

## Homeland Security Research

Following the 2001 terrorist attacks, the U.S. Environmental Protection Agency's homeland security research responsibilities were expanded by several Presidential Directives and the Bioterrorism Act of 2002.

EPA's Homeland Security Research supports the Agency's role as the lead federal agency for protecting water systems and decontaminating buildings, outdoor areas and water systems following incidents involving chemical, biological, or radiological contaminants.

The research strengthens the resiliency of our communities by providing water utility managers, laboratory technicians, on-scene coordinators, risk assessors, and emergency responders with scientific tools and technology to detect, prepare, respond to and recover from terrorist attacks and other disasters.

Research is organized under three themes:

- Securing and Sustaining Water Systems
- Characterizing Contamination and Determining Risks, and
- Remediating Indoor and Outdoor Environments



**Decontaminating a residence in Danbury, Connecticut**

### Securing and Sustaining Water Systems

Drinking water distribution systems are vulnerable to intentional or accidental contamination. Researchers are developing tools that help water utility managers detect and respond effectively to water contamination incidents.

Scientists and engineers test new detection technology and develop software and models to help:

- determine the best locations to place water quality sensors in water distribution systems
- predict the movement of contaminants in water systems
- identify response activities such as pipe flushing or closing valves to limit the extent of contamination and,
- differentiate between actual contamination events and costly false alarms.

Early intervention by water utility managers will reduce public health and economic consequences. Researchers are also developing ways to clean contaminated water and associated water infrastructure (pipes, towers) should an incident occur. This helps ensure that utilities can return systems to service as quickly as possible.

### Characterizing Contamination and Determining Risks

The chemical, biological or radiological threats involved in homeland security incidents may differ from those previously encountered in typical environmental cleanups. Following an incident, the type and quantity of a contaminant must be identified. Research is underway to find reliable sampling and analytical methods for them.



In addition to identifying the nature and extent of contamination, restoring a facility or outdoor area to its previous use requires an understanding of the health risks posed by potential contaminants. Clean up managers need to know the routes by which people can be exposed (i.e. inhalation, ingestion, skin contact) and their potential health effects, so that appropriate cleanup can be undertaken.

Gaps exist in our knowledge of how toxic or infectious some contaminants might be, so researchers are conducting studies to fill these gaps.

### **Remediating Indoor and Outdoor Environments**

Remediating buildings and outdoor areas following a contamination event requires knowing how contaminants behave in the environment and which decontamination methods are most effective. Researchers are studying the degree to which contaminants persist in the environment and are transported following a contamination incident. Various factors such as surface materials (concrete, carpet, soil) and environmental conditions (temperature, humidity) affect contaminant persistence and movement. Persistent contaminants require inactivation or removal.

Methods for inactivating and/or removing them from various surfaces are being tested first in controlled laboratory settings and then in real-world, full-scale, field operations. The impact of decontamination activities on building materials and sensitive equipment such as electronics is also being explored.

Clean up operations almost inevitably result in contaminated solid and liquid waste. Researchers are working on ways to safely manage the wastes by addressing questions such as:

- How can wastewater from these incidents be safely and effectively treated onsite or in municipal sewage treatment plants?
- How do contaminants behave in landfills? Are they degraded or do they escape?
- How can wastes from these incidents be safely and effectively treated in incinerators or autoclaves?

The scientific tools and technology developed are used by those on the front line of protecting from and responding to accidental or intentional environmental threats. The research is improving the ability to detect and determine the extent of contamination, determine risk to humans, and develop appropriate clean-up and waste management approaches.

### **More Information:**

#### **Web site:**

[www.epa.gov/nhsrc](http://www.epa.gov/nhsrc)

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