



# EPA's Role in Water Security Research

The Water Security Research and Technical Support Action Plan



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*The Water Security Research  
and Technical Support Action Plan*

United States Environmental Protection Agency

Office of Research and Development  
National Homeland Security Research Center

Office of Water  
Water Security Division



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*"We are... taking significant steps to  
strengthen our homeland protections  
— securing cockpits, tightening our borders,  
stockpiling vaccines, increasing security at  
water treatment and nuclear power plants."*

PRESIDENT GEORGE W. BUSH  
JUNE 6, 2002



## Introduction

Water — every drop of it — is a precious natural resource that Americans once enjoyed with little thought to potential tampering by terrorists or others. Today, however, U. S. citizens are increasingly aware of threats of harm to our homeland. The terrorist attacks of September 11, 2001, and the delivery of anthrax-contaminated letters later that year have taught us to anticipate that other such threats are possible.

Terrorist threats are targeted not just at individuals, but also at the country's vital institutions and infrastructure, including drinking water and wastewater systems. To combat such threats, it is essential that



government agencies, water utilities, state and local water agencies, public health organizations, emergency and follow-up responders, academia, and the private sector from across the country be ready to protect our water infrastructure. These entities are working together to reduce vulnerabilities to terrorism, prevent and prepare for terrorist attacks, minimize public health effects and infrastructure damage, and enhance recovery from any attacks that may occur.

## EPA's Water Security Role

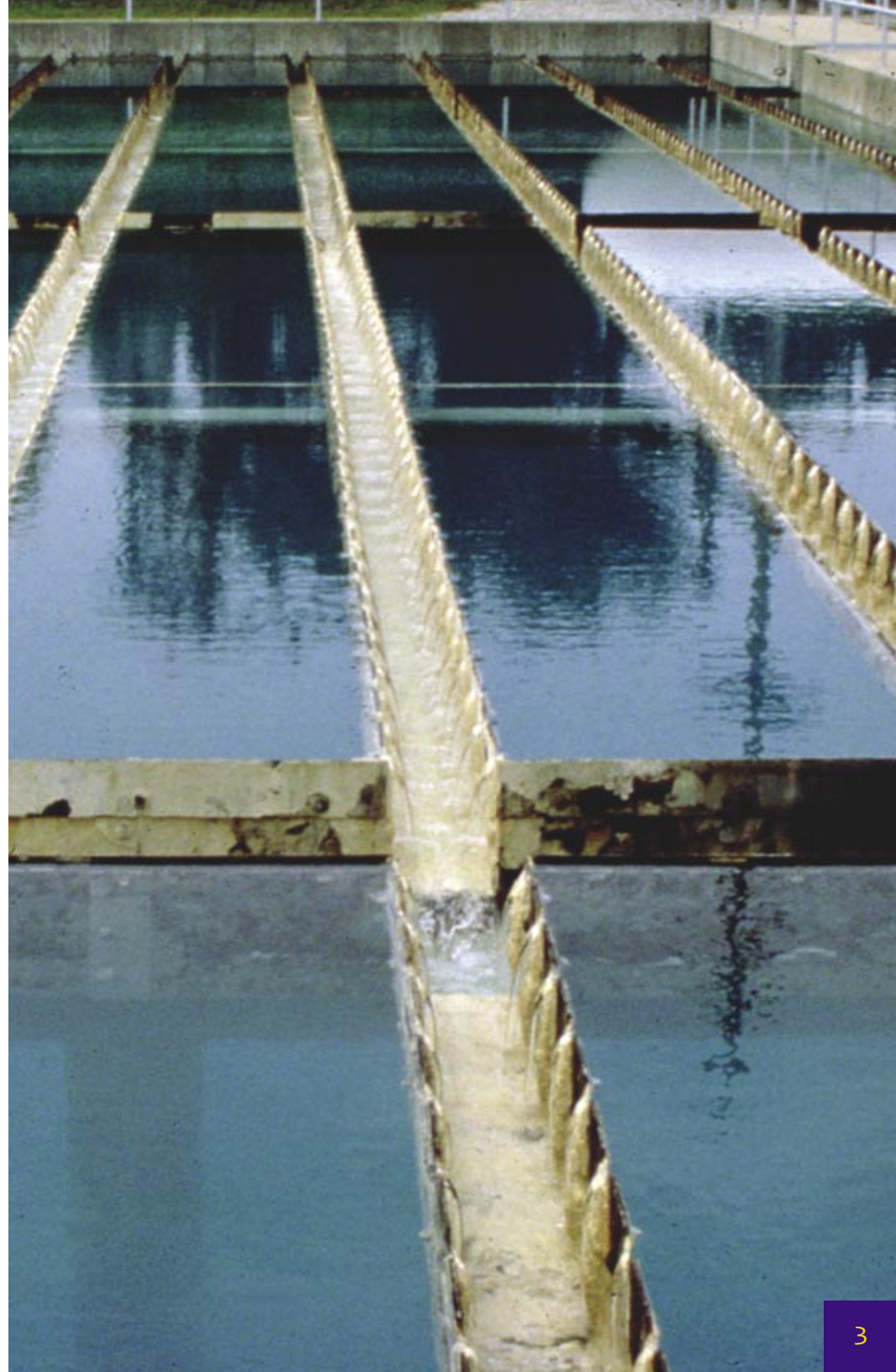
As the lead federal agency for protecting the nation's drinking water and wastewater infrastructure, the U.S. Environmental Protection Agency (EPA) plays a critical role in homeland security. Agency support for water system protection is multifaceted. Much of the work accomplished by EPA over the past several decades in such areas as emergency response, risk assessment, hazardous waste cleanup, drinking water and wastewater treatment, and water quality monitoring is being applied to water security. Many of the current Agency activities supporting water infrastructure protection are conducted by the Office of Research and Development's National Homeland Security Research Center (NHSRC) and the Office of Water's Water Security Division (WSD), both of which were initiated after the 9-11 terrorist attacks. These organizations work together to provide research and technical support to the drinking water and wastewater sectors.



The National Homeland Security Research Center oversees three major research areas: Water Security, Rapid Risk Assessment, and Safe Buildings. The Center's Water Security Team is conducting research to increase the understanding of public health and environmental impacts from various kinds of water infrastructure attacks. This understanding, when integrated into water security practices, leads to improved awareness, preparedness, prevention, response, and recovery from intentional acts against water systems. The Team is producing analytical tools and procedures, technology evaluations, models and methodologies, decontamination techniques, technical resource guides and protocols, and risk assessment methods. All of these products are for use by EPA's key water infrastructure customers—water utility operators, public health officials, and emergency and follow-up responders.

The Water Security Division supports drinking water and wastewater utilities by preparing vulnerability assessment and emergency response tools and training, providing technical and financial assistance, and developing information exchange mechanisms. The Division has provided training and financial assistance to water utilities for assessing their security vulnerabilities and developing emergency response plans for dealing with potential terrorist attacks. WSD is also charged with supporting best security practices, providing security enhancement guidance, and incorporating security into the day-to-day operations of drinking water and wastewater utilities. In addition, the Water Security Division works closely with NHSRC in delivering research results in a timely and appropriate fashion.

Along with providing research and technical support, both the Water Security Division and the National Homeland Security Research Center encourage information sharing and risk communication strategies among key water infrastructure stakeholders. This includes making use of the Water Information Sharing and Analysis Center (WaterISAC), a comprehensive online resource of security information for drinking and wastewater utilities managed by the Association of Metropolitan Water Agencies ([www.waterisac.org](http://www.waterisac.org)).

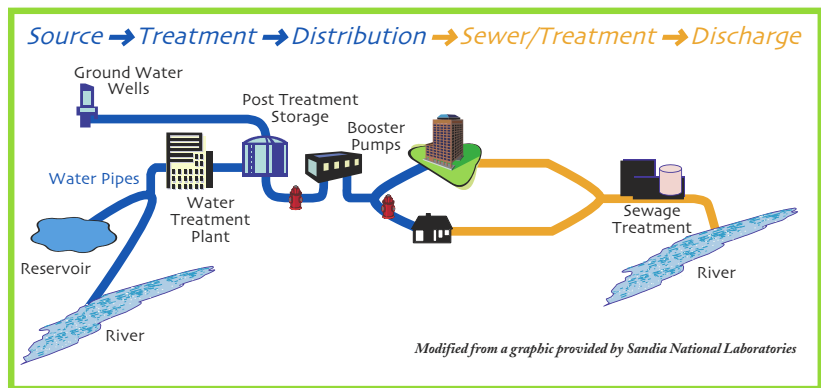


## The Water Security Research and Technical Support Action Plan

To enhance its working knowledge of water industry security problems in the U.S., EPA has engaged numerous water experts and stakeholders from government, industry, and academia. Other key participants are representatives from public health organizations, emergency responders and follow-up responders, law enforcement officials, environmental groups, and related professional associations.

EPA has held meetings with these experts and stakeholders to gain their insights on the vulnerabilities and technical challenges facing the water industry for which research and technical support are crucial. With assistance from other federal agencies and contractors, both the Water Security Division and the National Homeland Security Research Center are addressing these challenges. Issues, needs, and projects are summarized in the comprehensive *Water Security Research and Technical Support Action Plan*, hereafter referred to as the *Action Plan*. The *Action Plan* is available on the web at [www.epa.gov/nhsrc](http://www.epa.gov/nhsrc) and [www.epa.gov/watersecurity](http://www.epa.gov/watersecurity).

The *Action Plan* addresses drinking water supply, water treatment, finished water storage, and drinking water distribution system infrastructure. It also covers wastewater treatment and collection infrastructure, including sanitary and storm sewers or combined sanitary-storm sewer systems, wastewater treatment, and treated wastewater discharges.



Work described in the *Action Plan* is ongoing and EPA will periodically update the plan as new information on threats, contaminants, and threat situations is developed.

## Action Plan Issues

Results from federal partner and water stakeholder meetings are organized in the *Action Plan* under the seven issues listed below. Each issue describes significant research needs with specific projects listed for each need. Although the *Action Plan* focuses primarily on biological, chemical, and radiological contaminants in drinking water systems, it also addresses physical and cyber threats, contingency planning, risk assessment, risk communication, and infrastructure interdependencies.

- Protecting drinking water systems from physical and cyber threats
- Identifying drinking water threats, contaminants, and threat scenarios
- Improving analytical methodologies and monitoring systems for drinking water
- Containing, treating, decontaminating, and disposing of contaminated water and materials
- Planning for contingencies and addressing infrastructure interdependencies
- Targeting effects on human health and informing the public about risks
- Protecting wastewater treatment and collection systems

The *Action Plan* takes the following approach to address these issues and deliver products:

- Enhance collaborative research and technical support
- Provide for technology advancement through testing, evaluation, and verification
- Share information in both secure and open fashions



# Research and Technical Support in the Context of EPA's Water Security Program



## Key Research and Technical Support Needs

Partners and stakeholders have identified the following key research and technical support needs to enhance protection of existing water infrastructure, including security against cyber attacks and other ways to disrupt water systems:

- Identify and characterize threats that could be used to disrupt water systems
- Develop methods for detecting and monitoring contaminants in water
- Create rapid screening technologies for the identification of unknown contaminants
- Improve detectors and early warning systems for water distribution and collection systems
- Enhance models for contaminant transport in pipes and distribution systems
- Test and evaluate the performance of sensors and biomonitors



- Refine fate and transport information for contaminants in water
- Develop treatment or inactivation techniques for water contaminants
- Evaluate and improve decontamination and disposal techniques for contaminated materials and equipment
- Establish contingency planning and infrastructure backup procedures
- Improve methods for assessing risks to the public from water contamination
- Enhance risk communication and information sharing among individuals and organizations dealing with a threat or attack
- Provide training and exercises that enhance preparedness, response, and mitigation to water system threats or attacks



## Projects Underway

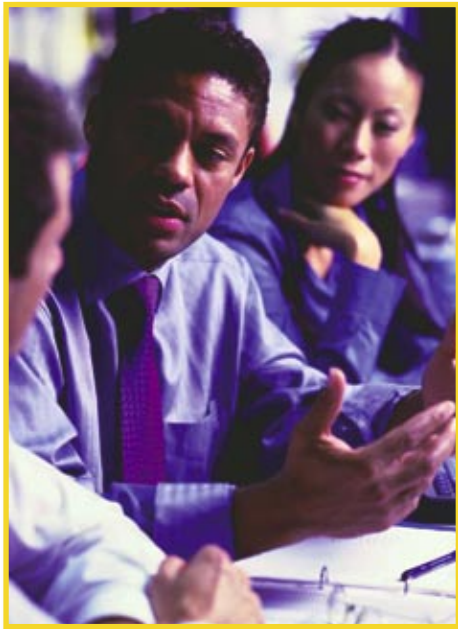
EPA has begun projects that address key issues contained in the *Action Plan*, including the following:

- State-of-the-art review of early warning systems
- Tracer studies guide for use by water utilities of various sizes
- Treatability guide for biological contaminants in water
- State-of-the-science review of emerging detection technologies for water contaminants
- Performance review of routinely used water quality monitors
- Case studies to assist in rapid access to alternative water sources

- Preliminary framework for communicating threats and attacks on water systems
- Tools to address water infrastructure interdependencies
- State-of-the-science review of the impacts of biologically produced toxins on water systems
- Protocols and devices to concentrate and analyze water for biological contaminants
- Test matrix and state-of-the-knowledge technical reports on six biological/biochemical surrogates
- Preliminary treatability database for treatment technique effectiveness in removing water contaminants
- Feasibility study for warnings and alerts based on public health surveillance reporting of disease indicators (syndromic surveillance)
- Performance verifications of monitoring, treatment, and decontamination technologies' effectiveness

### Action Plan Products

The challenges facing EPA in securing water infrastructure are interdependent and complex. The goal of the *Action Plan* is to provide useful and timely products to key water infrastructure customers that help protect drinking water and wastewater systems. To accomplish this goal, EPA is partnering with other federal agencies, national laboratories, non-governmental water industry research groups, and the private sector to build on



existing strengths, share the workload, and take advantage of related research already underway.

An example of such partnerships is the Distribution System Research Consortium formed by the National Homeland Security Research Center and the Water Security Division. The consortium is comprised of 15 federal and non-federal organizations that meet twice a year to advance research and technical support focused on distribution systems.

EPA's research and technical support activities will result in various types of products, tools, and technologies made available to the water industry, public health officials, health care providers, emergency responders, appointed and elected officials, and others to aid in the fight against terrorism.

Key Customer Products
<ul style="list-style-type: none"> <li>■ Computerized data compendiums</li> <li>■ Response guides and protocols</li> <li>■ Technical resource documents, case studies, and model procedures</li> <li>■ Laboratory methods and protocols</li> <li>■ Communication tools and frameworks</li> <li>■ Technology screening, evaluation, and verification</li> <li>■ Workshops and training</li> <li>■ Computerized tools and software systems</li> <li>■ Risk assessment methods and procedures</li> <li>■ Journal articles, fact sheets, and technical bulletins</li> </ul>

### Information Sharing

Work in progress is shared with key water security stakeholders and the public in open forums such as journals, Web sites, and meetings. If the information is sensitive, it is provided using more limited venues such as the WaterISAC. EPA information clearinghouses,



booths at conferences and workshops, and announcements and press releases are used to deliver *Action Plan* results as well.

### Information Users

- Water industry representatives
- State, regional, and local response organizations
- Public health officials and organizations
- Federal agencies and departments
- Laboratories with water sample testing capabilities
- Academia and consulting firms
- Elected officials and the public

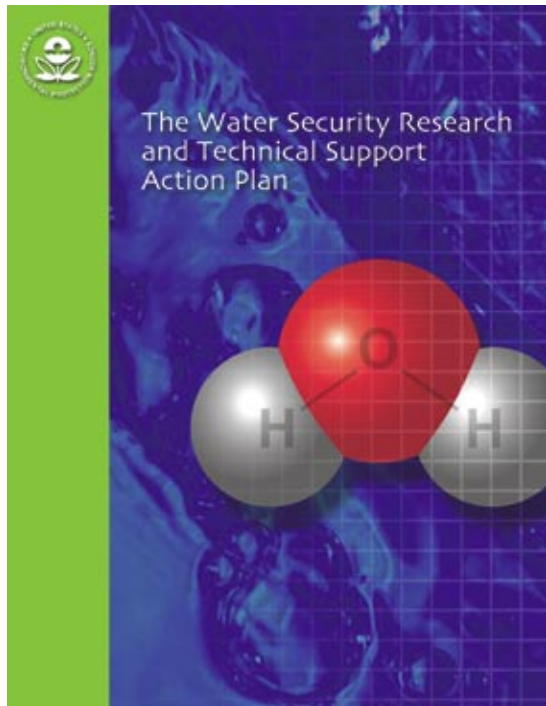
A listing of all publicly available interim research products are available on NHSRC's Web site at: [www.epa.gov/nhsrc](http://www.epa.gov/nhsrc). An Internet-based catalog with publicly available products from both WSD and NHSRC is located on the WSD Web site at: [www.epa.gov/watersecurity](http://www.epa.gov/watersecurity).



## Conclusion

As the federal lead for water infrastructure security, EPA draws upon its long history of environmental protection to develop new tools and technologies that address potential attacks on drinking water and wastewater systems. The critical research described in the *Water Security Research and Technical Support Action Plan* is improving awareness, preparedness, prevention, response, and recovery from threats or attacks against water systems.





*The Water Security Research and Technical Support Action Plan* (shown above) is available for downloading at [www.epa.gov/nhsrc](http://www.epa.gov/nhsrc) and [www.epa.gov/watersecurity](http://www.epa.gov/watersecurity)



Additional information may be obtained through the National Homeland Security Research Center's Web site: [www.epa.gov/nhsrc](http://www.epa.gov/nhsrc) and the Water Security Division's Web site: [www.epa.gov/watersecurity](http://www.epa.gov/watersecurity)





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