Evaluation of Atmospheric Dispersion Models: AERMOD

In regulating major industries the Agency uses atmospheric dispersion models to assess the impacts of airborne pollutants released from prescribed processes, in accordance with the Environmental Protection Act 1990. This assessment is a central feature of IPC (Integrated Pollution Control) and the BATNEEC (Best Available Techniques Not Entailing Excessive Cost) process and will continue to be so under IPPC (Integrated Pollution Prevention and Control) and BAT (Best Available Techniques).

The most widely used of a new generation of models, ADMS, is installed and in use in some 30 regional/area Agency centres. At present ADMS is the principal model used by the Agency for IPC assessment. In the last few months a new model, AERMOD, has become available in the UK. This has been developed by the United States Environmental Protection Agency (USEPA) and is the successor to the widely used ISC (Industrial Source Complex) model which was the main model used in the UK before the development of ADMS. AERMOD is the USEPA new generation equivalent to ADMS and it is anticipated that AERMOD will be used increasingly in the UK for IPC applications.

This project was commissioned to provide an assessment of AERMOD for regulatory purposes in the UK. It had two main objectives:

(i) to develop a protocol for model assessment which could be used in this assessment and which will provide a consistent framework for future assessment of models for regulatory purposes;
(ii) to compare the performance of AERMOD with ADMS and other models and assess its performance for use in regulation.

A suitable protocol has been developed which tests all the main features of models used in regulatory practice with a minimum number of calculations. The features include calculations in single weather conditions to examine the response of the models to specific meteorological circumstances and annual calculations using sequential hourly weather data.

The protocol has been used to examine the performance of AERMOD and to compare it with ADMS and other models. The assessment has also included consideration of practical aspects of the models including cost, computing requirements, compatibility with meteorological and topographical data, range of applications, speed of operation, versatility of outputs and supplier backup.

The main conclusion is that there are significant differences between the outputs of the models but that these do not follow any consistent pattern. It is not practicable to provide overall recommendations on the use of one or the other model and each specific application must be considered on its own merits.

Nevertheless, the advanced models represented by ADMS and AERMOD provide significant advantages over older models particularly in their treatment of the boundary layer and of complex terrain. However, the results demonstrate that the new generation models are still in a state of development. In particular the study has shown their sensitivity to the methods used to process meteorological data to provide the boundary layer parameters required for dispersion calculations. This and other aspects of the performance of the models require further development and the study provides guidelines and recommendations for good practice in such development and the use of models in regulation.

This R&D Technical Summary relates to information from Project P4-078 contained in the following output:

R&D Technical Report P353: A review of dispersion model intercomparison studies using ISC, R91, AERMOD and ADMS. ISBN 1 85705 276 5.

R&D Technical Report P362: An intercomparison of the AERMOD, ADMS and ISC dispersion models for regulatory applications. ISBN 1 85705 340 0.

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