As we look back over this process, we can see that the business of producing and distributing safe drinking water has changed. The public perception about the importance of a reliable water supply has increased. Water systems have developed a new culture of security that marks how they now operate:

- Vandalism is treated as a serious threat;
- ERPs are being revised to include what to do in the event of bioterrorism acts; and
- communication with other states and local emergency responders is deemed critical.

The deadline for systems with populations greater than 100,000 to submit their VA has passed, and virtually all of the largest water systems have met that challenge. Now, it’s the small systems’ turn. Smaller systems are in the process of completing the VA (for systems serving more than 3,300 people, final submission is due by June 30, 2004) or updating their emergency response plans (ERP), which must be completed by December 30, 2004.

Creating a Culture of Security

The American Water Works Association (AWWA) published a report in May 2003 stating that the requirements of the Bioterrorism Act “have resulted in an unprecedented mobilization of effort and resources to protect America’s water supply.”

Many of the activities that create a culture of security are things that we should have been doing all along. Background checks of new employees are always a good idea. Having personnel policies that include limited access to information and resources, a restricted key policy, and employee termination procedures that recover all keys are all examples of what we should do to properly manage a drinking water system.

Having a protocol to control the delivery and storage of hazardous chemicals at the water plant is part of a good safety program. Locking vehicles and taking the keys are examples of what should have been good utility management policy all along. Checking on remote storage facilities and having a neighborhood watch program help systems keep an eye out for the unusual and are opportunities to promote good public education about the water system. Going through the VA process has underscored the need for good management practices and ultimately will help us do a better job of providing safe drinking water.

Evaluating the Process

The assessment process “compels us to examine the water supply system and serves as a wake-up call to the absence of security in many systems,” says Coy Donaldson, Florida Rural Water Association training specialist. Those who conduct VAs in small community water treatment facilities have learned that support from community leaders is vital to producing a comprehensive assessment. And they have learned to use this assessment as a guide to revising their ERPs. Community-wide support also is necessary in promoting cooperation and communication with other emergency personnel, local health officials, and law enforcement agencies.

Many communities have completed their vulnerability assessments (VA), and the documents are now securely inside the U.S. Environmental Protection Agency (EPA) headquarters, or soon will be.
The Northeast Rural Water Association (NeRWA) has been very active over the past two years, encouraging small systems to improve security. They have awarded grants of $300 to $600 to systems serving 3,300 or fewer customers.

“Very basic security improvements can be a major deterrent to intrusions,” says Michael Wood-Lewis, executive director of NeRWA. “We work with systems where the door is never locked. Now those attitudes are changing, and we’re working with operators to better protect Vermont’s water supply.”

Wood-Lewis believes that these grant awards have been an incentive for building community support for improved security. In many very small systems, the fact that someone is willing to give even a modest grant to start the process is enough to convince community leaders that security should be a priority.

No Fancy Solutions

When word of the new Bio-terrorism Act first came out, many operators were asking about what kind of security improvements EPA was going to require. Small systems especially were concerned about the cost of surveillance cameras and other sophisticated security devices.

As the dust began to settle, small system operators learned from trainers, such as Rich Weigand, coordinator for the West Virginia Environmental Training Center, that good operation and maintenance, such as flushing lines, exercising valves, preventive maintenance, backflow prevention, and monitoring water quality, were all included in the process of strengthening the system against threats.

These were not fancy, high-priced solutions to security but the kind of low-cost, practical security improvements that small systems could afford.

Over the last year, many organizations have offered training, including the Rural Community Assistance Program (RCAP). Joy Barrett, Ph.D., director of RCAP’s training and technical services, says, “We believe that any situation where public services might be compromised represents a potential threat to public health, and we approach our security-related activities with this in mind.”

RCAP will be offering a Web-based magazine in the spring, featuring current topics of interest, including security.

Painting the Water Tower

Vandalism has always been a concern for water utilities, especially remote storage facilities. However, painting the local water tower is no longer an accepted rite of passage for high school students, and the water utility must treat any form of vandalism as a serious security risk. Many water utilities have posted warning signs that state that tampering with a water supply system is a federal offense as stated in U.S. Code Title 42, Section 300 I-1.

Florida has recently changed its notification policy concerning acts of vandalism from 24 hours to two hours. Any water system in Florida that has evidence of trespassing or tampering with a water supply must notify the Florida Department of Environmental Protection within two hours after evidence of an event is discovered.

The advice given to operators is that they should report any and all suspicious activity as soon as possible. If trespassing or vandalism has occurred, they must consider their water unsafe until testing or other investigation proves otherwise. The area where entry occurred must be treated as a crime scene until it is investigated. The EPA Response
Protocol Toolbox offers specific instructions for investigating these events.

**Shaking the Complacency**

Lynn Pitts, Iowa Department of Natural Resources, has been involved in water system security issues from the regulatory side and through his work as a volunteer fireman. He stresses that one of the important outcomes from the work done over the past two years has been to shake communities out of their complacency.

Pitts emphasizes the importance of simple, precautionary security measures, such as those discussed above, but also suggests looking at the design of buildings and supply structures. He plans to begin discussions with design engineers about incorporating security features into the planning and design of facilities.

Pitts believes that many good things have happened in this process of training and completing the VA. He urges operators and utility managers to “think of your customers” and take the steps needed to assure them that the water supply is safe.

A variety of new water testing technologies also are available. (See Table 1 on this page). These technologies have been tested through the EPA Environmental Technology Verification (ETV) process and include specific test kits for cyanide and arsenic, as well as a generalized toxicity testing system for nine contaminants that included aldicarb, cyanide, botulinum, and ricin. (More information about this technology may be found on the EPA Web site at www.epa.gov.etv.)

**Protecting the Water**

The Safe Drinking Water Act (SDWA) requires water systems to take steps to ensure that the supply and quality of water are protected during an emergency. The biggest impact of the Bioterrorism Act on small drinking water systems is the requirement under section 14.33 of the SDWA to use the VA in revising the ERP. Many small systems have an ERP that was developed in response to requirements from the 1996 SDWA Amendments. Over the past year, small systems have found their ERPs, dusted them off, and reviewed the contents from a post-9/11 viewpoint.

### Table 1 - Anti-Terrorism Water Monitoring Technologies

<table>
<thead>
<tr>
<th>CONTAMINATE</th>
<th>PRODUCT</th>
<th>VENDOR</th>
<th>ESTIMATED COST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cyanide</td>
<td>VVR V-1000 Multi-Analyte Photometer with the V-3803 Cyanide Module</td>
<td>CHEMetrics</td>
<td>$687</td>
</tr>
<tr>
<td></td>
<td>1919 SMART 2 Colorimeter with 3660-SC Reagent System</td>
<td>LaMotte Company</td>
<td>$789</td>
</tr>
<tr>
<td></td>
<td>Mini Analyst Model 942-032</td>
<td>Orbico-Hellige</td>
<td>$366</td>
</tr>
<tr>
<td></td>
<td>AQUAfast IV AQ4000 with AQ4006 Cyanide Reagents</td>
<td>Thermo Orion</td>
<td>$1,021</td>
</tr>
<tr>
<td></td>
<td>Model 9606 Cyanide Electrode with Model 290 A+ Ion Selective Electrode Meter</td>
<td>Thermo Orion</td>
<td>$1,510</td>
</tr>
<tr>
<td></td>
<td>Cyanide Electrode CN 501 with Reference Electrode R503D and Ion Pocket Meter 340i</td>
<td>WTW Measurement Systems</td>
<td>$1,702</td>
</tr>
<tr>
<td>Arsenic</td>
<td>Quick II Test Kit</td>
<td>Industrial Test Systems, Inc.</td>
<td>$219</td>
</tr>
<tr>
<td></td>
<td>Quick Ultra Low II Test Kit</td>
<td>Industrial Test Systems, Inc.</td>
<td>$299</td>
</tr>
<tr>
<td></td>
<td>Quick Low Range II Test Kit</td>
<td>Industrial Test Systems, Inc.</td>
<td>$1,779</td>
</tr>
<tr>
<td></td>
<td>Quick Arsenic Test Kit</td>
<td>Industrial Test Systems, Inc.</td>
<td>$139</td>
</tr>
<tr>
<td></td>
<td>PDV 6000 Portable Analyzer</td>
<td>IMonitoring Technologies, P'TY, Ltd.</td>
<td>$7,900</td>
</tr>
<tr>
<td></td>
<td>AS 75 Arsenic Test Kit</td>
<td>Peters Engineering</td>
<td>$220</td>
</tr>
<tr>
<td></td>
<td>AS-Top Water Arsenic Test Kit</td>
<td>Information currently unavailable.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Nano-Brand Explorer Arsenic Test Kit</td>
<td>PTrace Detect</td>
<td>$8,000</td>
</tr>
</tbody>
</table>

Please note that the estimated costs vary as to the number of tests that can be run for the given cost based upon disposable supplies. In addition, some testing kits may be used with an inexpensive color comparator chart or with the more expensive colorimenter.

Source: U.S. Environmental Protection Agency (EPA), www.epa.gov
The VA process has given us a structured approach to examine the ERP and strengthen it based upon the findings. Also, EPA has endorsed the incident command structure that emergency responders use, and the water utility must incorporate these procedures into their ERP. The ERP must be a flexible document that changes as the needs of the utility change. We must practice our emergency response capability through drills that involve other community groups. After the drill, we must identify the weak links and adapt the ERP.

Some of the technologies include bacteria cultures that require reconstitution, special chemical enzymes, reagents, or the small crustacean Daphnia. One of the technologies includes a temperature-controlled environment for conducting the testing, and several others could be used with typical standard lab equipment, such as a dissolved oxygen meter or colorimeter. Test kits that use standard lab equipment are among the least expensive of the technologies and the temperature-controlled testing systems are among the more expensive technologies.

For a more detailed look at eight of these technologies, visit the National Drinking Water Clearinghouse’s Web site at www.ndwc.wvu.edu. For more information about EPA’s ETV program, visit their Web site at www.epa.gov.etv.

### TABLE 2 - Rapid Toxicity Testing Systems

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>VENDOR</th>
<th>Estimated Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>IQ Toxicity Test</td>
<td>AquaSurvey, Inc.</td>
<td>$2,400</td>
</tr>
<tr>
<td>ToxScreen-II</td>
<td>CheckLight, Ltd.</td>
<td>$2,895</td>
</tr>
<tr>
<td>Tox Trak</td>
<td>Hach Company</td>
<td>$3,950</td>
</tr>
<tr>
<td>BioTox</td>
<td>Hindex Oy</td>
<td>$8,900</td>
</tr>
<tr>
<td>POLYTOX</td>
<td>InterLab Supply, Ltd.</td>
<td>$1,600</td>
</tr>
<tr>
<td>Eclox</td>
<td>Severn Trent Services</td>
<td>$7,900</td>
</tr>
<tr>
<td>Deltatox</td>
<td>Strategic Diagnostics, Inc.</td>
<td>$5,900</td>
</tr>
<tr>
<td>Microtox</td>
<td>Strategic Diagnostics, Inc.</td>
<td>$17,895</td>
</tr>
</tbody>
</table>

Source: U.S. Environmental Protection Agency (EPA), www.epa.gov

We need to integrate security into everything we do and improve our ability to respond to an emergency event. Security and emergency response will become a part of the capacity-development process.

Managerial capacity must include policies and procedures that will protect employees and the public from acts of terrorism from both internal and external sources. Financial management should include how to best use limited resources to harden our existing facilities and incorporate security improvements into capital planning projects. On the technical side, we need to establish baseline monitoring of water quality and regular maintenance so that we will be able to detect and delay an event. Perhaps the most important part of this process is that we need to talk to each other and to our customers about security and the importance of safe drinking water. The lessons we have learned since September 11 have included the need for better communication during an emergency and better cooperation with all emergency service providers. Water utilities need to contact their local emergency responders and work with them to detail how everyone will respond and communicate during an emergency event.

For more information about EPA’s Environmental Technology Verification (ETV) program, visit EPA’s Web site at www.epa.gov.etv. The Winter 2002 issue of On Tap was dedicated to security. The NDWC also published a manual “Small Drinking Water System Security,” which includes many of these recommended operation and maintenance procedures. To order a copy of either of these products, call (800) 624-8301 or e-mail us at ndwc_orders@mail.nesc.wvu.edu.

Lorene Lindsay has 26 years experience in water and wastewater treatment and is a certified operator in the state of Missouri. She now serves as part of the technical assistance unit for the National Environmental Services Center.