DEPARTMENT OF ENERGY
OPERATIONAL AND RESEARCH WEATHER PROGRAMS

The overarching mission of the Department of Energy (DOE) is to advance the national, economic, and energy security of the United States; to promote scientific and technological innovation in support of that mission; and to ensure the environmental cleanup of the national nuclear weapons complex. DOE's weather- and climate-related operational and research programs contribute in specific ways to this departmental mission.

OVERVIEW OF DOE OPERATIONAL AND RESEARCH METEOROLOGICAL PROGRAMS

The need for site-specific meteorological services at DOE Federal facilities was first recognized in 1944, with the development, fabrication, and testing of atomic weapons and their accompanying national security and nuclear safety issues. In response to this need, DOE has established, operated, and maintained meteorological programs and undertaken various atmospheric research projects at many of its reservations and field offices.

Operational meteorological program requirements were subsequently augmented by the passage of the Clean Air Act and its amendments, reinforced by several DOE Orders that specify requirements for meteorological services to protect the environment. Consequently, a meteorological monitoring program has become an essential component of each DOE site. The acquisition of quality-assured meteorological data, provision of weather forecasting services, and development of site-specific climatology from these meteorological programs are important elements of the DOE Integrated Safety Management System (ISMS) because these elements contribute substantially to the implementation of site-wide personnel safety programs and support the following evaluations:

- Protection of facility workers and the public from severe weather (e.g., lightning, tornadoes, hurricanes), cold weather exposure, and heat stress, sufficient to meet Occupational Safety and Health Administration (OSHA) regulations
- Development of nuclear safety and chemical safety documentation (e.g., Safety Analysis Reports and Documented Safety Analyses)
- Establishment of diagnostic and prognostic consequence assessment elements of an emergency management response system to meet the requirements of DOE O 151.1C and the principles of DOE G 151.1-1
- Preparation of air, surface water, ground water, and waste management permits to support environmental protection and compliance activities that comply with U.S. Environmental Protection Agency regulations
- Preparation of impact analyses for construction, operation, deactivation, and decommissioning of projects and missions requiring National Environmental Protection Act determinations

The atmospheric sciences contribute to the successful implementation of many of DOE's mission elements. Meteorological data acquisition programs, analytical assessments requiring meteorological information, and weather forecasting operations are integral to meeting DOE goals. Understanding the nature of the atmospheric domain, with its various dynamic and chemical aspects of energy-related phenomena is vital to DOE goals for national energy security, scientific discovery and innovation, and environmental responsibility. For instance, an accidental release of a radioactive material, or a chemically or biologically toxic material, into the atmosphere can potentially have serious acute and chronic health effects, as well as long-term environmental consequences. Meteorological transport and diffusion processes play a key role in determining the fate of radioactive, chemical, or biological agents released into the atmosphere; including those resulting from malevolent acts. Consequently, a central theme within the DOE community has been to protect public health, safety, and the environment on and around DOE facilities by accurately measuring and characterizing the important local atmospheric processes necessary to establish real-time and projected atmospheric transport and diffusion conditions.

DOE administers operational meteorological

activities through various offices, such as the Office of Health Safety and Security, the National Nuclear Security Administration (NNSA), and the Office of Envi-ronmental Management, that have missions linked to the atmospheric sciences. The Office of Science (SC) is responsible for managing DOE's climate change research programs. SC Climate Change Re-search is described in detail in the interagency report: Our Changing Planet, FY 2009. Activities at DOE sites include support to daily operations and national defense programs, all of which require fundamentally sound and well-managed meteorological monitoring programs.

WEATHER SUPPORT TO DAILY OPERATIONS

Operational support programs include daily-customized weather forecasting services, support to national defense projects and homeland security, onsite meteorological monitoring programs, climatology services, occupational safety and health program support, and emergency preparedness and response program support. Each meteorological monitoring program is primarily directed toward the support of emergency preparedness and response programs and focused on protecting the environment and the safety and health of the onsite work force and the public.

Operational meteorological programs are conducted at Argonne National Laboratory, Brookhaven National Laboratory, Idaho National Laboratory (INL), Lawrence Livermore National Laboratory, Los Alamos National Laboratory, Nevada Test Site (NTS), Oak Ridge Reservation (ORR), Pacific Northwest Na-tional Laboratory and Hanford Site, Pantex Plant, Sandia National Laboratory–Albuquerque, Savannah River Site (SRS)/Savannah River National Laboratory, and the Waste Isolation Pilot Plant. Some of these DOE sites maintain 24-hour weather watches for severe weather conditions that have the potential to im-pact site operations and construction projects, damage property, or threaten lives. For example, DOE-wide lightning safety initiatives, which are becoming integral elements of ISMS, are supported by DOE operational meteorological programs at such sites as NTS, Hanford, SRS, and INL. The Nevada Site Of-fice, which manages NTS, has developed a site order for implementation of lightning protection measures.

Several DOE field offices and their associated sites and facilities cover large areas, called reserva-tions (e.g., INL, ORR, NTS, Hanford, and SRS). In addition, several DOE sites are situated in areas of complex topography and heterogeneous surface characteristics (e.g., land-water interface, mountain-valley morphology) that influence local weather and airflow trajectories. The latter are important for their influ-ence on atmospheric transport and diffusion. For these reasons, and to ensure the protection of public health and safety and the environment, onsite meteorological monitoring programs are an essential part of DOE atmospheric science programs.

Some DOE weather monitoring sites enhance the spatial resolution of the National Weather Service (NWS) observing network by taking standard surface and upper-air observations. Many of these sites are in remote areas where NWS and community weather observations would otherwise be sparse to non-existent. Weather observations taken at a few DOE field sites are entered into the NWS database via the NWS meteorological data ingest and display system. Some DOE sites use NOAA's Advanced Weather Information Processing System, as well as vertical profilers and meteorological monitoring networks.

METEOROLOGICAL RESEARCH ACTIVITIES

Currently, DOE does not support any weather-related meteorological research. As stated above, SC does support Climate Change Research as reported in Our Changing Planet, FY 2009.

DOE METEOROLOGICAL COORDINATING COUNCIL (DMCC)

The DOE Meteorological Coordinating Council (DMCC) was formed in 1994 to coordinate meteorological activities among the field offices to enhance cost-effectiveness and productivity and to leverage synergistic opportunities. DOE has delegated the operation of its site/facility meteorological programs to DOC/NOAA and non-Federal for-profit M&O contractors. The DMCC membership is therefore composed of subject matter experts from within the DOE complex, representing the three components with

operational responsibilities for these programs:

- Department of Commerce (DOC/NOAA) under an Interagency Agreement;
- Management & Operating (M&O) contractors
- Private contractors

The DMCC operates as a subcommittee of the DOE Emergency Management Issues Special Interest Group (EMI SIG) and has a web page that can be accessed directly or through the web page of the Subcommittee for Consequence Assessment and Protective Actions. DMCC also issues an annual report as part of its presentation to the EMI SIG Steering Committee.

A current DMCC project is to improve the provision of quality-assured meteorological information and execution of transport and diffusion models that meet software quality assurance requirements. Products of the DMCC include evaluations of meteorological requirements contained in DOE orders and guidance documents, site meteorological program peer reviews (i.e., meteorological program assist visits), and, as needed, customized technical assistance. The DMCC developed an Assist Visit Guide to enable DOE/NNSA sites to perform their own self-assessments.