1972

B72-10003

AEC-NASA TECH BRIEF

Urban Air Pollution Dispersion Model

A multiple source, computerized, atmospheric dispersion model has been formulated and programmed for the IBM System/360-75 at Argonne National Laboratory.

This "integrated-puff" model is based on a kernel which allows for time-dependent variations in meteorological and source variables. The model therefore provides a more realistic physical simulation of the processes of smoke plume dispersion than has hitherto been used by models based on the steady state, Gaussian-plume equation. Of special importance is the demonstrated capability of the model to estimate pollutant concentrations during periods of low wind speed. Furthermore, the simulation of area sources is greatly facilitated by the three-dimensional nature of the puff algorithm.

The model can be used in combination with previous collected emission data as the primary analytical tool in the performance of a series of air pollution systems analysis studies.

It has been validated by comparison with over 10,000 hourly averages of sulfur dioxide monitored by the Department of Environmental Control of the City of Chicago. For example, the model accounts for 50 percent of the variance in 6 hour averages of observed data and 70 percent of the variance in 24 hour averages.

Primary uses for the dispersion model include cost effectiveness studies of alternative control strategies for specific source aggregates, such as power plants, the food processing industry, the steel industry and asphalt batching.

The model can also be used for development of rapid-response, automated, optimal, incident control strategies for the urban power-plant network; optimal gas allocation to dual fuel sources; emission control, etc., using mathematical programming and other operations research techniques.

Finally, the information may be applied to development of long range air pollution abatement plans, oriented around the computer simulation of the city combined with projections of its population, fuel use, production, and transportation network growth patterns. Emission control legislation and zoning ordinances, for example, can be tested in a simulation of the region of the future, and cost effectiveness can be studied to evaluate the economic impact of pollution abatement measures.

Note:

Requests for further information may be directed to:

Technology Utilization Officer
Division of Technical Information
U. S. Atomic Energy Commission
Washington, D. C. 20545
Reference: TSP72-10003

Patent status:

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Argonne National Laboratory
under contract to
Atomic Energy Commission
(AEC-10004)

Category 03