OAK RIDGE NATIONAL LABORATORY

FACT SHEET

MANAGED BY UT-BATTELLE FOR THE DEPARTMENT OF ENERGY

July 30, 2002

SensorNet

Nationwide Detection and Assessment of Chemical, Biological, Radiological, and Nuclear (CBRN) Threats

The Department of Energy's (DOE's) Oak Ridge National Laboratory (ORNL) and strategic partners that include the National Oceanographic and Atmospheric Administration (NOAA) and the American Tower Corporation (ATC) are working to immediately build a comprehensive national incident-management system for the real-time detection, identification, and assessment of chemical, biological, radiological, and nuclear (CBRN) threats. SensorNet will bring together and coordinate all necessary knowledge and response assets quickly and effectively. This is an issue of the highest national concern for homeland security.

Strategy to Protect the Nation: ***The capability to dispatch informed first responders within minutes following a CBRN event will save lives.***

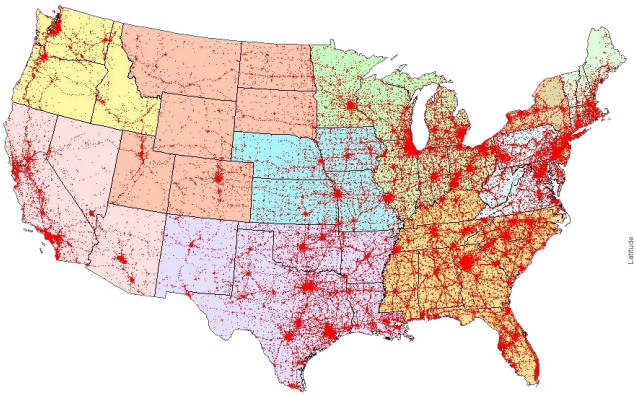
Rapid Deployment of a Nationwide System: All components presently exist to rapidly create a nationwide system for the real-time detection, identification, and assessment of CBRN threats.

Strategic Sites

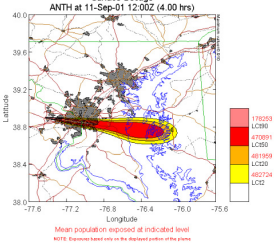
Nationwide Field Service

Remote Telemetry

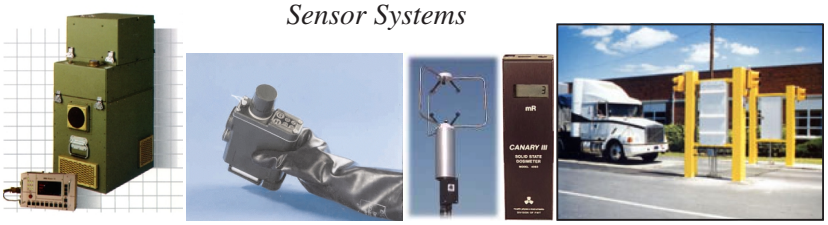
First Responders (Save lives) ← **National Operations Centers**



Automated Hazards Analysis



Sensor Systems



SensorNet, the nationwide real-time detection, identification, and assessment system of CBRN threats, will consist of the following:

- **Sensor Technologies:** Many chemical/biological sensors are available and under development. The SensorNet approach is to use the "best in class." A modular and open architecture will allow for easy upgrades at any time. The system would also incorporate technology for rapid detection of a radiological release and meteorological instruments.

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- **Real-Time Threat Assessment:** Several atmospheric dispersion models are available; again, the approach is to use the "best in class." Once a CBRN event is detected by chemical, biological, and radiological sensors, the modeling system will, in real time, produce a plume model, determine the number of people exposed, and predict immediate and latent effects on the population.

- **Nationwide Coverage:** The SensorNet infrastructure will be created by strategically locating state-of-the-art sensors at existing ATC communications sites (10,000). Strategically located to create a nationwide wireless communications infrastructure, the ATC tower sites are ideal for the SensorNet. In addition, ATC has a nationwide technical field service group to rapidly install, maintain, and upgrade on-site systems.

- **Nationwide Real-Time Remote Communications:** The SensorNet communication system will provide secure and redundant methods of communication between the sensor sites and local, regional, and national operations centers. These communication protocols will be based on industry standards that will allow a choice of communication equipment and vendors and provide for expansion and seamless upgrades in the future.

Field Testing: The integrated SensorNet system underwent field testing at ATC communications towers in Tennessee on March 11 and 12, 2002. The field test included

- a Block II Chemical-Biological Mass Spectrometer (CBMS) for detection of airborne chemical agents in the mail room of the City-County Building in Knoxville,
- a direct-sampling ion trap mass spectrometer for detection of chemical agents in air and compounds in water in Chattanooga, and
- a Block II CBMS for detection of airborne chemical and biological agents in Nashville.

The Block II CBMS used for this test is under development for the U.S. Army, and the Hazard Prediction Assessment Capability (HPAC) is currently deployed in military command centers throughout the world. All sensors were networked to a command center at the State of Tennessee Office of Homeland Security in Nashville using ATC's FTM 5000 remote telemetry technology, where detection information and local meteorological data were input to HPAC for plume prediction. The results of this successful field test are given in the accompanying table.

Agent	Detection and identification time (s)	Total elapsed time of test (s)[a]
Air tests		
Sarin simulant (methyl salicylate)	4–25	39–96
Anthrax simulant [bacillus globigi (BG)]	29–40	64–77
Water tests		
Chloroform	1.7–2.0	*b*

[a] Total elapsed time from injection in the sensor to detection, identification, and hazard plume prediction at the command center.
[b] HPAC water plume dispersion modeling was not performed for chloroform in water.

Results of March 11–12 test of SensorNet in Tennessee

During the passive-response-mode test, the command center successfully received sensor data, without loss of information, from simultaneous alerts at the three dispersed sensor locations.

Future tests will include meteorological instruments and radiation sensors at the sensor locations and automatic data transfer from the command center sensor-monitoring station to the HPAC system.

Point of Contact:
Jim Kulesz
Oak Ridge National Laboratory
Bethel Valley Road
P.O. Box 2008
Building 4500N, Room H-38
Oak Ridge, TN 37831-6237
Phone: (865) 241-9219
Fax: (865) 241-6261
Email: kuleszjj@ornl.gov

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