ENVIRONMENTAL SAFETY AND TESTING

07

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GOAL OF THIS SECTION

To provide information on terrorist threats to the air and water supply in the United States.

WHAT THIS SECTION INCLUDES

- **A description of threats to air and water**
- **The importance of environmental surveillance and monitoring systems**

WHAT THIS SECTION DOES NOT INCLUDE AND WHY

- **Detailed descriptions of waterborne and airborne toxins because any one of thousands of substances could be used to contaminate air or water. However, a number of substances of high concern are included in the sections on terrorism agents.**

WATER SUPPLY

Water has always been a strategic target during times of war, and the fear of a terrorist threat to the water supply is intense and widespread. Most experts agree that the actual risk that an attack on the water supply would cause casualties is low because the millions of gallons of water would dilute the toxins, or the chlorination, ozone, filters, or other means of water purification at the treatment plant would render the toxins inactive (Johns Hopkins Center for Public Health Preparedness 2004). However, water supply and distribution systems are vulnerable components of the nation's critical infrastructure. In addition to the water supply, the infrastructure for drinking and wastewater includes treatment plants, pumping stations, pipelines, and storage facilities. Nationally, there are more than 168,000 public drinking water facilities, with tens of thousands of miles of aqueducts and pipelines in remote rural areas and other unguarded locations.

Terrorist threats to the water supply include:

- Deliberate contamination with biological, chemical, or radiological agents
- Bombs or explosives at pumping stations or other critical facilities
- Sabotage and disruptions of the distribution of drinking water or firefighting supplies

Many environmental health experts are concerned about unguarded chlorine gas supplies at water treatment facilities, which terrorists could release into the air or water or put into the food supply. Most treatment plants use chlorine to kill bacteria and viruses in drinking water, but in stronger concentrations, chlorine causes choking and tissue damage and can be fatal (Centers for Disease Control and Prevention 2003). To reduce terrorism risks from chlorine, some treatment plants have converted to safer purification technologies, such as sodium hypochlorite.

No known terrorist act has ever involved the water supply. However, public health officials had a water supply crisis in the spring of 1993, when water contaminated by a parasite called *Cryptosporidium* made more than 400,000 people sick with diarrhea in Milwaukee, WI. Contaminated water from Lake Michigan entered a city water treatment plant. This contaminated water was then inadequately treated. The parasite is present in animal waste and may have come from a nearby sewage plant or slaughterhouse (MacKenzie et al. 1994).

In response to this crisis, public health officials in Milwaukee set up one of the nation's first disease-monitoring systems to help them track future outbreaks, and the city water treatment plant improved its filtration system. Emergency preparedness courses often cite the Milwaukee experience to illustrate the rapid and widespread consequences of water contamination.

PROTECTING THE WATER SUPPLY

The Environmental Protection Agency (EPA) is the agency with primary responsibility for water infrastructure security, working in coordination with the U.S. Department of Homeland Security (DHS). EPA is responsible for protecting the nation's water supply by enforcing the Clean Water Act (http://www.epa.gov/region5/water/cwa.htm) and the Safe Drinking Water Act (http://www.epa.gov/safewater/sdwa/sdwa.html), and the Public Health Security and Bioterrorism Preparedness and Response Act of 2002. In January 2003, EPA established a new homeland security research center to address detection and characterization of contaminants, response and mitigation, and prevention and protection of water systems. EPA's Water Security Division, also established in 2003, assists the water sector by providing guidance, tools, training, and technical assistance to address water security concerns. More information can be found at http://www.epa.gov/watersecurity.

Water treatment and distribution systems are public utilities, and industry associations have played a major role in their preparedness and protection efforts. The Public Health, Security, and Bioterrorism Preparedness and Response Act requires all public water systems serving more than 3,000 people to prepare vulnerability assessments and submit them to EPA for review and certify the completion of emergency response plans (http://cfpub.epa.gov/safewater/watersecurity/bioterrorism.cfm). While developing their plans, public drinking water systems need to partner with their community waste water utilities and local government officials, including law enforcement and public health. Continuing to update vulnerability assessments and practice emergency response plans is essential for an effective response in the event of an emergency.

The American Water Works Association; Sandia National Laboratory; and many other industries, state drinking water agencies, and research organizations are working with EPA to help water systems reduce any possible risks to their water supply (Greenblatt et al. 2003; EPA 2004).

HHS' ROLE IN WATER SECURITY

While the role of the U.S. Department of Health and Human Services (HHS) in water security is to provide technical assistance and support during emergency response and recovery, the Federal Emergency Management Agency and the U.S. Army Corps of Engineers may have lead roles. Within HHS' Centers for Disease Control and Prevention (CDC), the Environmental Public Health Readiness Branch of the National Center for Environmental Health works with federal, state, and local agencies after natural and technological disasters. CDC's environmental disaster epidemiologists help communities to assess the impact of hurricanes, floods, and other extreme weather conditions on health (http://www.cdc.gov/nceh/hsb/disaster/default.htm).

CDC team's activities may include conducting laboratory tests on water samples to identify toxic contaminants, setting up surveillance programs to monitor the number of people with waterborne diseases or other serious health risks, setting up programs to control the spread of disease, and providing other support and technical assistance.

AIR

Terrorists could release harmful chemical and biological agents into the air, which might not be recognized for several days. An airborne communicable disease can spread through a ventilation system or pass person-to-person through coughing or sneezing before anyone realizes what has happened.

Noncommunicable bioagents, like anthrax, also spread readily through the air, and technology has not kept pace with the need to detect them or remove them from the air by advanced surveillance and filtering techniques. Recognizing these technical gaps, the federal government is exploring several new biosurveillance programs, including new sensor networks and new health-tracking data analysis programs (http://www.dhs.gov/dhspublic/display?theme=43&content=3092&print=true).

Many federal agencies are now working to coordinate their scientific, technical, and regulatory responsibilities. These agencies must share the responsibility for monitoring and protecting air quality. EPA is responsible for outdoor air quality, but the National Aeronautics and Space Administration and the National Oceanic and Atmospheric Administration operate weather satellites that would provide critical information during a large-scale chemical attack. For example, satellite photos, along with meteorological data about wind direction, speed,

and temperature, could help officials determine the best responses to protect the public health by advising evacuation or shelter-in-place.

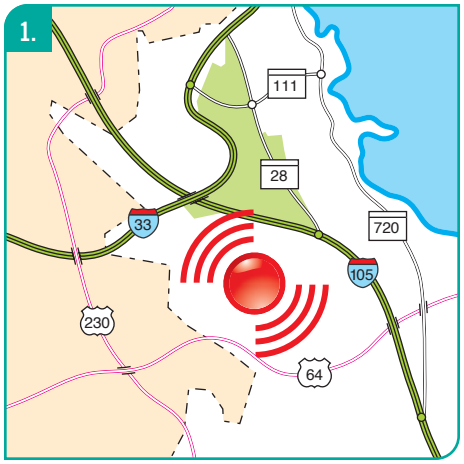
CDC's National Institute for Occupational Safety and Health (NIOSH) has the primary responsibility for research and recommendations on air quality in the workplace, thus protecting the health of the workforce. In 2002, NIOSH issued detailed guidance for defending building environments against airborne chemical, biological, or radiological attacks. Its recommendations address physical security, ventilation and filtration, maintenance, and other preventive strategies based on vulnerability assessments.

EPA's Environmental Technology Verification Program (http://www.epa.gov/etv) is working with DHS to develop new ways to monitor, measure, detect, and filter out, rinse out, or otherwise remove chemical and biological warfare agents from indoor air and water systems. The program is funding research to develop the next generation of environmental monitoring technologies and warning programs.

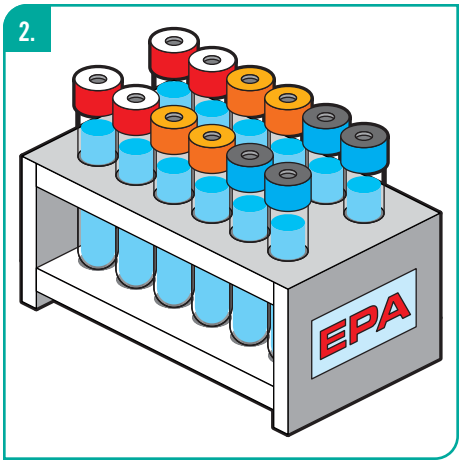
BIOWATCH

Project BioWatch is an air-monitoring system that will provide an early warning for biothreats in urban areas. The initiative is led by DHS, in partnership with EPA, and CDC's Laboratory Response Network. This biosurveillance system includes round-the-clock air-monitoring stations, which have been operating in more than 30 cities across the nation since 2003.

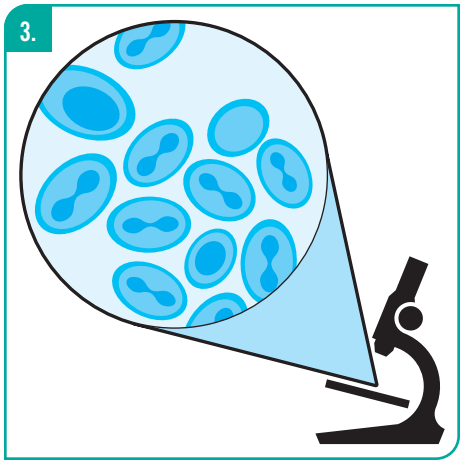
FIGURE 7–1: HOW BIOWATCH WORKS



Sensors are located in cities throughout the country.



EPA collects samples and sends them to CDC.



CDC analyzes samples.

IF AGENT DETECTED:

Rapid-response protocol implemented: DHS, HHS, EPA, and the Federal Bureau of Investigation (FBI).

How BioWatch Works

Technicians collect air samples from BioWatch sensors at least once a day. The samples then go to labs to undergo testing for the presence of specific bioagents, including anthrax, smallpox, and plague. In general, EPA collects the samples and designated labs that are a part of the Laboratory Response Network, including the Rapid Response and Advance Technology lab at CDC, analyze them.

Rapid Response Protocols

If lab workers at the Laboratory Response Network facilities or CDC lab workers detect a bioagent, a rapid response protocol goes into effect. This protocol involves DHS, CDC, EPA, and the Federal Bureau of Investigation. Though federal officials have not released the protocol to the public, they have indicated that CDC would notify the other agencies and the designated members of the rapid response team would quickly make decisions and communicate a coordinated response and mitigation strategy (with recommended actions) to local health departments (Marburger 2003).

Critics say that the air-monitoring technology is not sensitive enough to detect small releases of biological or chemical toxins. Critics also point out that BioWatch does not monitor indoor releases and that there can be delays of several hours between the collection and the analysis of air samples (The Associated Press 2003).

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