

Bioterrorism May Pose Threat to Water Supplies

Can POU/POE technology aid the war on bioterrorism?

Well, it's unanimous. It would take an incredible amount of contaminant to cause any damage to our drinking water supplies. It was said that four truck loads of sodium cyanide would be needed in order to contaminate one million gallons of water before it would be a threat to consumers. That amount of any biohazard would not easily be obtained or dispersed. Drinking water plants nationwide also have security guards, extra monitoring and testing, background checks and other security precautions. These facts make the threat of bioterrorism to our nation's water supplies is, as Christine Whitman, administrator of the U.S. Environmental Protection Agency (EPA), said "small."

So far, no direct threats have been made regarding our water systems. However, last month it was reported that terrorist associates may have been inquiring about water systems and animal-borne diseases. A transportation method for moving such large quantities of chemical became a possibility when the FBI announced that terrorists had inquired about learning to operate "big rigs." In addition, the FBI extended its advisory to water utilities through Dec. 11. These reasons alone are enough to raise an eyebrow with the water treatment industry and create a new concern for consumers.

Although drinking water plants already were enforcing security protocol and security systems already had been in place, the Sept. 11 attacks forced major utilities nationwide to further put into place risk management and emergency plans. Such actions call for limited access, additional testing and additional training.

A Real Threat

Despite early concern from the FBI, successful bioterrorist contamination is not being considered a real threat to the approximately 168,000 public water systems in the United States. "It would take large amounts of contaminants to threaten the safety of a city water system," said Whitman during her visit with Washington Suburban Sanitary Commission Consolidated Laboratory in Silver Spring, Md. "Because of increased security at water reservoirs and other facilities, and people being extra vigilant as well, we believe it would be very difficult for anyone to introduce the quantities needed to contaminate an entire system."

Such large quantities of any dangerous agents would be extremely hard, if not impossible, to come by and then even more difficult to deliver without being detected. "Most systems have so much water and such effective treatment mechanisms that anything less than many tanks full of dangerous agents would be diluted and easily neutralized," said Jack Hoffbuhr, executive director of the American Water Works Association.

Although there has been some media "panic," water contamination with anthrax is not very likely, explains Joseph Harrison, technical director for the Water Quality Association. "Water isn't a very effective way to spread anthrax. It doesn't disperse well in water." Besides, all water systems are not connected. So, if only one system is attacked, it would not affect the others. It would, however, create fear among the public, which some industry professionals say presents a bigger problem that the actual threats of a bioterrorist attack. It is the fear factor that a terrorist may be seeking more than a mass contamination. Security concerns should not be taken lightly and water systems and companies should continue enforcing their high security alert plans.

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If our water supplies actually do come under attack, the question remains: Is there any way for consumers to protect themselves?

Unfortunately, it seems to be too early to tell, yet some companies are beginning to emerge with products that may be the answer. It is suggested that technologies such as distillation, reverse osmosis,

and real fine filters could stop anthrax based on the premise that it can take out certain particle sizes."

At the end of October, Aqua Care Systems, Inc. launched its Water Saver drinking water filtration product, which is based on a polymeric membrane called the Ster-O-Tap micro-filter. The system is designed for homeowners to improve the quality and safety of their water by eliminating contaminants or bacteria greater than 0.15 microns including *Cryptosporidium*, *Giardia*, *E. coli* and anthrax.

Similarly, other companies have come forward presenting ozone and ultraviolet technologies as a solution to possible attacks. Ozolutions, Inc. announced that anthrax bacteria could be destroyed effectively by ozone treatment. Ozolutions reports that ozone disinfects bacteria such as anthrax and *E. coli* as well as viruses such as polio and protozoa such as *Cryptosporidium*. The company's point-of-entry system is being marketed toward residents with private wells or surface water.

Harrison does warn that until we can test actual anthrax spores, there is no guarantee that they will react the same way as other contaminants do towards such technologies.

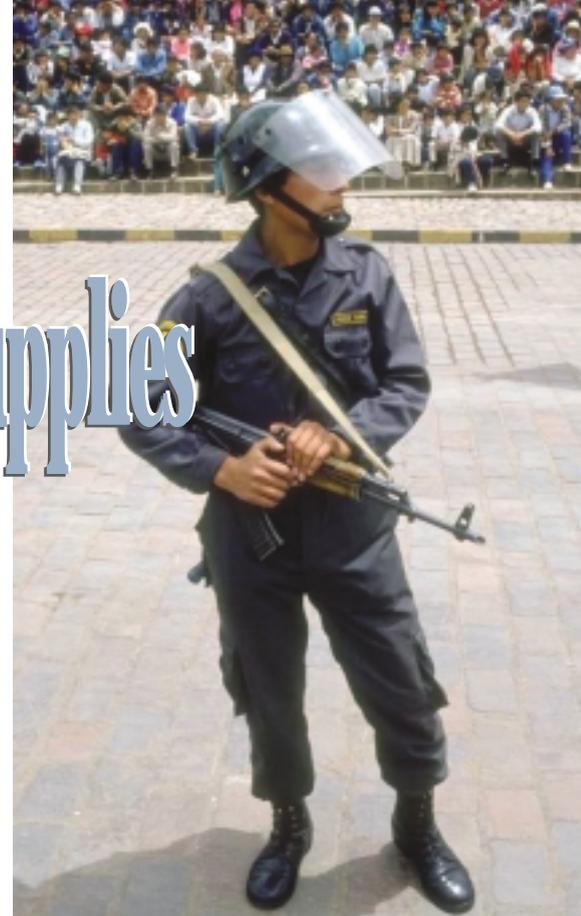
Chlorine already has been dismissed as having the ability to work against such contamination as anthrax. Water supplies already are geared to protect against such terrorist agents as cholera, smallpox and *Cryptosporidium*, adds Harrison.

"Until we can test actual anthrax spores there is no guarantee that they will react the same way as other contaminants do towards certain technologies."

ultraviolet disinfection and fine filtration may provide some protection against many biological threats.

Distillation inactivates many biological organisms by way of heat. Certain residential units can take out specific particle sizes via filtration. Companies offering such filtration devices claim that they can protect against anthrax, which has a particle size of 2 to 6 microns, similar to protozoan cysts. "There's logic there," said Harrison. "Reverse osmosis

The WQA remains cautious of any company making guarantees to customers without the proper testing. "Products need to be validated through test procedures before 'absolute' claims can be made," continues Harrison. The WQA states that drinking water treatment products have not been tested or certified for their effectiveness in reducing these exotic chemical or biological sabotage agents. So far, WQA has no products from the industry scheduled for such testing.



It is important not to confuse the anthrax bacteria with the spores, which are what have been found in the U.S. postal service. Several companies may claim the ability to remove anthrax bacteria, but the spores are something different to consider and much harder to remove.

"It is being assumed that ultraviolet and ozone will inactivate or kill, but you must be careful you are talking about killing bacteria vs. spores," warns Harrison. "Claiming bacteria elimination is much different from being able to get rid of the spores." He explains that increased amounts of ozone and ultraviolet light—possibly more than double the dosage—would be necessary in order to get rid of spores.

Finally, the WQA stands by its statements that no current water treatment product can claim specific ability to eliminate any terrorist-introduced bioorganism or chemical. However, it states, "It is important to note that commonly available water treatment products may provide some level of benefit to the user."

Testing

Other technologies at the forefront are water test kits. Both Vital Living Products, Inc. (VLPI) and Silver Lake Research Corp. (SLR) have announced "effective" tests for detecting chemical and biological terrorism. VLPI claims the test detects the presence of "anthrax germs and spores, providing consumers with results right at home." SLR manufactures WaterSafe testing kits, which it now is applying to the threat of terrorism, but says it will be offering tests designed specifically for a "list of chemical and biological toxins that may be available to terrorists," reports Tom Round, director of sales and marketing for SLR.

Of course, testing also is available through laboratories as well, although information and hands-on research currently is limited

to agencies such as the Center for Disease Control (CDC). According to Harrison, since actual anthrax is not available for testing, tests of susceptibility are being left to the CDC and the release of that information is in its discretion.

What is Being Done?

Since the attacks, much concern has been focused on the nation's water systems. President Bush has kept the water systems on heightened alert promoting agencies and private companies to step up security of dams, treatment plants, pipelines and pumping facilities. The industry and consumers alike have watched as these water systems post guards at entrances to the facilities, limit access, perform testing more often as well as improved background checks on employees.

New workshops from the American Water Works Association are being developed to offer information and training for heightened water security for plants. Efforts also are being made

by organizations and states such as the U.S. Geological Survey and New Jersey, which both have removed information about the nation's water systems from their websites.

The Association of Metropolitan Water Agencies is in planning a Water Information Sharing and Analysis Center (WISAC) to act as a resource center, available online, for anti-terrorism efforts. The voluntary WISAC program will

- Be available to water systems within the United States,
- Collect incident information and disseminate it as appropriate,
- Provide threat alerts, warnings and vulnerabilities, and
- Offer response and recovery suggestions.

The EPA stated that its goal is to ensure that drinking water utilities are provided with the best expertise, information and assessments available. Whitman wants

Top Seven Security Procedures

1. Write down a well-developed security plan for employees including chain of command for reporting suspicious behavior or threats.
2. Limit access to water facility/company.
3. Limit access to computers, monitors and other technology.
4. Post well-trained security guards at entrances or throughout facility.
5. Conduct thorough background checks on employees.
6. Secure access points, meter boxes, keys, etc.
7. Make adjustments to all vulnerable areas to make them more secure.

the EPA to work with the FBI on advising local law enforcement agencies of steps they can take to help watch for possible threats to water systems. Additionally, the EPA established a centralized notification system and developed assessment tools and guidelines to improve security for water systems.

Whitman added that despite small probabilities and stepped-up prevention, there are no "iron-clad guarantees."

She assured that the EPA is ready to respond. "Our experts are ready to provide guidance. Our federal labs are ready to provide analysis. And our specialists are ready to assist in recovery." **WQP**

About the Author

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Are We Vulnerable to Terrorist Attacks?

WEFTEC 2001 Addressed These Concerns

By Linda Chaloux, Frost & Sullivan

Are U.S. water supplies vulnerable to terrorist attacks? Is our nation's infrastructure prepared to handle contamination in multiple forms? These and many more questions were at the forefront of attendees' minds at the Water Environment Federation Technical Exposition and Conference (WEFTEC). Of prime concern was the safety of our water systems and the steadfastness of the infrastructure of plants across the United States.

To address this poignant issue, WEF added two new sessions entitled "Perspectives on Water Infrastructure Security (I and II)," and included key speakers from the Association of Metropolitan Water Agencies (AMWA), WEF and the Environmental Protection Agency (EPA) to get multiple views of the

state of the country in this area.

Security at utilities throughout the United States has been beefed up. Codes have been changed, locks have been added to gates and water quality is monitored more frequently. But the key thought from all views essentially is that our water systems are predominately safe for human consumption, but our infrastructure is in desperate need of help.

Owners and operators of utilities are at a heightened state of alert, but this will not help fix aging pipes or tanks. Vulnerability assessments have been taking place on a national level, and the threats to water supplies from chemical, biological or radiological hazards have been deemed relatively small. However, damage, destruction or sabotage of the already-aging infrastructure is a possibility. The EPA did assemble a Water Protection Task Force to ensure that our water supply infrastructure is secure and is working with the FBI to maintain a flawless web of communication in safeguarding water systems. Training materials are even being made available for water companies to ensure the most

appropriate assessments are conducted of infrastructure vulnerabilities.

However, some still remain curious about additional steps to take for the protection of the general public or, more specifically, for the protection of their families. Chlorine treatment may step out from the shadows, well pumps will be sealed, vents will be protected and more detection equipment will be used. Restricted public access to water reservoirs is inevitable, at least for awhile, and the installation of motion detection sensors, alarms and other surveillance equipment is a probability. Even computer-operated robots are being considered to monitor pipes and tunnels.

Each of these moves is expected to aid in the effort to thwart potentially dangerous scenarios; however, the poor grade given to the infrastructure including our water pipes and wastewater collection pipes inevitably justifies a request for more funding, and fast. The EPA has estimated a need of \$123 billion, 56 percent of which is for transmission and distribution of drinking water. The American Water Works Association (AWWA) has estimated \$360

billion and the Water Infrastructure Network (WIN) has estimated \$1 trillion in needs for the next 20 years. Some experts have claimed that \$5 billion is needed immediately to ensure our protection right now.

Unfortunately, the fire fueling this funding demand goes unquenched. So, the industry waits, with the questions posed by the WEFTEC conference still smoldering to some degree, knowing that we are almost safe, but there is still more work to be done.

About the Author

Linda Chaloux is an environmental industry analyst for Frost & Sullivan and is focused on water and wastewater applications, specifically on water recycling. She has authored 125 technical articles in 30 publications, completed two industry reports and published a field testing method for Hexavalent Chromium (VI).

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