Sharing Meteorological Resources with the Local Community at the DOE's Savannah River Site

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SUMMARY

The end of the Cold War resulted in significant workforce reductions throughout the Department of Energy's complex of nuclear weapons sites. In response to these reductions, DOE has encouraged its operating contractors to pursue 'technology transfer' as a means of maintaining the economic viability of local communities surrounding these sites.

As part of the 'technology transfer' mission, Westinghouse Savannah River Company (WSRC), in conjunction with DOE's Savannah River Operations Office, has established a program to share meteorological capabilities developed at the Savannah River Site (SRS) with county-level emergency management agencies. Specifically, WSRC will provide the technical expertise needed to establish and maintain meteorological monitoring sites in major industrial areas, share custom dispersion modeling software for consequence assessment and protective action decision-making, and provide weather consultations and forecasting during hazardous material emergencies or severe weather events.

The development and initial implementation of the program will be described.

BACKGROUND

The SRS is a 500 square km reservation located along the South Carolina side of the Savannah River near Augusta, Georgia. The mission of the site since operations began in the early 1950s was to produce nuclear materials for national defense, primarily plutonium and tritium. This mission was fulfilled through the operation of up to five nuclear reactors, a nuclear fuel fabrication facility, two chemical separations plants, a tritium facility, and numerous support facilities. Each of these facilities contained significant inventories of radioactive material and hazardous chemicals.

To meet the needs of the SRS in the areas of environmental stewardship and emergency response, a comprehensive meteorological program was established under the purview of the operating contractor (currently WSRC). Major program areas include:

- Meteorological monitoring from a network of towers across SRS;
- Development/adaptation of computer models for predicting transport and diffusion of airborne contaminants;
- Development of integrated, computer-based capabilities for conducting environmental consequence assessment during emergency response (the Weather INformation and Display System);

- o Meteorological analysis and forecasting in support of hazardous materials or severe weather emergencies (SRS Weather Center).

Many of the facilities involved in the production of weapons grade nuclear materials no longer operate. The business of the SRS has evolved toward new missions in the areas of tritium recycling, storage of foreign and domestic spent nuclear fuel, disposition of nuclear waste, and environmental restoration. These activities continue to require management of significant inventories of hazardous materials. Consequently, a fully developed meteorological program is considered a core competency in support of these and potential future missions at SRS.

The workforce at SRS is drawn principally from five surrounding counties: Aiken, Barnwell, and Allendale in South Carolina and Columbia and Richmond counties in Georgia. Consequently, these counties have been formally designated by Congress as economically impacted by SRS workforce reductions.

Given the historically strong link between the SRS meteorology program and emergency response, emergency management agencies (EMAs) of the five counties were identified as potential customers for a 'technology transfer' initiative. Richmond County, in particular, as well as Columbia and Aiken counties have industrial facilities containing significant quantities of hazardous materials. Interstate 20 and several major U. S. highways and major rail routes also transect these counties.

A concurrent catalyst in the development of a meteorological partnership with the local community was the closure of the Augusta National Weather Service Office. As part of a national restructuring of NWS, the Augusta NWS office was closed in 1995 and its responsibilities transferred to the Columbia, SC NWS office approximately 100 km away. County EMA officials who had become accustomed to close contact with NWS meteorologists stationed in Augusta no longer had a needed source of meteorological information and expertise readily available.

DEVELOPMENT OF THE PROGRAM

A series of meetings were held with representatives from the local EMAs during the latter half of 1995 to familiarize the EMA directors with the meteorological capabilities SRS and to discuss ways these capabilities could be utilized to enhance their emergency preparedness programs. Three areas of collaboration were identified:

(1) *Provide technical assistance for establishing meteorological monitoring sites in critical industrial areas.*

Quality real-time meteorological data from monitoring sites located within high hazard industrial clusters was considered critical to developing and implementing an appropriate set of protective measures for populations near a hazardous material incident. Furthermore, additional sources of meteorological data from the surrounding area would help WSRC meteorologists refine analysis of offsite transport and consequences of an accidental releases from SRS.

As a result, this element of the program was designed such that all participants shared in the costs and benefits of implementation. WSRC would establish equipment specifications, install and maintain the instrumentation and associated data acquisition hardware, and provide a means for accessing the data in real-time. The local county would be responsible for purchase of the meteorological instruments

and other hardware and provide power and phone service to the site. For each set of meteorological equipment that was purchased by (or through) the county EMA, WSRC would loan a set of equipment for a second site. These stations would be incorporated into the existing SRS monitoring network and all data from the new regional network (mesonet) would be made available to the local EMA office for tabular and graphical display using custom software. At a minimum, measurements at each site would consist of wind speed, wind direction, temperature, and dew point.

(2) *Provide WSRC's Puff/Plume NT code for real-time assessments of hazardous material transport and consequences.*

All counties targeted for this initiative use the ALOHA dispersion model to define downwind hazard areas for hazardous chemical releases. Since ALOHA assumes 'straight-line' transport based on a single wind speed and direction, the results may be applicable only for relatively short downwind distances. The WSRC's Puff/Plume model has been used for many years at SRS for consequence assessment and protective action decision-making. Puff/Plume is a segmented trajectory Gaussian model which can simulate a release under time-variant meteorological conditions. As part of a technology transfer initiative, WSRC would provide a PC version of Puff/Plume (Puff/Plume NT) to supplement CAMEO/ALOHA in situations where intermediate range transport (2-20 miles) is important. WSRC would install the code on a computer supplied by the county, set up the code to run automatically with current wind data from the regional mesonet, and provide training in running the code and interpreting the results.

(3) *Provide meteorological consultations and forecasts during hazardous material and severe weather emergencies.*

As an extension of support currently provided SRS operations managers, WSRC meteorologists would provide county EMA directors weather consultations or forecasts during severe weather situations. All information provided by WSRC would be offered as a value-added ***supplement*** to the more generic weather statements, watches, or warnings issued by the NWS. Supplemental information could include specific details on the timing of a severe event within the local area, the magnitude of the event, or probabilities associated with a range of possible outcomes for the event (i.e., 'worst case' and 'most likely' scenarios).

After the specific elements of the program were established and DOE approval was obtained, additional meetings were held with county representatives to determine which of the three program elements were of interest. All of the targeted counties had interest in at least two of the three elements of the program. Formal Mutual Aid Agreements with each of the five counties were signed in November 1996.

IMPLEMENTATION

As part of the mutual aid agreement with Richmond County, WSRC is establishing new monitoring sites in three high hazard industrial corridors of the county as well as incorporating an existing monitoring site into the regional network. The other four counties chose not to pursue installation of monitoring sites in their counties at this time.

The Richmond County local emergency planning committee (LEPC) has proven to be a key partner in the success of this effort. Donations from more than 20 LEPC member companies are being used to cover the costs of the meteorological hardware. Furthermore, an LEPC member company within each of the three corridor areas have

volunteered to serve as a site sponsor. In addition to providing space for the equipment, each sponsor will arrange for needed utilities and provide engineering support for the installation. WSRC also has received hardware donations from two meteorological equipment vendors.

Surveys of the three target areas were completed in April 1997. In each case, the selected configuration consisted of a 10-meter tower erected on the roof of a well exposed building. Equipment for one site has been purchased and installation of the site is scheduled for late September/early October 1997. Installation of the remaining two sites is expected by December 1997. The existing monitoring site, located in a fourth industrial corridor of concern, consists of a 15-meter tower equipped to measure the primary variables of concern.

Data (15-minute averages) from each site will be sent to a central computer at SRS and posted in a relational database. Software has been developed to extract the 15-minute data from the database and write flat files to an SRS server that can be accessed by the county EMAs. Existing software is being modified which will allow county personnel to download the data and generate data tables or plot the data on a regional map.

Additional data files will be available via the SRS server which contain 12 hours of winds and turbulence for use in Puff/Plume NT. The Puff/Plume code has been modified to allow users to specify a release of one of up to 170 chemicals. Plots of downwind concentration calculated by the model will be displayed in colors corresponding to emergency response planning guide (ERPG) threshold values (or temporary emergency exposure limit values if ERPG values are not available for the particular chemical). Geographic information system (GIS) background maps applicable to each of the five counties are being developed for the graphical displays of plume transport. In addition, a feature is being added to Puff/Plume that will allow the user to export the plume plot file to a GIS software package and display the model results as a GIS coverage in more detailed mapping analyses. Deployment of software for downloading and displaying real-time data from the regional mesonet as well as the Puff/Plume NT software is scheduled for October 1997.