NUMUG POSITION PAPER
The Role of Meteorologists in Nuclear Utilities

Meteorology is the study of atmospheric phenomena. Meteorologists have specialized education in the atmospheric sciences; and use scientific principles to observe, understand, explain, and forecast atmospheric processes. In the nuclear industry, meteorological data and assessments support site selection, facility planning, routine operations, and emergency preparedness/response.

Before a nuclear plant is even constructed, meteorologists examine local climatology (including both normal and extreme conditions) to judge the appropriateness of particular locations. They use available data to examine proposed locations with respect to environmental, engineering, licensing, and operational requirements. Meteorologists assist in designing supplementary meteorological monitoring programs to provide site-specific information, and participate in atmospheric dispersion modeling to document the suitability of locations for routine and accidental releases to the atmosphere.

Once the plant location is determined, meteorologists provide critical information used in designing and evaluating various plant components (e.g., heat dissipation systems). Data about extreme weather conditions are needed so plant structures and other components can be designed to withstand adverse conditions. Other meteorological information is used to evaluate dispersion conditions impacting control room habitability and the surrounding community.

During plant operations, a broad range of meteorological information is needed. Meteorologists participate in design, operation, and maintenance of meteorological monitoring and data processing systems. This includes reviewing calibration procedures, examining daily measurements (critical to maintaining required valid data recovery levels), reviewing calibration reports, validating data, and archiving data records. A major application for onsite meteorological data is identifying transport and diffusion conditions that impact routine effluent atmospheric releases. This requires expertise to use collected data for preparing appropriate summaries (e.g., joint frequency distributions). Finally, meteorologists continuously assess data from onsite and other sources (e.g., National Weather Service) to provide forecasts of weather conditions and enable performance of various activities more effectively (e.g. storm water sampling). Advance warnings of adverse conditions (icing, strong winds, intense lightning, etc.) permit appropriate preventive actions.

Meteorological information can have its greatest influence during and after accidental releases. If an unplanned release occurs, knowledge of weather conditions helps determine the location and intensity of impacts. Meteorologists estimate conditions using onsite instrumentation and information from other sources. Atmospheric dispersion models are used to determine transport and diffusion conditions, and identify effluent paths. This information permits effective deployment of monitoring teams and helps decision makers formulate appropriate protective actions. After an event, meteorological information is essential in the post-accident analysis.

 (approved by NUMUG Steering Committee on June 20, 2007)

Options for obtaining meteorological expertise range from in-house staff to external contractors, and include all combinations in-between. The broad range of meteorological expertise involved in siting, licensing, and operating nuclear power plants, requires support from many individuals. Specialists are needed to efficiently identify local climatic conditions, conduct atmospheric measurements, provide weather-related information for engineering design, assess potential environmental impacts, forecast relevant weather for plant operations, and respond to potential accidental releases of harmful materials. Finally, only someone familiar with the plant environs and the surrounding region can provide the most useful meteorological information during routine operations and emergency situations.

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