

**Atmospheric Dispersion Modelling
Liaison Committee**

Annual Report 2003/2004

INCLUDING

**Modelling of atmospheric dispersion for releases
from fires**

AND

Review of past work funded by ADMLC

PREFACE

In 1977 a meeting of representatives of government departments, utilities and research organisations was held to discuss methods of calculation of atmospheric dispersion for radioactive releases. Those present agreed on the need for a review of recent developments in atmospheric dispersion modelling, and a Working Group was formed. Those present at the meeting formed an informal Steering Committee, that subsequently became the UK Atmospheric Dispersion Modelling Liaison Committee. That Committee operated for a number of years. Members of the Working Group worked voluntarily and produced a series of reports. A workshop on dispersion at low wind speeds was also held, but its proceedings were never published.

The Committee has been reorganised and has adopted terms of reference. The organisations represented on the Committee, and the terms of reference adopted, are given in this report. The organisations represented on the Committee pay a small annual subscription. The money thus raised is used to fund reviews on topics agreed by the Committee, and to support in part its secretariat, provided by NRPB. The new arrangements came into place for the start of the 1995/96 financial year. This report describes the ninth year in which the Committee has operated under the new arrangements, and during which it placed two contracts. These covered a review of atmospheric dispersion modelling for releases from fires and a review of the work previously funded by the committee. The technical specifications for the contracts are given in this report, and the contract reports are attached as annexes to this report. The Committee funded nineteen studies in previous years; they are described in its earlier annual reports.

The Committee intends to place further contracts in future years and would like to hear from those interested in tendering for such contracts. They should contact the Secretary:

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1 ORGANISATIONS REPRESENTED ON THE COMMITTEE

The organisations on the committee during the year covered by this report were:

Amersham plc

Atomic Weapons Establishment, Aldermaston

British Nuclear Fuels plc

BNFL Magnox Generation

Defence Science and Technology Laboratory

Department for Environment Food and Rural Affairs (DEFRA)

Environment and Heritage Service, Northern Ireland

Environment Agency

Food Standards Agency

Health and Safety Executive

Methodology and Standards Development Unit, Hazardous Installations Directorate

Nuclear Installations Inspectorate

Health Protection Agency

Meteorological Office

National Nuclear Corporation

National Radiological Protection Board

Nuclear Department, HMS Sultan

Rolls Royce Naval Marine

Scottish Environment Protection Agency

Shell Global Solutions

Westlakes Research Institute

The Chairman and Secretary are provided by NRPB.

2 TERMS OF REFERENCE

The terms of reference of the committee were revised at the start of the year covered by this report. The revised terms of reference are:

Areas of technical interest

1. ADMLC's main aim is to review current understanding of atmospheric dispersion and related phenomena for application primarily in authorization or licensing of discharges to atmosphere resulting from industrial, commercial or institutional sites. ADMLC is primarily concerned with dispersion from a particular regulated site or from discrete sources, and will not normally consider work in the following areas: traffic pollution, acid rain and ozone.
2. ADMLC is concerned both with releases under controlled conditions occurring at a constant rate over long periods, and with releases over shorter periods such as accidents or controlled situations where the release rate varies.
3. ADMLC is concerned with modelling dispersion at all scales, including on-site and within buildings.

Organisations and outputs

4. The Committee shall consist of representatives of Government Departments, Government Agencies and organisations with an interest in modelling dispersion of material for the situations identified above. Each organisation represented on the Committee shall pay an annual membership fee.
5. ADMLC believes that it can be most effective by limiting its membership to about 25 organisations. New organisations will only be admitted to membership of ADMLC if the majority of existing members agree to their membership.
6. ADMLC aims to review, collate, interpret and encourage research into applied dispersion modelling problems. It does not endorse particular brands or suppliers of commercial models. However, it is concerned to ensure that users for industrial applications are aware of what is available, how it can be applied to particular problems and of the uncertainties in the results.
7. The Committee will commission work on selected topics. These should be selected following discussion and provisional agreement at meetings of the Committee, followed by confirmation after the meeting. It will produce reports describing current knowledge on the topics. These may be reports from contractors chosen by the committee or may be based on the outcome of conferences or workshops organised on behalf of the committee. The money raised from membership fees will be used to fund contractors, organise workshops and report on their outcome, and any other matters which the Committee may decide.

3 WORK FUNDED DURING THE YEAR

3.1 Modelling of atmospheric dispersion for releases from fires

The Atmospheric Dispersion Modelling Liaison Committee wishes to fund work for a review of models for plume rise and for calculating the atmospheric dispersion of material released in a fire.

The contractor should review and compare different models for plume rise, and their validation. In particular, are the models validated for the height of the plume centre line, or the concentration at ground level.

The work relating to fires should address the capabilities of current models to describe the dispersion of material from a range of different types and intensities of fire, including

- a Fires in large buildings, such as warehouses, where only a small part of the building is affected by the fire and the building remains intact
- b Fires in buildings where a large part of the building suffers damage and material is released from most of one face or through a severely damaged roof. Any differences in the modelling for different building sizes, shapes and orientations to the wind should be identified.
- c A fire at a location unaffected by building effects; for example, an intense fire following an aircraft crash in the open countryside.

The review should include the following items:

- a The calculation of air concentration at ground level underneath a rising plume.
- b What models are available for the different aspects identified above.
- c The range of values for the buoyancy parameters to be used in calculations relating to fires of different intensities.
- d The likely particle size of material released into the atmosphere.
- e The calculation of air concentration at short distances from a burning building or transport accident involving a fire.

The study is not intended simply to be a review of available information but should, where possible, provide guidance to model users on the most appropriate approach for the situations considered.

The report on this work is published as [ADMLC/2003/1](#).

3.2 Review of previous work

ADMLC and the Working Group which preceded it have published a number of reports, starting with NRPB-R91. In some cases, similar topics have been

covered in more than one report. ADMLC requires the following work undertaking:

1. Prepare a summary of all work that has been carried out by ADMLC and the Steering Committee and Working Group from which it was formed. The work must cover all reports from NRPB-R91 to the work carried out for ADMLC in the 2002/03 financial year. This document is intended for use within ADMLC for the following purposes:
 - Identifying items in existing reports
 - Identifying gaps or overlaps where similar topics have been addressed in different ADMLC reports
 - Summarising previous work as a basis for identifying future needs of the Committee
2. The document should be limited to considering what is in the existing reports. It is not intended that this review will identify work since the reports were published which might be used to update the existing reports.
3. ADMLC has supported a number of contracts on items loosely related to meteorological data. A summary of the relationship between these reports, and the overall position on choice of met data for dispersion models is also required, as part of the review in item 1.
4. Identify ways in which items in existing reports can be easily located, such as a key-word index which could be incorporated in the report from item 1 if this were published on the ADMLC web site.
5. Copies of all existing reports should be placed on the ADMLC web site.

The report on this work is published as [ADMLC/2003/2](#)