UCRL-JC-149004-EXT-ABS

LAWRENCE
LIVERMORE
NATIONAL
LABORATORY

Multi-agency Utilization of the National Atmospheric Release Advisory Center

Ronald L. Baskett, Fernando J. Aluzzi, Brent M. Bowen, Connee S. Foster, John S. Nasstrom, Brenda M. Pobanz, Philip J. Vogt

November 2002

American Nuclear Society Annual Meeting, Washington DC, November 2002.

UCRL-JC-149004-EXT-ABS

Multi-agency Utilization of the National Atmospheric Release Advisory Center

Ronald L. Baskett
Fernando J. Aluzzi
Brent M. Bowen
Connee S. Foster
John S. Nasstrom
Brenda M. Pobanz
Philip J. Vogt
University of California
Lawrence Livermore National Laboratory
Livermore, California

1. INTRODUCTION

The National Atmospheric Release Advisory Center (NARAC) at LLNL is a national resource center for software tools, planning, real-time assessment, and analysis of incidents involving hazardous nuclear, radiological, chemical, biological or natural emissions. NARAC provides modeling tools to end users, access to global meteorological and geographical data, and advanced three-dimensional, complex-terrain model predictions.

NARAC's primary function is to support Department of Energy (DOE), Naval Reactor (NR), Department of Defense (DoD) sites, and DOE Crisis Response and Consequence Management (CR & CM) teams through DOE s Atmospheric Release Advisory Capability (ARAC) program. Under the auspices of the Federal Radiological Emergency Response Plan, the Federal Response Plan, and the DOE/NNSA Chemical Biological National Security Program (CBNP), NARAC assists other federal agencies, as well as state and local agencies. NARAC also provides direct assistance to the Nuclear Regulatory Commission for events involving nuclear power plants, and in May 2002, the

Secretary of Energy offered NARAC services directly to each Governor and their associated state Emergency Operations Center (EOC).

To facilitate these multi-agency interactions, NARAC developed two advanced Internet and Web-based tools — the NARAC iClient and the NARAC Web. NARAC iClient is intended for use by power modelers, those who know specifics about source terms, routinely run dispersion models, and prepare real-time consequence assessments for exercises or emergencies. The tool provides a graduated modeling approach — depending on the complexity of the release, users can run simple or intermediate models locally or submit the run to NARAC independently or in parallel to their local run. Light modelers who do not routinely run dispersion models can submit their modeling request to NARAC via the NARAC Web tool. Results from either the NARAC iClient or Web requests can then posted on the web so that the requester can immediately distribute them to all participating agencies simultaneously.

A companion paper in this conference (Nasstrom, et al 2002) discusses the capabilities of these software applications. This paper presents examples of the recent experience with these tools in multi-agency events and exercises.

2. USE AT DOE FACILITIES

Under direction by DOE Headquarters, NARAC has installed the iClient in EOCs throughout the DOE complex. Modelers may choose to use the NARAC tools either as a backup to their existing system or as their primary modeling software. In April 2001, Oak Ridge Y-12 was one of the first sites to exercise the full capabilities of NARAC iClient and Web tools. They initially ran the NARAC model based on worst case inventories from hazard assessment documentation. Once available, the site sent NARAC a set of

seven exercise-determined measurements, which were subsequently used these to adjust the source amount downward from the initial default. The refined model contours were overlaid on an aerial photograph of the site and posted on a web page so that the State of Tennessee and local decision makers could readily view the extent of the problem on a familiar image and take appropriate action.

In April 2002, NARAC supported a major ingestion pathway exercise at the Savannah River Site (SRS). Both SRS and NARAC used different mesoscale forecast models to produce similar regional-scale deposition patterns. Site, state, and federal agencies deployed their field measurement teams based on the plume predictions. In addition, each modeling team recalculated their source term based on comparing model results with simulated ground and aerial survey data (see Figure 1). SRS and NARAC both published results on web sites for all agencies to view.

3. USE IN NATIONAL SPECIAL SECURITY EVENTS (NNSEs)

During the 2002 Winter Olympics, Sandia National Lab (SNL) and LLNL staff deployed to Salt Lake City supplied the DOE modeling support to the multi-agency Utah Olympic Public Safety Command (UOPSC). Working with the Defense Threat Reduction Agency (DTRA) in the UOPSC Consequence Assessment Center (CAC), the three organizations collaborated on several hypothetical assessments. For radiological releases, SNL transmitted to NARAC and DTRA detailed source term data. NARAC provided SNL hourly surface and upper air profiles interpolated for each of the Olympic Venue locations based on the University of Utah s real-time MesoWest mesonet observations. NARAC also delivered forecasted profiles based a COAMPS runs at LLNL.

SNL, LLNL, and DTRA agreed upon a set of procedures to assure that a single result would go forward to decision makers. SNL and DTRA ran local desktop models while LLNL reached back to NARAC for more extensive calculations. On several occasions all three organizations ran models in parallel to test delivering a consensus result. While DTRA employed different meteorological forecast models, the results from each of the teams were generally more similar than different. The differences were magnified during mornings when winds were light and variable. One of the key lessons learned in comparing models is each team must have control of all model inputs and be able to deliver intermediate model outputs, such as derived wind fields and time-dependent dispersion patterns, in order to understand how the model performed in a specific situation.

4. FUTURE PLANS

A significant new integration of DOE CM tools in underway. Part of this is a unified DOE consequence assessment package that combines SNL and NARAC systems. Interaction between the monitoring and modeling teams in the Federal Radiological Monitoring and Assessment Center (FRMAC) is another key component with an important feature involving standardizing DOE model products for public agencies. When more than one agency is involved in responses, it is imperative that all agencies can produce consequence reports with similar content and plots displaying the same contours and color scheme. We continue to develop our tools and operational protocols and procedures to deliver and integrate credible assessments to the first responder, the governor, as well as the lead federal agency in a timely manner.

Acknowledgements. This work was performed under the auspices of the U.S. Department of Energy by the University of California, Lawrence Livermore National Laboratory under contract No. W-7405-Eng-48.
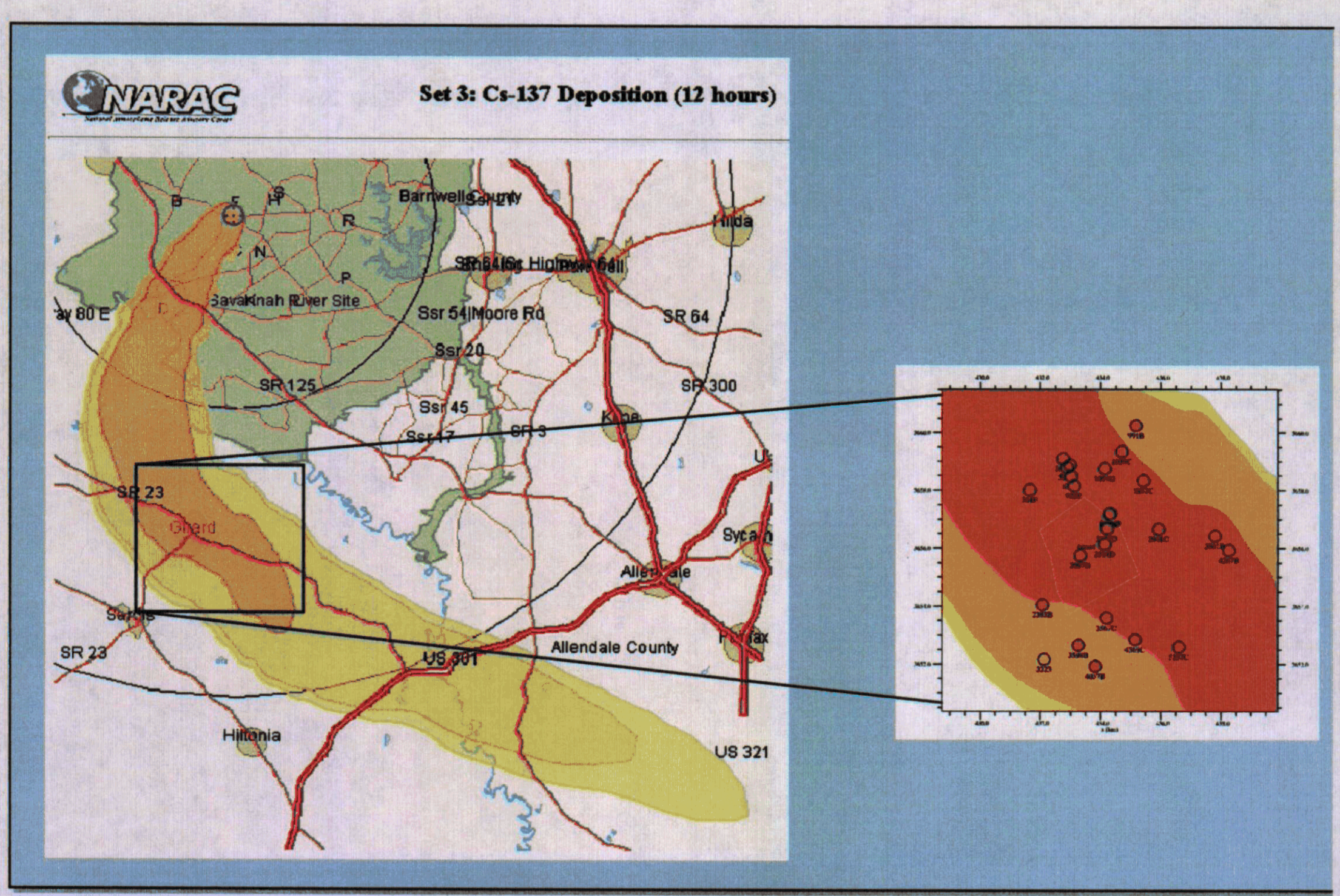
Figure 1. Hypothetical NARAC model calculation for Savannah River Ingestion Pathway Exercise compared with Aerial Measurement Survey data