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Water and Homeland Security: An Introduction

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The possibil2ity of terrorist disruption or contamination of the United States' water resources recently entered our national consciousness. Since September 11, 2001, several media reports revealed plots to contaminate drinking water. In 2002, suspected terrorists in Italy and France were arrested under suspicion of planning to contaminate drinking water systems—maps of water distribution systems and service connections were found in their possession. In 2003, an email from an al Qaeda spokesman to an Arabic media outlet stated the group's intention to poison the United States' water supply. In response, public and private entities have cooperated to determine effective preventative measures and counter-measures to improve the security of the water supply. The U.S. Environmental Protection Agency (EPA), as the lead federal agency for protecting the nation's water supply, began working with water utilities, water associations, other federal agencies, and the states to fortify the tens of thousands of utilities that provide water to the American people. The Public Health Prevention and Bioterrorism Preparedness Act of 2002, in part, provides funding and direction for water security initiatives.

Individual water utilities have incurred great expense and effort to improve their security. Many have spent large sums of money to harden their systems against attacks by adding locks, fences, security guards, new policies and procedures for employees, and updated computer systems. Utilities have also improved their emergency response capabilities, forming local and regional partnerships with law enforcement and public health officials. Now, to address the threat of contamination, water utilities are considering the use of sensors and early warning systems, and the use of computational models to track, isolate, and optimize treatment of contaminated water.

However, many questions remain about the nation's ability to protect water systems adequately. To a large degree, effective political policies and emergency response protocols are hindered by the lack of available and reliable scientific information.

An avalanche of research has been sparked to address these unknowns. Much is focused on the potential agents of contamination: Which agents pose a real threat to drinking water systems? How do these agents behave in drinking water systems? Can they be removed or inactivated with conventional treatment? Can better analytical methods and laboratory protocols be developed to sample, identify and verify these agents? Research also pertains to methods to detect contamination—improved sensors and hardware and public health surveillance networks. Much research is also focused on data analysis tools and computational models—vulnerability assessments, real time pattern recognition and data analysis for early warning systems, and improved hydraulic and water quality models to prepare for and respond to attacks. Research is also needed in the social sciences, including cost-benefit analysis for security improvements.

This issue of the *Journal of Contemporary Water Research and Education* outlines the current major areas of research in water security, and highlights the scientific unknowns that are preventing the development of reliable and robust protective measures for our nation's water supply. Experts from various government agencies, national laboratories, universities, water utilities, and water associations prepared the papers in this issue. The papers address the following topics: EPA's policy

and research efforts in water security; methods to identify vulnerabilities of water systems; early warning systems; applications of hydraulic modeling; treatment and decontamination; emergency response protocols; public health initiatives; and wastewater security. Research in these areas promises to broaden our basic understanding of drinking water systems, improve water security, water quality and system operations. It is hoped that these papers will inspire readers to initiate research in these areas.