HOMELAND SECURITY

First Responders' Ability to Detect and Model Hazardous Releases in Urban Areas Is Significantly Limited

Why GAO Did This Study

First responders are responsible for responding to terrorist-related and accidental releases of CBRN materials in urban areas. Two primary tools for identifying agents released and their dispersion and effect are equipment to detect and identify CBRN agents in the environment and plume models to track the dispersion of airborne releases of these agents. GAO reports on the limitations of the CBRN detection equipment, its performance standards and capabilities testing, plume models available for tracking urban dispersion of CBRN materials, and information for determining how exposure to CBRN materials affects urban populations. To assess the limitations of CBRN detection equipment and urban plume modeling for first responders' use, GAO met with and obtained data from agency officials and first responders in three states.

What GAO Recommends

The Secretary of Homeland Security should (1) reach agreement with agencies on who will have the mission and responsibility to develop, certify, and independently test first responders' equipment for detecting hazardous material releases; (2) ensure testing and validation of manufacturers' claims about CBRN detection equipment's sensitivity and specificity; (3) refine IMAAC's procedures for addressing contradictory modeling predictions in CBRN events; (4) with IMAAC, work with the federal plume modeling community to accelerate R&D on model deficiencies in urban areas and improve federal modeling and assessment capabilities.

www.gao.gov/cgi-bin/getrpt? GAO-08-180.
To view the full product, including scope and methodology, click on the link above. For more information, contact Nancy Kingsbury at 202-512-2700.

What GAO Found

While the Department of Homeland Security (DHS) and other agencies have taken steps to improve homeland defense, local first responders still do not have tools to accurately identify right away what, when, where, and how much chemical, biological, radiological, or nuclear (CBRN) materials are released in U.S. urban areas, accidentally or by terrorists. Equipment local first responders use to detect radiological and nuclear material cannot predict the dispersion of these materials in the atmosphere. No agency has the mission to develop, certify, and test equipment first responders can use for detecting radiological materials in the atmosphere. According to DHS, chemical detectors are marginally able to detect an immediately dangerous concentration of chemical warfare agents. Handheld detection devices for biological agents are not reliable or effective. DHS's BioWatch program monitors air samples for biothreat agents in selected U.S. cities but does not provide first responders with real-time detection capability. Under the BioWatch system, a threat agent is identified within several hours to more than 1 day after it is released, and how much material is released cannot be determined.

DHS has adopted few standards for CBRN detection equipment and has no independent testing program to validate whether it can detect CBRN agents at the specific sensitivities manufacturers claim. DHS has a mission to develop, test, and certify first responders' CB detection equipment, but its testing and certification cover equipment DHS develops, not what first responders buy.

Interagency studies show that federal agencies' models to track the atmospheric release of CBRN materials have major limitations in urban areas. DHS's national TOPOFF exercises have demonstrated first responders' confusion over competing plume models' contradictory results. The Interagency Modeling and Atmospheric Assessment Center (IMAAC), created to coordinate modeling predictions, lacks procedures to resolve contradictory predictions.

Top Officials Exercises 1–4, 2000–2007

Exercise	Date	Place	Type of agent release simulated
1	May 20–24, 2000	Portsmouth, N.H.	Mustard gas
		Denver, Colo.	Pneumonic plague
		Washington, D.C.	Radiological dispersion device
2	May 12–16, 2003	Chicago, Ill.	Pneumonic plague
		Seattle, Wash.	Radiological dispersion device
3	April 4–8, 2005	New London, Conn.	Mustard gas
		New Jersey	Pneumonic plague
4	October 15–20, 2007	Guam	Radiological dispersion device
		Phoenix, Ariz.	Radiological dispersion device
		Portland, Ore.	Radiological dispersion device

Source: DHS.

Evaluations and field testing of plume models developed for urban areas show variable predictions in urban environments. They are limited in obtaining accurate data on the characteristics and rate of CBRN material released.

Data on population density, land use, and complex terrain are critical to first responders, but data on the effects of exposure to CBRN materials on urban populations have significant gaps. Scientific research is lacking on how low-level exposure to CBRN material affects civilian populations, especially elderly persons, children, and people whose immune systems are compromised.

_____ **United States Government Accountability Office**