PRESENTATIONS

SESSION I

USER REQUIREMENTS FOR DISPERSION MODELING

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Synopsis

During Session I, agencies addressed current requirements for dispersion modeling, described how the current requirements are being met, and presented new and/or unmet requirements. A wide range of application scenarios for dispersion modeling resulting from both natural and human activities were described by the agencies. These included ash released from volcanic eruptions and its impact on air travel; the release of radioactive material from nuclear reactor accidents/incidents and its impact on operators and surrounding populations; the release of smoke from forest fires and other materials from industrial sources and the subsequent impact on air quality and human health; the release of chemical/biological agents and their impact on populations especially in the urban environment; and the release of various toxic material through spills resulting from surface transportation accidents and its impact on populations. Also highlighted was the requirement of a wide range of spatial and temporal scales ranging from meters to thousands of kilometers and from minutes to days. Generally speaking, the diverse requirements for dispersion modeling are being met by existing models and agencies are addressing new/unmet requirements through modest investments in research and development, with a special focus on the urban environment.

The following snapshot of requirements was derived from the agency presentations: Within the Department of Defense (DOD), the requirements for dispersion models are driven by the need for immediate response to the threat of chemical and biological attacks as well as the development of concepts of operation. In keeping with the mission of the National Oceanic and Atmospheric Administration (NOAA), the protection of life and property and providing reliable information to decision makers, as well as environmental concerns, dictate dispersion modeling requirements. These requirements include forecasting in urban, coastal, and complex terrain environments; injecting descriptions of stochastic behavior into deterministic models; and assessing the skill of predictive schemes. For the Department of Energy (DOE), application users, as well as research and development, drive the requirements. The application users apply models for prediction, assessment and strategic purposes associated with routine facility operational emissions and to support emergency response activities when an accidental or terrorist release occurs. For the Environmental Protection Agency (EPA), air quality concerns are of primary interest with model

applications focused on contingency modeling, accidental releases and short term assessments. The Federal Emergency Management Agency (FEMA) highlighted the need for a tiered approach to modeling similar to the graded modeling approach mentioned by the DOE. Under this approach, initial responses with preliminary impacts are based on less sophisticated models. As better meteorology and better source characteristics become available, more sophisticated models are used. The Nuclear Regulatory Commission (NRC) cited areas of need dealing with power plant design, control room habitability, incident response, cost/benefit analyses, high level waste disposal, and facility decommissioning. The Department of Agriculture (USDA) Forest Service (FS) focused on three areas: (1) smoke/fire emissions, (2) wilderness air quality related values, and (3) carbon management. The impacts of smoke on air quality and the acidification of alpine watersheds drive requirements for the Forest Service. The Department of Transportation (DOT) highlighted volcanic ash and other airborne hazardous materials as key concerns for air transportation. Accurate transport and diffusion forecasts of these hazards are required for safe flight in the National Airspace System. The DOT also relies on dispersion modeling to support assessments based on federal hazardous material transportation laws for flammable and poisonous materials. The Department of Interior (DOI) U.S. Geological Survey (USGS) discussed its role in volcano monitoring and emphasized the importance for space-based systems for observing parameters used to initialize dispersion models. The requirements of the U. S. Air Force's Eastern and Western Ranges are driven by the need for predictions to support long range planning, launch operations, and emergency response in order to protect populations and to comply with federal and local exposure guidelines.

From the agency presentations on requirements for dispersion modeling, a number of cross-cutting issues emerged. These included:

- The need for credible dispersion forecasts applicable to complex terrain, coastal regions, and especially urban areas.

- The need for model verification to establish the bounds of uncertainty for the intended application.

- The need to conduct field studies to verify models and model products under the same circumstances for which the models are to be applied.

- The need for probabilistic forecasts of dangerous concentrations of hazardous materials.

- The need for improved understanding of the loading, properties and transport of atmospheric aerosols in relation to sources.

- The need to use a graded modeling approach to increase modeling complexity commensurate with the complexity of the problem. The models must handle the urban environment and be valid over a wide range of meteorological conditions.

•The need to correctly represent the source term in the models.

•The need for model output to be understandable and readily accessible to emergency managers through the use of self-evident graphics/tables provided via the Internet or on backup PC's.

•The need for model users/regulators and model researchers/developers to interact during model development.

For information on the Session I presentations, see Appendix C.