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# Meteorological Partnerships for the Savannah River Site/Central Savannah River Area

C. H. Hunter, M. J. Parker, and G. L. Snyder  
Westinghouse Savannah River Company  
Aiken, SC 29808

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## Summary

In November 1996, Westinghouse Savannah River Company (WSRC), and the Department of Energy Savannah River Site (SRS) Operations Office, established formal Mutual Aid Agreements (MAA) with five local counties to provide meteorological assistance for emergency preparedness and response. The agreements defined three areas of collaboration: (1) establish meteorological monitoring stations in industrial corridors, (2) providing dispersion modeling software for emergency response, and (3) meteorological consultations during severe weather. In a related collaboration, WSRC partnered with a local television station to purchase and install a Doppler weather radar.

Two monitoring sites have been installed in Augusta/Richmond Co., Georgia; two additional sites are planned. Real-time meteorological data from the new installations and from the existing SRS sites are now available to the participating counties via the Internet. The successful implementation of these initiatives is attributed to structuring agreements such that all participants become stakeholders who mutually share in the costs and benefits. More importantly, the project demonstrated that coordinated leveraging of resources existing within a community can provide a cost-effective benefit to the public.

## I. Background

Historically, the primary mission of the SRS was the production of nuclear materials for national defense. This mission was fulfilled through the operation of multiple facilities designed to fabricate, irradiate, and chemically separate nuclear fuel and target elements. Although the production mission has waned in recent years, ongoing operations include nuclear materials storage and disposition, high-level waste management, and environmental restoration.

To meet the needs of the SRS in the areas of environmental stewardship and emergency response, a comprehensive meteorological program was established during the 1970s and continues today. Major program

areas include meteorological monitoring utilizing a network of towers across SRS, development of models for predicting transport and diffusion of airborne contaminants, development of an integrated capability for conducting consequence assessment during emergency response (the Weather INformation and Display System), and meteorological analysis and forecasting in support of hazardous materials or severe weather emergencies.

A major reduction in the Site's production mission during the early to mid-1990s resulted in the elimination of approximately one-third of the SRS workforce. To mitigate the impact of 'downsizing' on the local community, DOE strongly encouraged the operating contractor (WSRC) to pursue community assistance projects as part of a broadly focused technology transfer program.

The workforce at SRS is drawn principally from five surrounding counties: Aiken, Barnwell, and Allendale counties in South Carolina and Columbia and Richmond counties in Georgia. Given the historic link between the SRS meteorology program and emergency response, emergency management agencies (EMAs) serving each of the five counties were identified as potential customers in a community assistance partnership.

Augusta/Richmond County, in particular, as well as Columbia and Aiken counties have industrial facilities which pose potential hazards to the local population. In addition, major U. S. highways and rail routes transect all five counties.

## II. Development of the Program

Reciprocal meetings between WSRC and EMA directors from the five target counties were held to ascertain existing capabilities and programmatic needs. From these meetings, the following areas of collaboration were proposed:

- ***Establish and maintain meteorological monitoring sites in high-hazard industrial corridors.*** Real-time meteorological data is critical for developing and implementing appropriate protective measures during a hazardous material incident. Under this element of the program, WSRC would provide technical assistance needed to establish meteorological monitoring stations at locations selected by the EMA director. Specifically, WSRC would provide technical specifications for the instrumentation, conduct site selection, install and calibrate the sensors and associated hardware, and arrange for data archival and dissemination to county operations centers. The county would be responsible for securing the monitoring site, arranging for the installation of any structures needed for the instrumentation, and providing all supporting utilities (power, phone, etc.) The counties also would be responsible for purchasing much of the monitoring hardware (sensors, data loggers, etc.); however, In some cases, WSRC would loan equipment.
- ***Provide custom software for emergency consequence assessment.*** Each county conducts emergency consequence assessment with a standard straight-line Gaussian model designed for near incident scene application (EPA's CAMEO/ALOHA). To supplement this capability, WSRC would provide a custom version of the Puff/Plume code. Puff/Plume is a segmented trajectory Gaussian dispersion model capable of simulating a radiological or hazardous chemical release based on up to twelve hours of observed and/or forecast meteorological data. This code has been used for many years at SRS for consequence assessment. WSRC would install the code on PCs in the county operations centers, establish the links to run the model with data from the regional mesonet, and provide training in running the code and interpreting results.
- ***Provide meteorological consultation during severe weather events.*** As an extension of support currently provided SRS operations managers, WSRC would provide meteorological consultations and forecasts during severe weather situations. Such consultations would serve as value-added ***supplements*** to the more generic weather statements, watches, or warnings issued by the National Weather Service (NWS).

Each county was allowed to select the area of collaboration that best fit their program. A mutual aid agreement was prepared for each county and formally enacted by WSRC, DOE-SR, and county officials in November 1996.

## III. Implementation

### A. Meteorological Monitoring

The MAA with Augusta/Richmond Co. committed WSRC to help establish meteorological monitoring sites in three potential hazard areas. Each site would measure wind speed, wind direction, temperature, and relative humidity. To meet their financial obligation to the agreement, the county EMA director solicited support from member companies of the local emergency planning committee (LEPC). Small donations from each of the industry members was used to cover most of the equipment costs. Donations also were received from meteorological equipment vendors. In addition, an LEPC member company within each of the three target areas volunteered to serve as a site sponsor. Sponsors agreed to provide physical space, utilities, and engineering support for the installations. Two of the three sites have been installed and are currently collecting data. Installation of the third site is scheduled for completion later in 1999. Sensors are mounted on a 10-meter tower that was erected on the roof of a well exposed building. In addition, a pre-existing monitoring site, operated jointly by two LEPC member companies in a fourth hazard area was incorporated into the network. This site consists of a ground-based 15-meter tower equipped to measure the primary variables of concern.



**Figure 1. Graphical display of wind data from the Savannah River mesonet**

Data (15-minute averages) from each site are transmitted to a central computer at SRS and posted in a relational database. Scripts were developed to extract data from the database every 15 minutes and write a flat file containing a rolling 24-hour record to a server. Software installed on PCs in the county operations centers (and some of the industry participants) allow automatic download the data file via Internet ftp. Users can then view either tabular summaries of the data or graphical displays of current winds on a regional map (Fig. 1). The data files also contain the most recent hourly observation from local National Weather Service (NWS) observing stations.

#### **B. Consequence Assessment Models**

Custom, county-specific versions of the Puff/Plume model were developed and installed on a PC in the operations center of each of the five counties. Customization consisted of incorporating a base map for plotting the release that centers on the particular county (Fig. 2).



**Figure 2. Puff/Plume display for Augusta/Richmond Co., GA**

The maps highlight political boundaries, major roads, and population centers derived from geographic information system (GIS) databases. A new feature of Puff/Plume allows exporting of the plot file as a 'coverage' in GIS systems utilized by several of the counties.

#### **C. Severe Weather Consultations**

Several tropical weather systems have affected the area since the MAAs were established. WSRC meteorologists were able to provide several of the county EMA directors with supplemental information concerning the timing and magnitude of the event which enabled better, more timely implementation of contingency plan elements. These consultations typically are delivered verbally over the phone or by e-mail.

### **IV. Local Doppler Radar**

In a related initiative, WSRC has partnered with a local TV station (WJBF) to purchase a Doppler weather radar for the Augusta area (located at Bush Field). Conventional radar was operated by the NWS at Augusta for many years. However, restructuring of NWS operations lead to closure of the Augusta office and removal of the radar unit in 1995. NWS radar coverage for the SRS/Augusta area is now provided by the NEXRAD radar site in Columbia, SC. Because the new radar was approximately 100km from the central Savannah River area, there was a common public perception that the area could not be given adequate warning of a developing severe weather threat.

The WJBF proposal to WSRC offered broadcast time for public service announcements, corporate identification during radar broadcasts, and continuous, real-time access to the radar display in exchange for financial support of the project. Although data collected by the proposed radar systems would not be as comprehensive as a NEXRAD data set, a system placed in Augusta was judged a worthwhile supplement to NEXRAD. Such radar would provide greater spatial resolution of weather systems in the local area and would deliver information to decision makers and the public a few minutes sooner. WSRC conducted technical reviews of the radar proposals for WJBF and assisted in the final selection of a vendor. The radar unit was purchased and installed in September 1998. An example display is shown in Fig. 3.

At SRS, radar images are posted on an Intranet web site every 5 minutes for access by the general site population. In addition, a 'live' image is broadcast on a Site cable channel for continuous monitoring by control room personnel and other emergency response decision-makers.



**Figure 3. Example display from the WRSC/WJBF weather radar**

## V. Conclusions

Two initiatives recently implemented in the central Savannah River area have demonstrated that partnerships between government and industry provide a cost-effective means of leveraging a region's resources to the benefit all participants. Quality, real-time meteorological information critical to developing appropriate protective actions during hazardous material or severe weather emergencies is now readily available to emergency responders at all levels throughout the community. By utilizing existing meteorological capabilities and sharing costs, a significant enhancement to public (and worker) safety was achieved with relatively small impact on the individual participants. Furthermore, these efforts have given SRS and other industry partners the opportunity to demonstrate to the community their willingness to be a good corporate neighbor.