Quality Forecasting System. The report is a compilation of progress reports for each of the four collaborating organisations for the project and managed by CSIRO Atmospheric Research. The project team comprises:

Environment Protection Authority (Victoria)
Environment Protection Authority of NSW
Bureau of Meteorology Research Centre
CSIRO Energy Technology and
CSIRO Atmospheric Research

A description of the Project, its Management Structure and the Work Schedule are described in the Appendix immediately following this Main Report.

Progress

This Report describes progress up to Phase 4, though all of the work in meeting objectives for Phase 5 has also been completed. We plan to report on Phase 5 briefly in a few weeks time, once the Demonstration System for the Forecasting System is running.

The Team has set the dates for the Demonstration Period to be 7 August – 4 December. This interval covers the Olympic Games (15 September for 3 weeks) and the ParaOlympics (two weeks after). During this period the full Demonstration System is to be running. A description of the detail of the operation is provided as Appendix 2.

Our external reviewer, Dr Phil Morgan of Department of Environmental Protection, Western Australia, has reviewed the Third Progress Report and his comments are included on the following page. He notes that aside from some delays in the emissions inventory component it seems that the project is proceeding well and is achieving some significant outputs. He also notes that the performance of the vehicle emissions power model is a particular example of a significant achievement, and one which will have spin-offs for assessing the effectiveness of implementing management strategies for those emissions.

In this Phase 4, progress has been slow for emissions and chemical transport modelling. However, the meteorological modelling component has progressed strongly and is reported in some detail. The following sections summarise this progress.

The following highlights are especially interesting:

- The numerous extensions of the LAPS meteorological model have culminated in the testing of five cases where the pilot pollution model overpredicts ozone pollution in the Sydney region and three cases where the predictions are satisfactory.
- The LAPS test events have highlighted the importance of closely coupling the meteorological and air pollution components, as is to be done in the full Demonstration System that is close to completion. In particular, interaction between biogenic emissions and temperature, between cloud and rain and radiation for ozone production, and between winds and particle emissions are all aspects that will benefit from this coupling.
- An advanced version of the on-line high speed chemistry (GRS) has been developed and is undergoing testing.
- A preliminary report of the work in developing aspects of the near-road component of the Forecasting System is presented. It has the necessary characteristics to describe pollution emissions at fine scales.
- EPA NSW has reviewed the MAQS emissions inventory and is planning several upgrades in preparation for the Demonstration Period.
- Staffing difficulties have slowed some of the on-line emissions components for vehicles and area sources. Biogenic emissions will be handled using methods developed by EPA Victoria for work in Western Australia.

Project Developments

A closed web site for the AAQFS is now running, as discussed in the CSIRO Report. It is proving to be an important source of information on the development of the project, and holds forecast fields as they are developed and will show a variety of kinds of presentations. We are obtaining feedback about the development and ways to present information.

For and on behalf of
AAQFS Management Committee



(Dr) **Peter Manins** PSM, FTSE, CCM, QEP

COMMENTS ON 3RD PROGRESS REPORT FOR PROJECT
AIR QUALITY FORECASTING FOR AUSTRALIAN MAJOR CITIES

In general the project is proceeding well, but there are some difficulties evident in meeting deadlines. However, these difficulties do not appear to be insuperable, or likely to compromise the objectives of the project.

The report on the Emissions Inventory Component appeared to not have been checked for spelling or grammar (cf page 10 line 23, page 11 line 29). It is also clear that this component is now behind schedule. The 4-month delay in accessing the NEC supercomputer is likely to have fairly serious implications for meeting the overall project schedule, and the next report should indicate how the consequent problems have been overcome, if indeed they have been able to be overcome.

The legal issue (Status of Agreement) may have been more appropriately reported in a section on project management rather than with the technical material.

The CSIRO Energy Technology report indicates that good progress has been made with the power based vehicle emission model. There will be some important spin-offs from this work for vehicle emissions management strategies in the future and for evaluating the likelihood of compliance with the 10-year goal of the Air NEPM.

The Bureau of Meteorology report demonstrates that considerable progress has been made with the upgraded meteorological model, and in the validation techniques. While it is recognised that the spikes in the near-surface temperature field resulting from "spin up" errors in the model are not serious, they appear to be significant in the temperature plots (see Figure 7 page 22). It is to be hoped that a technique to minimise or eliminate them will be quickly developed and applied. Otherwise this aspect of the project appears to be proceeding very well.

The CSIRO Atmospheric Research report also indicates that good progress continues with the photochemical modelling work. It would seem (Figure 2 page 37) that the GRS chemistry performs reasonably well for days when maximum 1-hour ozone is 60 ppb or less, ie for non-episode days, but the LCC chemistry provides a better fit to the peak value on episode days. Presumably meteorological screening can be applied to determine those cases where LCC should be used, as it clearly performs better for episode days.

The time series plots for the 11–13 December 1998 episode are very encouraging. With the expected improvements in the meteorological modelling, the quantitative forecasts of photochemical smog seem likely to have a high level of accuracy.

In summary, then, Progress Report No 3 indicates that the project is proceeding well, aside from some slippage in meeting the deadline for completing emissions inventory work.

Phil Morgan
19 April 2000

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