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AFTER CHERNOBYL — STUDY COMPLETED OF LONG-RANGE ATMOSPHERIC MODELS TO ESTIMATE RADIONUCLIDE DISPERSION

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AFTER CHERNOBYL -
STUDY COMPLETED OF LONG-RANGE ATMOSPHERIC MODELS TO ESTIMATE RADIONUCLIDES' DISPERSION

Based on the dispersion of radionuclides following the Chernobyl reactor accident (April, 1986), the World Meteorological Organization co-sponsored a study designed to evaluate mathematical models applied to the long-range atmospheric transport and deposition over the European continent. Other sponsors were the International Atomic Energy Agency and the Commission of the European Communities. The necessity for such studies was once again demonstrated in attempts to assess the atmospheric consequences of the recent Kuwait oilfield fires.

The study, carried out within the framework of the WMO Global Atmosphere Watch programme, was successfully concluded with a workshop in Varese (Italy) in March, 1991. Modellers and other experts participating from more than 15 countries, ranging from Japan to the U.S.A., discussed the results of the evaluation.

The major conclusions were that:

- the majority of the 21 models investigated provided reasonably good estimates of the trajectories and arrival times of the radioactive plume (which defines the spread of the pollution) using the observed windfield data,

- a smaller group of models (some 30%) could estimate cumulative deposition of radioactive Cesium satisfactorily,

- the use of observed data and short term forecast windfields and precipitation leads to a significant improvement in model performance over the use of global 2-3 day forecasts,

- the more complex models did not necessarily produce improved results.

The evaluation study involved the definition of the source term (i.e. the total amount of pollution) and contained the provision of meteorological data from the relevant period with the assistance of the European Centre for Medium-Range Weather Forecasts (ECMWF) and the Dutch Weather Service (KNMI). A data base of airborne concentrations and ground deposition measurements was established at the CEC Joint Research Centre (Ispra).

The structure of the applied models varied from relatively simple to extremely complex. Some models could be run on a simple PC while others required the largest computer capacity currently available. They were then run against the standard input data and the results obtained compared with the environmental measurements using computerized statistical techniques.

This evaluation was a unique opportunity to test modelling skills and performance and over 20 institutes and laboratories from the world expressed their interest in participating.

The data collected during and after the Chernobyl accident incorporated some uncertainties and gaps which inhibited the work. A follow-up study to the Atmospheric Long-Range Transport Model Evaluation Study (ATMES) project is under consideration to carry out a tracer experiment across the European continent under controlled conditions. The objective would be to increase our present knowledge and hence our ability to predict the outcome of accidental hazardous releases into the atmosphere.

Another essential element of the proposal, referred to as the ETEX project - European Tracer Exercise - is that meteorological services and related institutions could use the experiment to test their emergency procedures, including communications, for modelling accidental atmospheric releases of hazardous materials in real-time.