OFFICE OF RESEARCH AND DEVELOPMENT

Homeland Security Research Program

Advancing Our Nation's Security Through Science

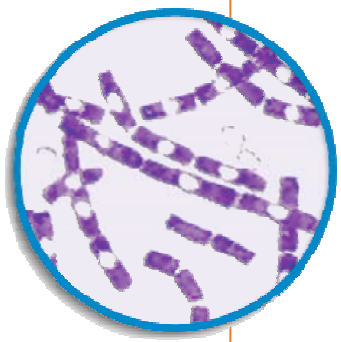
MISSION

The EPA's homeland security research program develops and delivers reliable, responsive expertise and products based on scientific research and evaluations of technology. Our expertise and products are widely used to prevent, prepare for, and recover from public health and environmental emergencies arising from terrorist threats and incidents.

ADVANCING OUR NATION'S SECURITY THROUGH SCIENCE

AUTHORITY

The Public Health Security and Bioterrorism Preparedness and Response Act of 2002, together with Homeland Security Presidential Directives charge EPA with protecting our nation's critical water infrastructure; and the decontamination of indoor and outdoor areas following an incident.



HSPD 7 – defines EPA as Sector Specific Agency for drinking water and water treatment systems.

HSPD 9 – requires EPA to develop a comprehensive, and fully coordinated water quality surveillance/monitoring system and an interconnected laboratory network.

HSPD 10 – requires EPA to address risks from biological agents and develop strategies, guidelines and plans to decontaminate persons, equipment and facilities

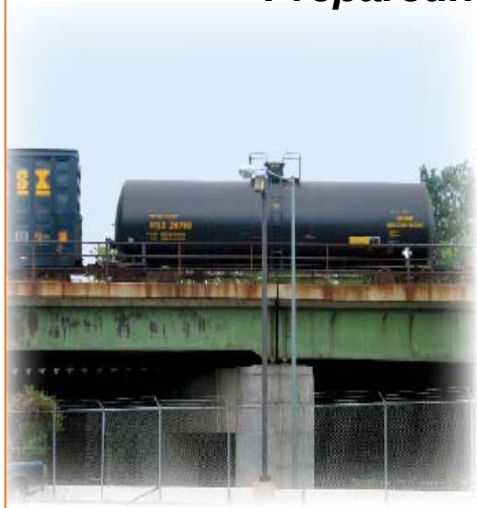
HSPD 22 – requires EPA to develop detection technologies, plans and protocol to decontaminate following a chemical incident including development of risk-based clean-up goals.

Planning from the Top Down

As required by the National Strategy for Homeland Security we are strengthening the nation's scientific and technological advantage by conducting innovative research and development to assist in protecting and defending against a range threats confronting the homeland. Our Homeland Security Research Program directly supports EPA's Homeland Security Strategy with respect to its:

Critical Infrastructure Protection Objectives

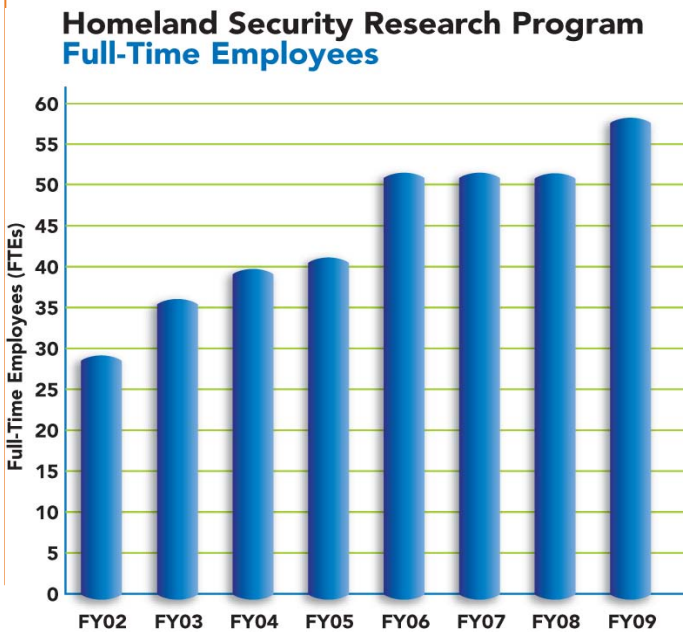
Preparedness, Response, and Recovery Objectives

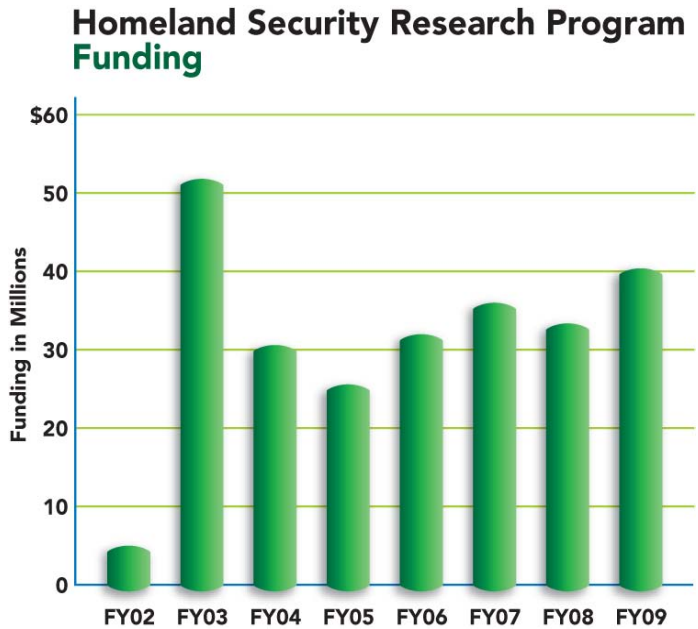


The importance of of homeland security research to EPA's mission is further acknowledged in EPA's Strategic Plan: Charting Our Course 2006 – 2011 through Objective 4: Sustaining Healthy Communities and Ecosystems.

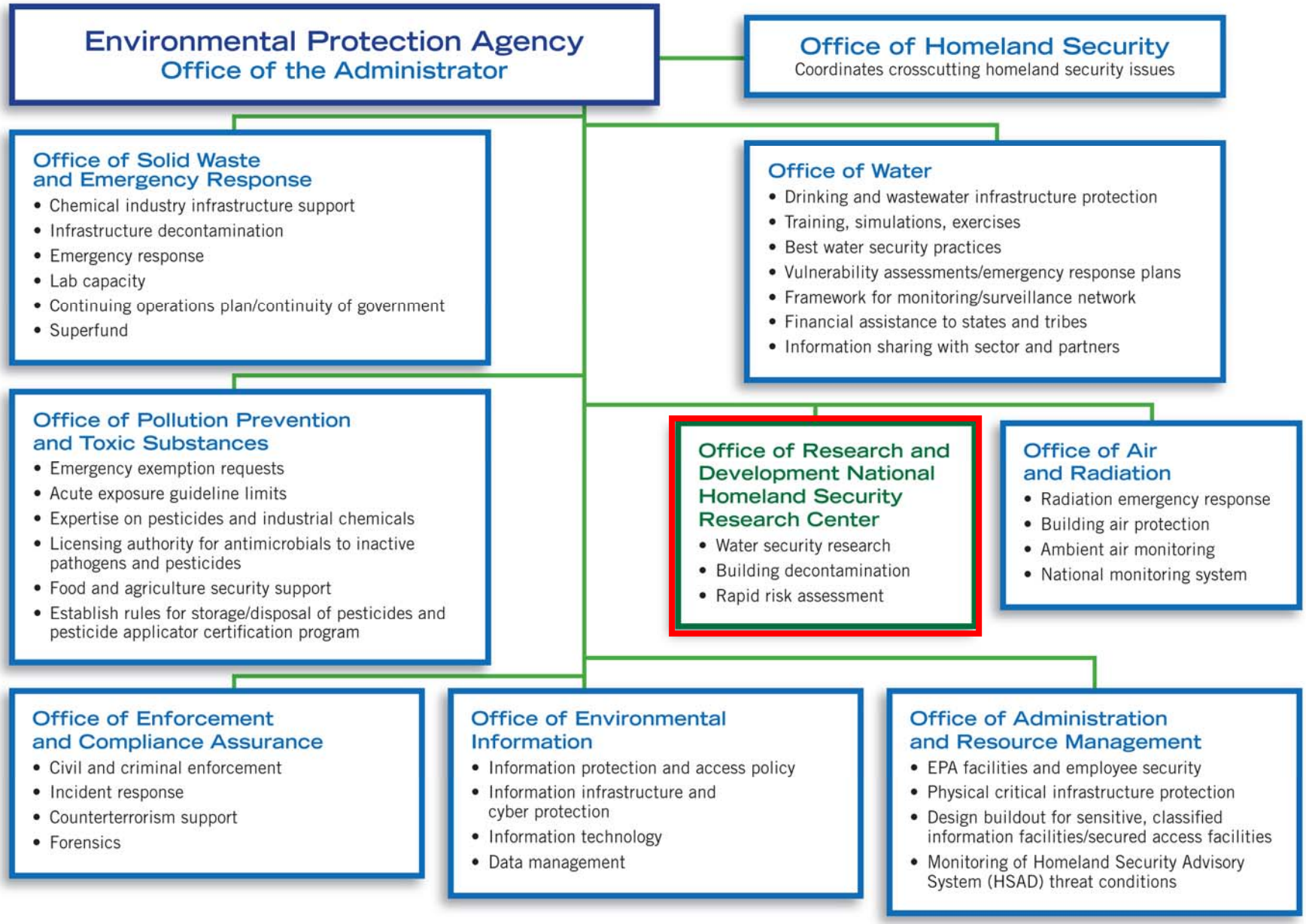
History of EPA's Homeland Security Research

- Begun in 2002 with 12 full- time employees.
- Intended to be a short-term effort that rapidly addressed critical research needs.
- In recognition of complex and ongoing needs, a permanent research center was established in December, 2004
- Currently 75 employees, including EPA employees, student contractors, post-doctorates and fellows, are dedicated to homeland security research.
- We have published research results in over 125 reports and journal articles since 2003.
- We partner with DoD, DOE, DOI, CDC, NIOSH, FDA and other EPA research labs.





EPA's Homeland Security Components



Homeland Security Research Program

RESEARCH PLANNING AND PRIORITIZATION PROCESS

Threat Scenarios

A possible sequence of events that make up a terrorist attack

Evaluate thousands of possible combinations of facility types and methods of attack

Priority scenarios are most probable and have highest consequences.

Identify knowledge gap analysis.

Focus research on filling these gaps

Peer review of research agenda

Best Scientific Judgment

Stakeholder Meetings – OSWER, OW, TRIO

Identify stakeholder needs

Develop research to meet needs

Peer review of our research agenda

Governmental Requirements

Bioterrorism Act

Homeland Security Presidential Directives

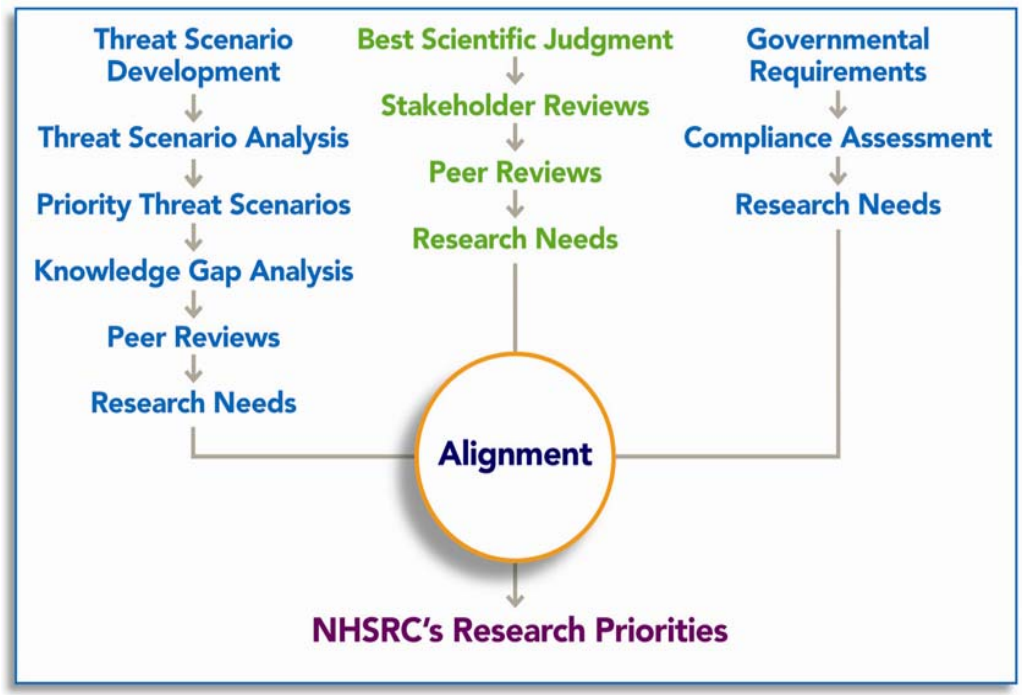
National Strategy for Homeland Security

National Strategy for Physical Protection of Critical Infrastructure and Key Assets

National Response Plan

National Plan for R&D in Support of Critical

Infrastructure Protection Sector Specific Plan for Water



Objectives of the Program

Our work is planned and prioritized to meet customer needs. Our long term goals and annual performance measures are based on these need. These goals, measures, research priorities and anticipated products are documented in the Homeland Security Research Center Multi-year Plan and the Office of Homeland Security Workplan

Provide means to PROTECT through threat assessment and vulnerability analysis

Develop methods and technologies to rapidly DETECT, identify and quantify contamination

Provide information and tools to rapidly CONTAIN contamination and mitigate health impacts

Develop effective and efficient methods that treat water and DECONTAMINATE infrastructure and the environment

Develop means to DISPOSE of contaminated materials generated during decontamination activities

COMMUNICATE with our clients

- Office of Water
- Office of Solid Waste and Emergency Response
- Task Force to Inform and Optimize Response and Readiness
- Regional and public health labs
- Water utility owners and operators

PROTECT WATER SYSTEMS BY DEFINING THREATS AND VULNERABILITIES

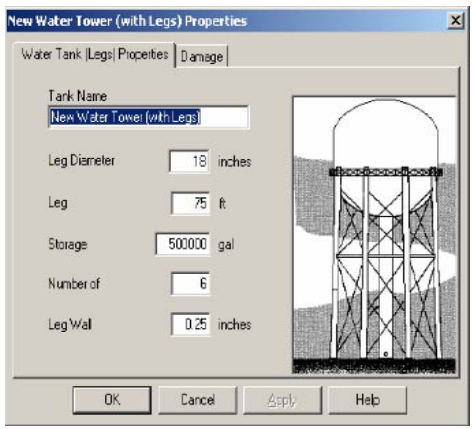
We conduct research to protecting water systems using a comprehensive approach: identify potential threats, assess vulnerabilities, estimate potential consequences, and improve security procedures and technology to deter attacks or mitigate their impacts

Projects Underway:

- Evaluation of Threat Scenarios
- Improvements to vulnerability assessment tools
- Develop cost estimates associated with public health impacts to two cities that were determined during a planning exercise using TEVA-CAT

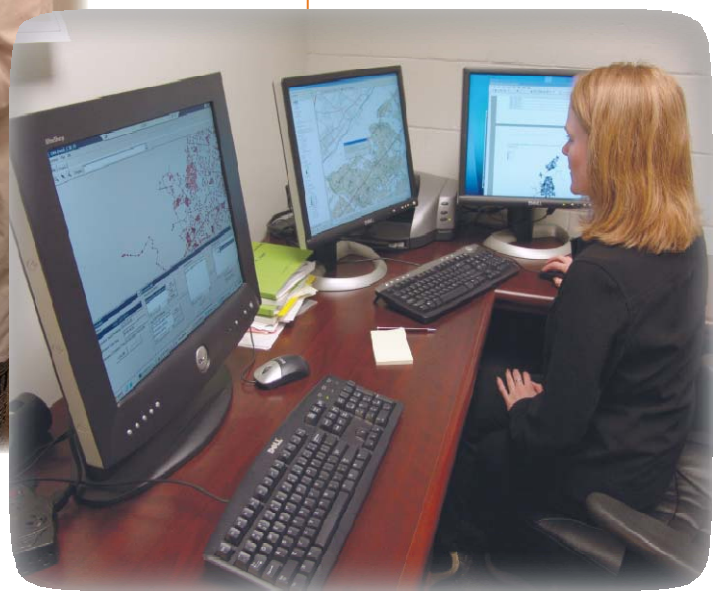
Selected Completed Products:

•***The Blast Vulnerability Assessment (BVA)*** computer model that allows water utilities to asses the explosive threats of various sizes in terms of damage to key structures.
•***TEVA-Consequence Assessment Tool*** works with water utility network models to estimate the public health impacts of contamination incidents in water distribution systems.
•**Emergency Portable Water Treatment** assessment of potable water treatment equipment available for various emergencies
•**Planning for Disaster – Case Studies** A preliminary report on the status of water utility planning for various natural disasters



RAPID, RELIABLE CONTAMINANT DETECTION

The ability to respond quickly to contamination events requires rapid detection and identification of chemical, biological, and radiological contaminants.



Projects Underway:

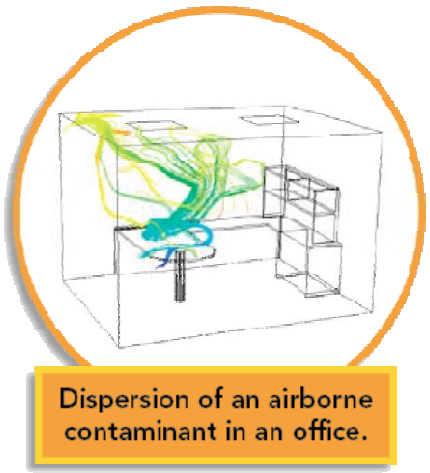
- Testing and evaluating commercially available detection technologies
- In support of the Water Security Initiative improving computer tools to enhance event detection
- Develop and validate laboratory methods for detecting and quantifying contaminants
- Improving sampling methods for contaminants of concern

Selected Completed Products:

- Evaluation of water quality sensors as devices to warn of intentional contamination in water distribution systems
- TEVA-SPOT and CANARY computer tools to guide sensor placement evaluated detection events
- Contaminant minimum-dose threshold concentrations for water quality sensors
- Water quality sensor responses to contamination in a single pass water distribution system simulator
- Development of improved understanding of the use of biotoxins for intentional contamination of drinking water systems
- Multispecies EPANET water distribution system computer code
- Standard Analytical Methods manual for use during homeland security events

CONTAMINATION CONTAINMENT AND IMPACT MITIGATION

Containment and mitigation research identifies and develops the best available technologies and procedures for limiting a contaminant's reach.



Dispersion of an airborne contaminant in an office.

Projects underway:

- Developing emissions, transport, and fate models for air releases
- Modeling contamination events in drinking water distribution systems
- Developing guidelines for managing contamination events
- Investigating the fate of biological, chemical, and radiological contaminants in water
- Investigation of degradation and kinetics of chemical agents of concern in chlorinated and chloraminated drinking water
- Guidance on response to water contamination events that impact a building's plumbing system.

Selected Products we've completed:

- Evaluation report on commercially available air filtration systems
- Multispecies EPANET distribution system computer code and EPANET-BTX
- Report: Energy and Water Distribution Interdependency
- Guidance on building retrofits for increased protection against Airborne CBR releases

DECONTAMINATION AND TREATMENT

Decontamination and treatment research focuses on methods for safe and cost-effective remediation and for restoration of indoor and outdoor areas after contamination.

Studies conducted with pilot-scale water distribution systems such as this clear pipe loop allow researchers to observe the behavior of contaminants within the pipe system.

Projects underway:

- Testing and evaluation of commercial decontamination methods
- Investigating biological contaminant removal from biofilm
- Conducting studies to optimize decontamination methods
- Conducting inactivation studies for biological contaminants in water
- Producing a database of methods for treating drinking water
- Comparison of efficacies of various decontamination protocols and technologies for drinking water and wastewater systems
- Investigating the persistence of various microbes in outdoor environments

Selected Completed Products:

- Report: Investigation of the use of Point of Use/Point of Entry Treatment Devices
- Planning for Decontamination Wastewater: A Guide for Utilities
- Catalytic Enzyme-Based Methods for Water Treatment and Water Distribution System Decontamination - Final Report
- Decontamination Technology Evaluation Reports
- Reports on the 2005, 2006 and 2007 Workshops on Decontamination
- Reports on decontamination method efficacy
- Reports on contaminant persistence
- Compilation of Available Data on Building Decontamination Alternatives

DISPOSAL OF CONTAMINATED MATERIALS

Cleaning up after an attack can result in the generation of large volumes of material that require disposal. We are developing tools, techniques and technologies appropriate for the safe removal, packaging, transport, and disposal of contaminated materials following an emergency.

A training exercise participant disposes of contaminated material.

Projects Underway:

- Conducting studies of thermal destruction of
- contaminant agents
- Investigating the environmental implications of disposal of waste resulting from the cleanup of chemical/biological/radiological contamination events
- Developing a guidance document for thermal treatment of building decontamination residue
- Developing a Radiological Dispersion Device waste estimator

Selected Completed Products:

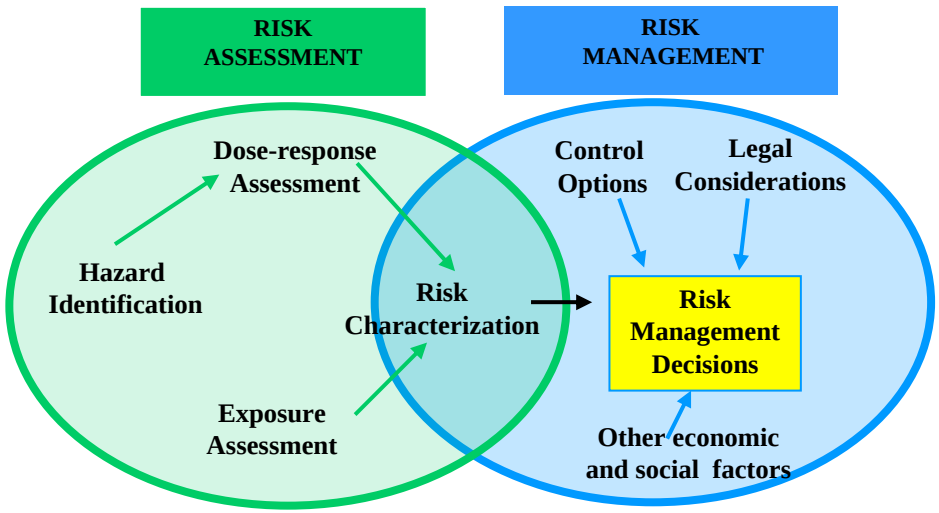
- Constructing a Web-based disposal decision support tool on potential landfill/thermal treatment facilities for building and water system decontamination residue
- Proceedings from a disposal workshop to identify disposal issues associated with weapons of mass destruction
- Reports on the results of decontamination efficacy studies
- Report on the Homeland Security Workshop on Transport and Disposal of Wastes From Facilities Contaminated With Chemical or Biological Agents
- Reports on fate of contaminants in landfill leachates

RISK ASSESSMENT AND COMMUNICATION

Assessment and communication research provides tools and expert guidance to help decision makers prepare for and respond to terrorist attacks.

Projects Underway:

- Developing acute, subchronic, and chronic exposure levels for agents of concern
- Establishing methodologies for assessing the risks from biological agents to human health
- Continuing the development of Provisional Advisory Levels for chemicals
- Addition of agents and information to the biological agent database
  - Investigating exposure due to boiling and misting
  - Developing Microbial Risk Assessment Methodology
  - Developing models to decrease the uncertainty associated with microbial risk assessment



Selected Completed Products:

- Database of biological agent information
- Evaluating unique methods for predicting health and risk information in the absence of contaminant-specific data
- Provisional Advisory Levels for chemicals
- Reports on exposure from various contaminant sources and pathways
- Effective Risk and Crisis Communication during Water Security Emergencies: Summary Report of EPA Sponsored Message Mapping Workshops
- A Compendium of Prior and Current Microbial Risk Assessment Methods

Ensuring Quality

Our products and research plans receive rigorous quality reviews. We follow a graded approach that requires multiple reviews of major products by individuals both within and outside of our research center.

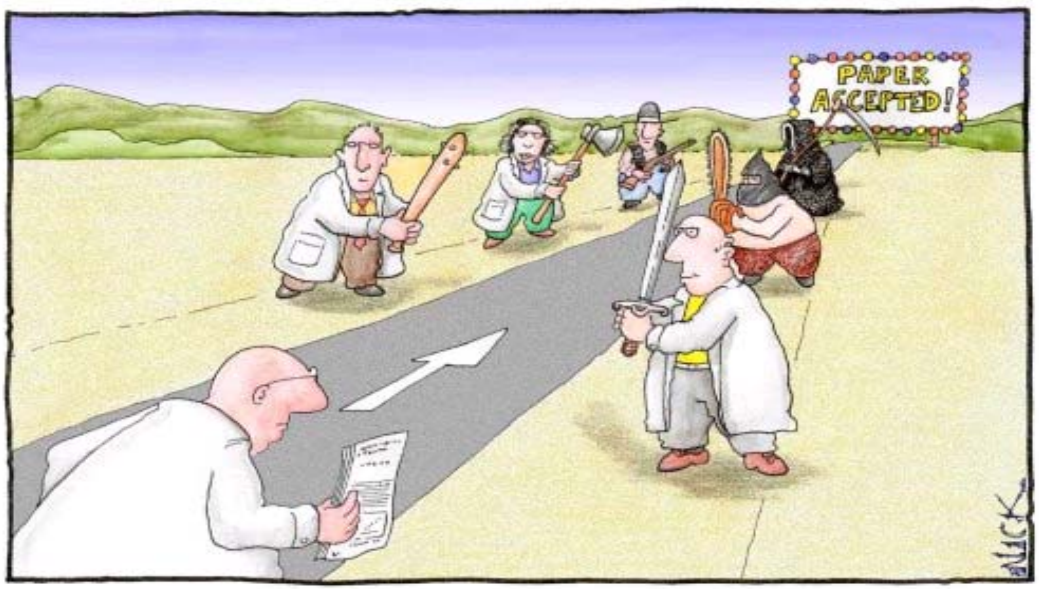
Components of our research program has been reviewed by the National Academies of Science and the EPA Science Advisory Board

The Program operate under a Quality Management Plan ensuring that research is conducted and products are generated under a Quality Assurance Project Plan approved by a qualified Quality Assurance Officer.

The Program conducts a peer review program for products to ensure that they are scientifically sound.

Products are reviewed by a Security Officer to determine the need for classification or handling as “For Official Use Only”.

Products are reviewed by EPA management to determine policy implications and ensure clear messages.

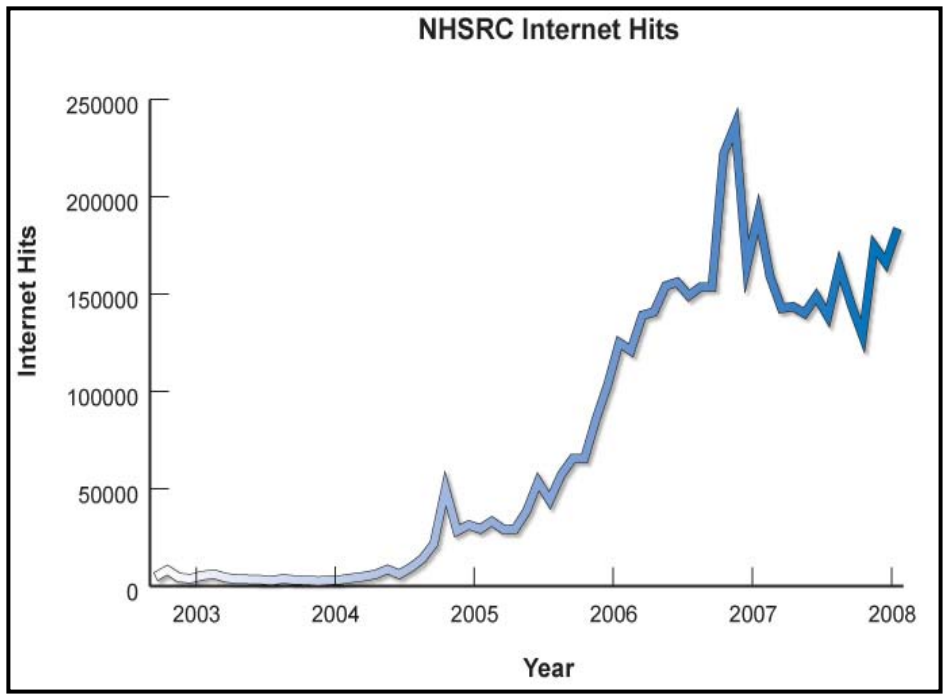


Most scientists regarded the new streamlined peer-review process as ‘quite an improvement.’

Communicating the Results

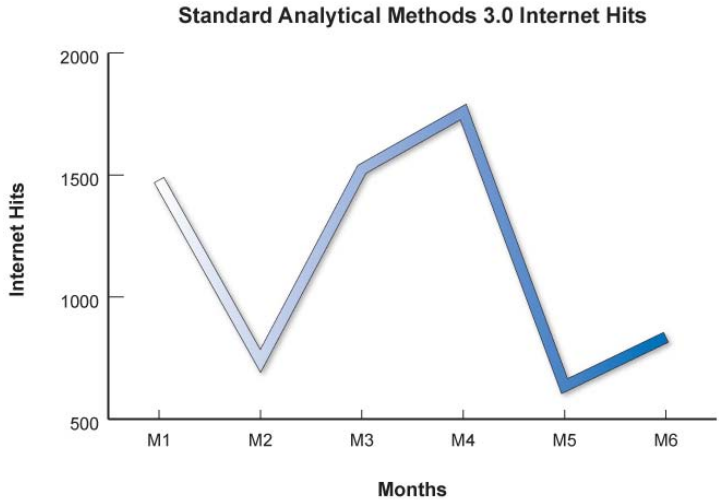
Communicating our research and results is done in may ways from small meetings held with stakeholders, to presentations given at symposiums and workshops to making our products widely available through websites.

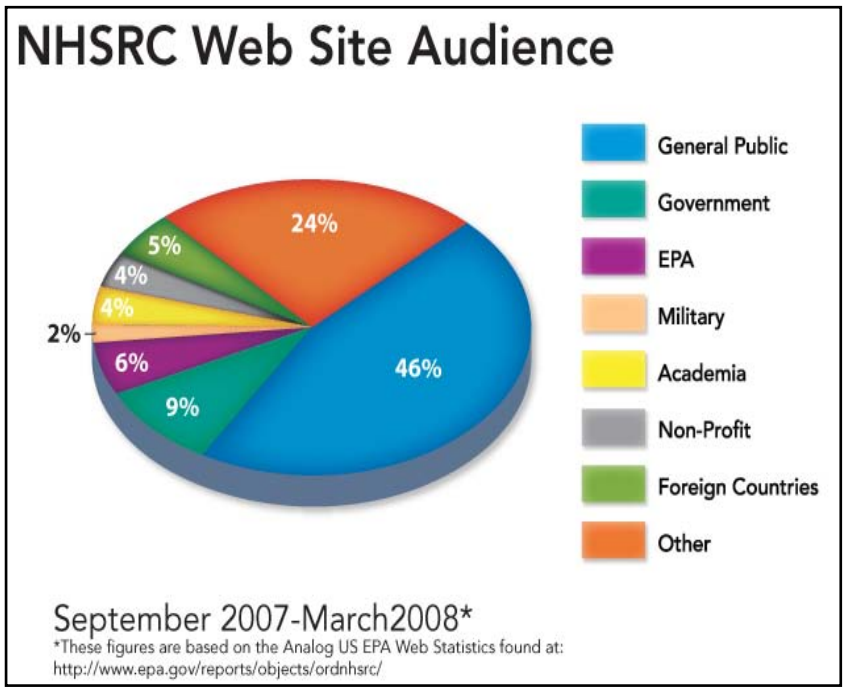
- Presentations at National and International Meetings and Symposiums
- Meetings with clients to discuss research goals, results and future needs
- Organizing widely-attended Annual Decontamination Workshop including representatives of the G8 Nations
- Post sensitive Information to the secure website of the WaterISAC
- Post non-sensitive products and information to our website

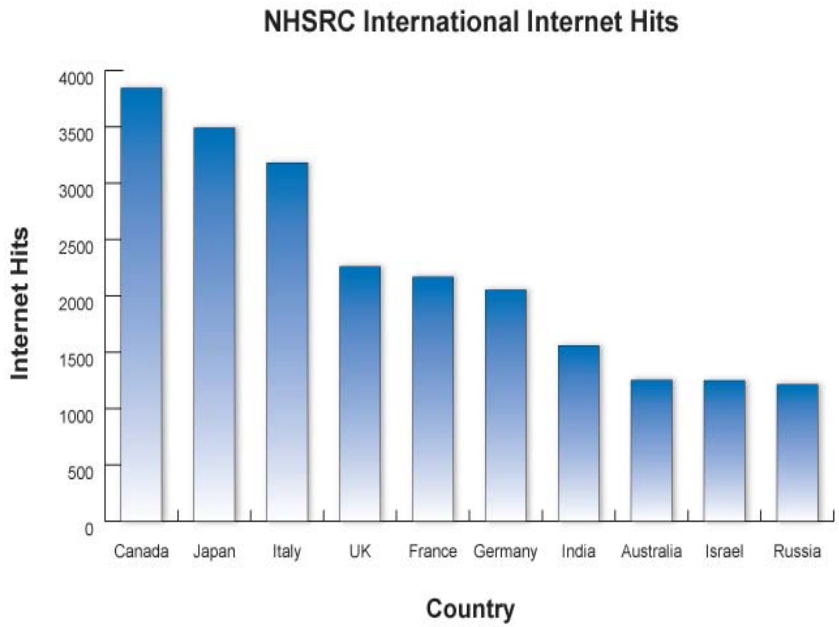


Who Are We Reaching

We monitor our web statistics to determine who is visiting the site and downloading our products. Site recognition and product downloads continue to grow. We maintain a mailing list consisting of hundreds of individuals who've asked to be notified when new products "hit" the web. We solicit feedback through a comment feature on the site.

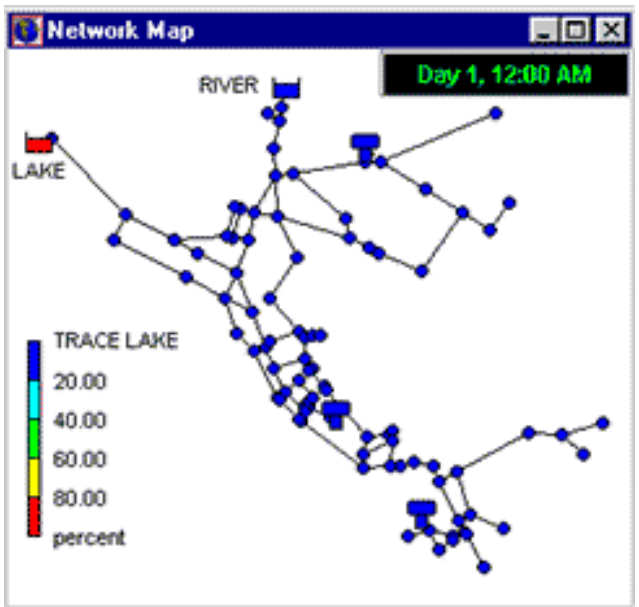






Determining Our Effectiveness

Providing a product to a customer is only the first step in communicating our results. Success is when a customer uses and benefits from out work. A database of customer Feedback and outcomes has been provided on the BOSC CDs. A few examples are provided in this presentation.

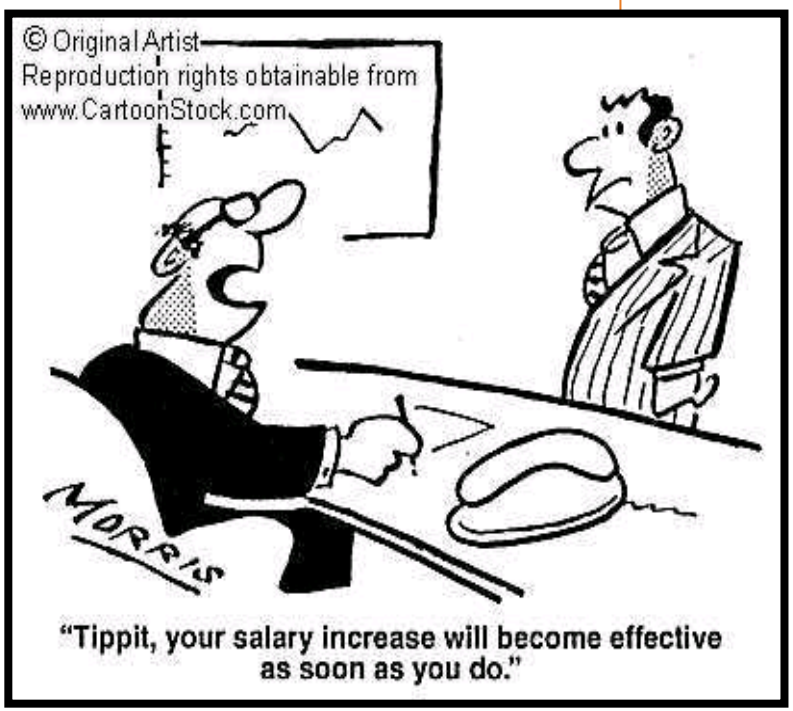


Here's what our customers are saying about our products:

- ☺ "I am writing to express State's appreciation for your help in including our international partners in the CBRN Decontamination Workshop in April, as well as to congratulate EPA on a successful workshop"
- ☺ "I just ran the BDR disposal tool for an exercise I am working on in Region 7. All I can say is WOW! "
- ☺ "DEP rapidly put together several laboratories to effectively analyze the water for a broad spectrum of possible agents based on the Standardized Analytical Methods for use Homeland Security Events"
- ☺ "the Naval Post Graduate program had adopted message mapping into its training as a result of having attended the NHSRC sponsored workshops"
- ☺ The (In-Duct UV light) report was helpful. It was organized and each item had a description that was meaningful, not cryptic.
- ☺ "TEVA provided a cost effective configuration of sensors for contaminant warning for the size of the Ann Arbor distribution system."
- ☺ "…the Security Information Collaborative Guide produced by the NHSRC was utilized by the State of Mississippi in emergency planning**"**

Determining Our Effectiveness

In addition to our products our technical expertise is sought for consultation and field support.



Here's what customers said about our technical support:

☺ **"**I wanted to let you know what an asset Shawn was during the Danbury Anthrax fumigation. His technical expertise enabled the Unified Command to make informed real time technical decisions in the field during the fumigation."

☺ "Just to let you know that, from my perspective at least, we had a very successful clearance committee meeting yesterday. The success is in large measure to the help that you and Nancy (and others in USEPA) have given us."

☺ "Outstanding! Many thanks for participating. I would have given lame assistance on my own. This is the compelling reason for our two groups working closely together."

☺ "….compared to all the others who reviewed the guide, the comments provided by EPA, were by far the most valuable - no contest. Although same iteration of the guide was sent to DVM's, MD's, microbiologists, and …., they missed virtually all of items listed in EPA's recommended edits"

Parting Sentiments and Summary

We appreciate the time and attention of the BOSC panel in reviewing the homeland security research program. We look forward to your questions, comments and recommendations and hope you find the experience equally rewarding.

The Homeland Security Research Program:

Our transition from temporary/startup status to a permanent part of EPA is nearly completed.

Our goals are clear and will strengthen EPA's abilities to carry out its homeland security responsibilities

We have proven ourselves effective in creating high-quality products useful to our clients and successful in communicating progress to our stakeholders.

We continue to address a broad scope of applied research issues ranging from detection to remediation, risk assessment to risk management.

Our work is far from over. Initial efforts focused on critical needs and high-consequence threat agents considered reasonably accessible to terrorist (e.g. *Bacillus anthracis*)

Equivalent research is needed to address additional threat agents in terms of detection capabilities, heath effects, risk assessment, and decontamination approaches.