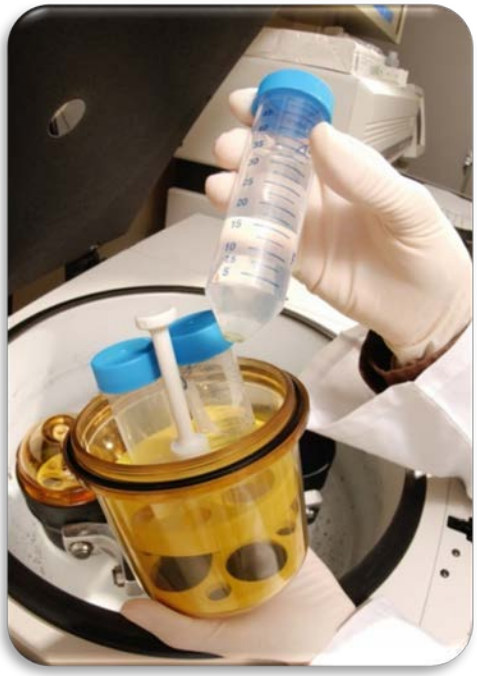
Progress on Water Sector Decontamination Recommendations & Proposed Strategic Plan



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DISCLAIMER

This document provides an update on the implementation status of recommendations published in the 2008 Critical Infrastructure Partnership Advisory Council (CIPAC) Report titled, *Recommendations and Proposed Strategic Plan: Water Sector Decontamination Priorities*. The recommendations and views expressed do not necessarily reflect those of the U.S. Environmental Protection Agency (EPA). This report does not establish EPA policy and does not obligate the federal government to take any actions.

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EXECUTIVE SUMMARY

In 2008, a Critical Infrastructure Partnership Advisory Council (CIPAC) Water Sector Decontamination Working Group was convened by the Water Sector Coordinating Council (SCC) and Government Coordinating Council (GCC) to develop a strategy and plan that supports priorities for Water Sector decontamination and recovery for the purpose of water security. The Working Group reviewed existing information and ongoing activities related to Water Sector decontamination to identify and prioritize 16 key decontamination issues in their 2008 report, *Recommendations and Proposed Strategic Plan: Water Sector Decontamination Priorities*. Each issue was ranked in terms of priority for water security and linked to one or more specific recommendations, resulting in a total of 35 key recommendations. Since that time, various stakeholders in the Water Sector have worked on implementing some of these recommendations. To determine the status of these ongoing efforts, the U.S. Environmental Protection Agency's Water Security Division (WSD) conducted a series of conference calls with potential leads identified in the report to address each recommendation. Calls were held with representatives from:

- U.S. Environmental Protection Agency Office of Water's WSD and Office of Research and Development's National Homeland Security Research Center
- Water Sector organizations, i.e., Association of State Drinking Water Agencies, American Water Works Association, National Association of Clean Water Agencies, Water Sector Coordinating Council
- Other federal government agencies, i.e., Centers for Disease Control and Prevention, U.S. Army Corps of Engineers

As of the date of this report, a significant amount of work has been undertaken to further support decontamination research and policy needs and communicate these efforts to Water Sector stakeholders. Of the 35 recommendations listed in the report, 23 are in progress and 3 have been identified as completed. As a result of work conducted since 2008, many resources are now available or under development to address the report's recommendations including in the areas of:

- Providing guidance regarding decontamination
- Containment and disposal of contaminated water
- Developed planning documents to facilitate preparation and response to a contamination event
- Evaluated results from studies on the persistence of target contaminants in water systems and the efficacy of treatment technologies and protocols
- Developed Web-based resources
- Conducted decontamination-specific training

Collectively, these key outputs represent an increase of available information and data to support Water Sector preparation, response and recovery from potential contamination incidents. Although the key outputs identified for many of the recommendations are concrete indications of progress, several recommendations remain unaddressed. Available resources and funding, as well as the existence of competing priorities, may have constrained the ability of lead agencies to fully address recommendations within the past 7 years.

The purpose of this report is to compile and communicate the current status of the CIPAC recommendations reported by the agencies during the calls. In doing so, the report aims to increase transparency, prevent any unnecessary duplication of efforts and streamline future research and activities.

CONTRIBUTORS TO THIS REPORT

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I. INTRODUCTION

1.1 Purpose

The goal of this report is to provide an update regarding the current progress on addressing the recommendations identified in the 2008 *Recommendations and Proposed Strategic Plan: Water Sector Decontamination Priorities* report. By communicating the current status of each recommendation, members of the Water Sector will become aware of work that is completed and work that is underway by other agencies within the sector. Information from this report can be used to help prioritize future efforts. Additionally, this report can also be used to help bolster ongoing communication activities with Water Sector utilities and other potential responders, ensuring that they have access to the most up to date information regarding how to decontaminate water and utility infrastructure.

1.2 Background

In 2008, a Critical Infrastructure Partnership Advisory Council (CIPAC) Water Sector Decontamination Working Group was convened by the Water Sector Coordinating Council (SCC) and Government Coordinating Council (GCC) to develop a strategy and plan that supports priorities for Water Sector decontamination and recovery for the purpose of water security. The Water SCC provides a mechanism to coordinate Water Sector policy and strategic planning. In this role, it recommends actions to reduce and eliminate significant homeland security vulnerabilities to the Water Sector through coordination with the federal government and other critical infrastructure sectors. The GCC, the government counterpart for the SCC, was formed to enable interagency and cross-jurisdictional coordination. At the time, the Water Sector lacked adequate information and guidance on the decontamination of water facilities, especially if they were contaminated with chemical, biological and radiological (CBR) agents through an accidental, intentional, or natural event. The Working Group was therefore charged to identify and prioritize decontamination and recovery issues and needs for returning drinking water (DW) and wastewater (WW) systems to service after a contamination event.

The CIPAC Working Group included experts from:

- U.S. Environmental Protection Agency (EPA):
    - Office of Water's (OW's) Water Security Division (WSD)
    - Office of Research and Development's (ORD's) National Homeland Security Research Center (NHSRC)
    - Office of Emergency Management (OEM)
    - Office of Solid Waste and Emergency Response (OSWER)
    - Office of Homeland Security
    - EPA Regions 1 and 6
- Centers for Disease Control and Prevention (CDC)

- U.S. Army Corps of Engineers (USACE)
- U.S. Department of Homeland Security (DHS)
- States
- Water utilities
- Water Sector organizations including the American Water Works Association (AWWA, represented by the Battelle Memorial Institute), Water Research Foundation (WRF, represented by O'Brien & Gere) and the Association of State Drinking Water Administrators (ASDWA).

The Working Group deliberated periodically over 6 months and reviewed existing information and ongoing activities on Water Sector decontamination. Based on the available information and subsequent discussions, the Working Group identified and prioritized 16 issues and defined 35 associated recommendations related to gaps in decontamination tools, guidance and research. The outcomes from the Working Group are presented in their 2008 report, *Recommendations and Proposed Strategic Plan: Water Sector Decontamination Priorities*. The recommendations are divided by the following functional categories:

- supporting information and capabilities
- policy decisions
- decontamination and treatment technologies and procedures
- outreach and communications.

Note that in the report, the Working Group provides specific recommendations for addressing 15 of the 16 key issues that were identified. Issue 16 contains overarching considerations that were not addressed individually by the Working Group.

As part of the Working Group process, potential lead agencies were identified from the organizations represented within the Working Group to address each recommendation. The identified lead organizations were not obligated to complete the work or assign it to others. Furthermore, it should be noted that asset and financial resources necessary to carry out these recommendations were not addressed by this Working Group. No assumption should be made that the suggested coordinating organizations have the people or funding to implement the Working Group's recommended actions. Rather, the recommendations were mainly used to help inform existing and new research efforts and related planning. The priority issues identified are listed in Table 1.

Table 1. Decontamination Issues Identified by the CIPAC Working Group

Priority	Issue Categories Raised by CIPAC Working Group
1	Containing or disposing of large amounts of contaminated water
2	Near-term practical solutions
3	Decontamination procedures for infrastructure in treatment plants
4	Decision-making frameworks for decontamination
5	Decontamination procedures for distribution and collection systems
6	Outreach and training to utilities, partners and stakeholders
7	Utility communications to public officials, responders, the public and others on decontamination
8	Cleanup levels
9	Treatment procedures for contaminated drinking water and wastewater
10	Agent fate and transport
11	Clarifying roles and responsibilities for decontamination and treatment
12	Process for regulatory waivers/suspensions
13	Resources and assets for decontamination and treatment
14	Laboratory analysis
15	Health and safety assessment for drinking water and wastewater treatment plant and field staff
16	Overarching Decontamination Needs

Approximate time frames for addressing each recommendation were designated by the Working Group. These time frames were assigned based on what the Working Group believed was appropriate for fully addressing each recommendation and acknowledge the practical considerations necessary to complete the associated activities, but did not consider whether the identified organizations have the resources available to address the Working Group's recommendations in the time frames proposed.

Table 2 provides a high-level overview of the priority issues, recommendations and associated statuses which may help lead agencies to identify outstanding recommendations and prioritize future actions.

Table 2: Summary of Recommendation Status

CIPAC Issues and Recommendations - Status	
Issue/Recommendation	**Status**
Priority Issue 1: Containing or Disposing of Large Amounts of Contaminated Water	
Recommendation 1.1 - Develop a decision-making framework regarding containing or purging contaminated water	**Not Started**
Recommendation 1.2 - Revise existing guidance or develop new guidance for containment and disposal of decontamination waste including large amounts of water and associated solid waste	**Complete**
Priority Issue 2: Near-term Practical Solutions	
Recommendation 2.1 - Provide information on using traditional techniques (i.e., those in routine use by utilities) for non-traditional contaminants	**In progress**
Recommendation 2.2 - Provide information on the efficacy of pipe cleaning aids, such as NSF-60-certified products, on the decontamination of infrastructure	**In progress**
Recommendation 2.3 - Provide operational steps to minimize impact of decontamination	**In progress**
Recommendation 2.4 - Use existing information services and Web-based databases to disseminate near-term practical decontamination solutions	**In progress**
Priority Issue 3: Decontamination Procedures for Infrastructure in Treatment Plants	
Recommendation 3.1 - Identify existing decontamination techniques (or develop new procedures) for CBR agents in treatment plant infrastructure	**In progress**
Priority Issue 4: Decision-Making Frameworks for Decontamination	
Recommendation 4.1 - Develop a decision-making framework for the decontamination of CBR agents in water systems, specifically to be used by utilities, responders and other decision makers	**In progress**
Priority Issue 5: Decontamination Procedures for Distribution and Collection Systems	
Recommendation 5.1 - Identify existing decontamination techniques and/or develop new procedures for CBR agents in utility distribution and collection systems	**In progress**
Recommendation 5.2 - Identify existing decontamination techniques and/or develop new decontamination methods for CBR agents in private plumbing	**In progress**
Priority Issue 6: Outreach and Training to Utilities, Partners, and Stakeholders	
Recommendation 6.1 - Identify the current state of decontamination and recovery knowledge for CBR agents and develop a preferred/vetted guidance to reconcile any conflicting information.	**Not Started**
Recommendation 6.2 - Populate and update EPA's Water Contaminant Information Tool (WCIT) to include additional fate and transport information	**In progress**
Recommendation 6.3 - Develop a Web-based information clearinghouse to share and disseminate decontamination and recovery information specific to the water sector	**In progress**
Recommendation 6.4 - Develop and provide two types, one each for drinking water and wastewater, of facility-based, decontamination training programs from "ground up" for water sector stakeholders and national response teams	**In progress**
Priority Issue 7: Utility Communication to Public Officials, Responders, the Public and Others on Decontamination	
Recommendation 7.1 - Develop guidance to help utilities prepare outreach materials to educate utility personnel, law makers and response agencies on decontamination and recovery process before an incident	**In progress**
Recommendation 7.2 - Develop guidelines for risk communication activities during decontamination and recovery phases	**In progress**
Priority Issue 8: Cleanup Levels	
Recommendation 8.1 - Develop transparent process for establishing target cleanup levels that can be used on an incident-specific basis	**In progress**
Recommendation 8.2 - Pre-establish information needs to determine target cleanup levels for contaminants that address multiple water uses	**Not Started**
Recommendation 8.3 - Establish measurement process for cleanup and clearance that addresses extent of sampling	**Not Started**

Table 2: Summary of Recommendation Status

CIPAC Issues and Recommendations - Status	
Issue/Recommendation	**Status**
Priority Issue 9: Treatment Procedures for Contaminated Drinking Water and Wastewater	
Recommendation 9.1 - Provide information on the treatment of drinking water and wastewater contaminated with CBR agents	**In progress**
Priority Issue 10: Agent Fate and Transport	
Recommendation 10.1 - Create a transparent and scientifically defensible process for estimating the fate and transport of contaminants in drinking water and wastewater systems in the absence of information on a specific contaminant	**In progress**
Recommendation 10.2 - Determine the persistence and interaction of CBR agents in drinking water and wastewater on pipe materials, and how chlorination affects contaminant persistence and interaction	**In progress**
Recommendation 10.3 - Integrate fate and transport information into hydraulic models	**In progress**
Recommendation 10.4 - Determine the fate and transport of decontamination agents in drinking water and wastewater systems and persistence in pipe materials	**In progress**
Recommendation 10.5 - Determine fate and transport of CBR agents, residuals, decontamination agents and solid discharge to the environment including if discharged to water body or after wastewater treatment (fertilizer or the sludge application to agricultural land, landfill, etc.)	**In progress**
Recommendation 10.6 - Assess the aerosolization or volatilization of contaminants released from drinking water and wastewater systems	**Not Started**
Recommendation 10.7 - Determine the risk that an aerosolized attack of CBR agents will result in concentrations of concern to drinking water or wastewater systems	**Not Started**
Priority Issue 11: Clarifying Roles and Responsibilities for Decontamination and Treatment	
Recommendation 11.1 - Develop a flowchart to show progression of roles and decision making authority to be used by the utilities and responding/coordinating agencies during decontamination, treatment and recovery	**In progress**
Priority Issue 12: Process for Regulatory Requirements	
Recommendation 12.1 - Provide guidance on regulatory waiver process for discharge/disposal, decontamination/treatment and return to service activities during CBR incidents	**Not Started**
Priority Issue 13: Resources and Assets for Decontamination and Treatment	
Recommendation 13.1 - Develop information guidelines for utilities on allocating and acquiring decontamination and treatment financial resources	**Not Started**
Recommendation 13.2 - Provide utilities with information on decontamination factors to be considered when making capital improvement decisions through best practices development organizations advising the water sector	**Not Started**
Recommendation 13.3 - Inform utilities of the critical assets available to the water sector to aid decontamination, treatment and recovery from CBR contamination	**Complete**
Priority Issue 14: Laboratory Analysis	
Recommendation 14.1 - Provide surface (in situ) and water analysis methods specific for CBR agents to be used during decontamination and clearance steps through existing efforts	**Significant Progress***
Recommendation 14.2 - Leverage existing efforts to identify laboratory capabilities and laboratory capacities specific to CBR agent decontamination needs	**Complete**
Priority Issue 15: Health and Safety Assessment for Drinking Water and Wastewater Treatment Plant and Field Staff	
Recommendation 15.1 - Develop detailed, risk-based frameworks for health assessments of drinking water and wastewater treatment plant and field staff that are consistent in approach across all EPA regions and states	**In progress**
Priority Issue 16: Overarching Decontamination Needs	
**Although significant progress has been made, related work may be ongoing (e.g., updates to available information).*	

1.3 Obtaining Information

To gather information for this report, WSD conducted conference calls with representatives from each designated lead agency to determine the status of activities under each of the relevant recommendations. After each call, agencies had the opportunity to follow up with additional supporting materials. This report was compiled based on voluntary input provided during these communications. A list of the questions used to obtain input is provided below. Details regarding key outcomes are documented in Section II, Table 3. The scope of this report is limited to the information gathered during the conference calls with the lead agency representatives and any follow up after the call. No additional research was conducted with other Water Sector agencies or across other sectors.

1.4 List of Questions Discussed with Representatives from Lead Agencies

Core Questions

1. How would you rate the implementation status of Recommendation *X* in the CIPAC report?
    a. Complete
    b. In progress
    c. Not started

2. What progress has been made toward addressing Recommendation *X*?

3. What projects are underway to aid the implementation of Recommendation *X*?

4. What products or other outputs have been developed or released by your Agency/Association that are relevant to implementing Recommendation *X*?

5. Are there projects that you are currently working on, or considering starting, to address other recommendations or issues that weren't directly assigned to your Agency/Association?

Optional Questions

6. Are you working with EPA offices or other government agencies or Water Sector entities to implement the recommendations? If so, which?

7. What have been the challenges you faced in addressing this/these recommendations?

8. Is this recommendation still relevant? If so, why?

II. OUTCOMES

Table 3 provides a summary of the results of WSD's communications with lead agencies regarding the status of activities addressing recommendations in the *Recommendations and Proposed Strategic Plan: Water Sector Decontamination Priorities* report. Input was provided by representatives of EPA's NHSRC and WSD as well as representatives from CDC, USACE, the Water SCC, the Water Environment Federation (WEF), AWWA, ASDWA and the National Association of Clean Water Agencies (NACWA). Input from DHS and the Occupational Safety and Health Administration (OSHA) was not available at the time this progress document was prepared. In some cases, progress was reported by agencies not explicitly identified as leads for specific recommendations.

Each recommendation was assigned a status as follows:

- Not Started: Based on the information collected during the conference calls, efforts have not been initiated to address the recommendation.
- In progress: Current efforts reflect progress towards meeting the recommendation, but additional work is planned or needed.
- Significant Progress: Work has been completed towards the recommendation, however, there may be some ongoing efforts to continue to update information as it becomes available.
- Complete: The recommendation has been addressed as detailed by key outputs. For each recommendation, key outputs (i.e., documents and products that have been prepared and published by lead agencies) are presented to support the listed recommendation status. Full citations and, when applicable, hyperlinks for these documents and products are provided in Section IV, References.

Table 3: Results of Communications with Lead Agencies

Note: Documents cited and listed in the bullets throughout this table reflect progress in meeting recommendations under Priority Issues 1 through 16 (see Table 1), since 2008. Full citations and links for documents cited in this table are provided in Section IV of this report.

CIPAC Issues and Recommendations Status			
Status	**Time Frame**	**Lead Agencies**	**Progress and Key Outputs**
Priority Issue 1: Containing or Disposing of Large Amounts of Contaminated Water			
Recommendation 1.1 - Develop a decision-making framework regarding containing or purging contaminated water			
Not Started	Mid-term	EPA OW (WSD) ASDWA	Efforts to address this recommendation have not been initiated.
Recommendation 1.2 - Revise existing guidance or develop new guidance for containment and disposal of decontamination waste including large amounts of water and associated solid waste			
Complete	Short-term	EPA OW (WSD) NACWA WEF	As noted in the 2008 CIPAC Report (titled below), guidance for direct surface water discharge or disposal through wastewater treatment plants (WWTPs) was not previously available. Prior guidance even suggested that this was not a viable option. EPA's "Containment and Disposal of Large Amounts of Contaminated Water: A Support Guide for Utilities" (2012) provides updated guidance for utilities to determine how to treat, store and dispose of contaminated water. The Guide outlines important considerations for various disposal options, including: direct discharge to surface water, disposal through a WWTP, transfer to a hazardous waste facility, underground injection and volume reduction and solidification. The Guide refers the reader to relevant regulations pertaining to the treatment and disposal of residuals (solids). ▪Containment and Disposal of Large Amounts of Contaminated Water: A Support Guide for Utilities (USEPA, 2012a)

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CIPAC Issues and Recommendations Status			
Status	**Time Frame**	**Lead Agencies**	**Progress and Key Outputs**
Priority Issue 2: Near-term Practical Solutions			
Recommendation 2.1 - Provide information on using traditional techniques (i.e., those in routine use by utilities) for non-traditional contaminants			
In progress	Mid-term	EPA ORD (NHSRC) EPA OW (WSD)	EPA has published the results of numerous studies (listed below), related to the use of traditional techniques for decontamination of several non-traditional contaminants. The use of chlorination and increased flow rates were evaluated for their efficacy in removing several target contaminants, including chlordane, cobalt and *Bacillus* spores. Results suggest that spores attached to bio-fouled concrete-lined pipe walls can persist in non-chlorinated conditions, but detach and/or are inactivated upon addition of free chlorine. Results also suggest that the presence of free chlorine limits adherence of viable spores by inactivating them before they have attached (Shane *et al.,* 2011). The use of chlorine dioxide as a disinfectant for *Bacillus* drastically reduced contamination (Hosni *et al.,* 2011; Hosni *et al.,* 2009). Additional studies showed that adsorbed cobalt was strongly resistant to decontamination by simulated flushing and the use of free chlorine and dilute ammonia, whereas use of aggressive solutions such as 14.5M ammonia and 0.36M sulfuric acid were much more effective. Similarly, hyperchlorination with increased flow was not effective at removing chlordane from cement surfaces (Szabo *et al.,* 2009a; USEPA 2012b). EPA recently published reports summarizing the current state of knowledge on the persistance of biological, chemical and radiological agents on drinking water infrastructure and decontamination. Areas suggested for future research include: expanding the availability of biological, chemical (i.e., inorganics) and radiological persistence data on infrastructure materials, additional methods for sampling or extracting chemical agents from infrastructure surfaces, such as the use of chelating agents, low pH and non-traditional disinfectants to treat contaminated drinking water (Szabo and Minameyer, 2014a, b, c). The aforementioned items are listed below. ▪Decontamination of Biological Agents from Drinking Water Infrastructure: A Literature Review and Summary (Szabo and Minameyer, 2014a) ▪Decontamination of Chemical Agents from Drinking Water Infrastructure: A Literature Review and Summary (Szabo and Minameyer, 2014b) ▪Decontamination of Radiological Agents from Drinking Water Infrastructure: A Literature Review and Summary (Szabo and Minameyer, 2014c) ▪Chemical Contaminant Persistence and Decontamination in Drinking Water Pipes: Results Using the EPA Standardized Persistence and Decontamination Experimental Design Protocol (USEPA, 2012b) ▪Efficacy of Chlorine Dioxide as a Disinfectant for *Bacillus* Spores in Drinking-Water Biofilms (Hosni *et al.,* 2011) ▪Persistence of Non-native Spore Forming Bacteria in Drinking Water Biofilm and Evaluation of Decontamination Methods (Shane *et al.,* 2011) ▪The Disinfection Efficacy of Chlorine and Chlorine Dioxide as Disinfectants of *Bacillus globigii,* a Surrogate for *Bacillus anthracis,* in Water Networks: A Comparative Study (Hosni *et al.,* 2009) ▪Persistence and Decontamination of Surrogate Radioisotopes in a Model Drinking Water Distribution System (Szabo *et al.,* 2009a) ▪*Bacillus* Spore Uptake onto Heavily Corroded Iron Pipe in a Drinking Water Distribution System Simulator (Szabo *et al.,* 2009b)

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CIPAC Issues and Recommendations Status			
Status	**Time Frame**	**Lead Agencies**	**Progress and Key Outputs**
Recommendation 2.2 - Provide information on the efficacy of pipe cleaning aids, such as NSF-60-certified products, on the decontamination of infrastructure			
In progress	Long-term	EPA ORD (NHSRC)	EPA has published the results of a pilot study (listed below) to, in part, determine the efficacy of pipe cleaning aids for decontaminating infrastructure. Baseline flushing techniques were evaluated along with several additives, including phosphate buffer, acidified potassium permanganate, shock chlorination and several NSF Standard 60 products, for removal of arsenic, mercury, *Bacillus subtilis* , diesel fuel and chlordane from cement and pipe material surfaces. Acidified potassium permanganate increased the removal efficacy of arsenic and mercury; NSF Standard 60 products increased the removal of arsenic; shock chlorination increased the removal efficacy of *Bacillus subtilis* ; and Surfonic TDA-6 increased the removal efficacy of diesel fuel and chlordane. For arsenic, use of the NSF Standard 60 products (e.g., NW-310/NW-400, Floran Biogrowth Remover/Catalyst and Floran Top Ultra/Catalyst) as flushing reagents was as effective as flushing with acidified potassium permanganate, but the NSF Standard 60 products are considered to be more environmentally friendly (USEPA, 2008). ▪Pilot-Scale Tests and Systems Evaluation for the Containment, Treatment and Decontamination of Selected Materials from T&E Building Pipe Loop Equipment (USEPA, 2008)
Recommendation 2.3 - Provide operational steps to minimize impact of decontamination			
In progress	Short-term	AWWA (DW) NACWA (WW) WEF (WW)	WEF has developed two documents (listed below) to provide guidance on how to minimize the impact of decontamination. WEF released a special publication to help utilities develop an emergency response plan to recover from events such as infrastructure failure, natural disasters and other incidents (WEF, 2013). WEF also released a Manual of Practice document based on best work practices to provide critical information necessary for regulatory compliance, reduction of costs and prevention of injury and illness. Details include information on: biological hazards, personal protective equipment, safe work procedures and hazardous waste management (WEF, 2012). ▪Emergency Planning, Response, and Recovery, WEF Special Publication (WEF, 2013) ▪Safety, Health, and Security in Wastewater Systems, WEF Manual of Practice (MOP 1) (WEF, 2012)
Recommendation 2.4 - Use existing information services and Web-based databases to disseminate near-term practical decontamination solutions			
In progress	Short-term	EPA	WaterISAC is a centralized resource that gathers, analyzes and disseminates threat information that is specific to the drinking water and wastewater community. Through WaterISAC, members (including water utilities, state and federal agencies dealing with security, law enforcement, intelligence, the environment and public health) can access databases of chemical, biological and radiological agent information as well as emergency preparedness and response resources. See WaterISAC below: ▪EPA's WaterISAC website - https://portal.waterisac.org/home
Priority Issue 3: Decontamination Procedures for Infrastructure in Treatment Plants			
Recommendation 3.1 - Identify existing decontamination techniques (or develop new procedures) for CBR agents in treatment plant infrastructure			
In progress	Long-term	EPA ORD (NHSRC)	Direct studies researching the efficacy of existing techniques on infrastructure specific to drinking water and wastewater treatment plants have not yet been undertaken by NHSRC, but results of studies on distribution system infrastructure under Recommendations 2.1, 2.2, 5.1 and 10.2 are applicable to some treatment plant infrastructure, such as pipes.

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CIPAC Issues and Recommendations Status			
Status	**Time Frame**	**Lead Agencies**	**Progress and Key Outputs**
Priority Issue 4: Decision-Making Frameworks for Decontamination			
Recommendation 4.1 - Develop a decision-making framework for the decontamination of CBR agents in water systems, specifically to be used by utilities, responders, and other decision makers			
In progress	Short-term	EPA DHS	EPA is developing decontamination decision-making frameworks that detail the steps involved in characterization and decontamination efforts as well as the relevant roles and decision-making authorities (Note: for practical purposes, Recommendations 4.1 and 11.1 have been combined). The draft frameworks leverage the "Planning Guidance for Recovery Following Biological Incidents" (US DHS and EPA, 2011).
Priority Issue 5: Decontamination Procedures for Distribution and Collection Systems			
Recommendation 5.1 - Identify existing decontamination techniques and/or develop new procedures for CBR agents in utility distribution and collection systems			
In progress	Long-term	EPA ORD (NHSRC)	EPA has conducted multiple studies (listed below) to evaluate the efficacy of decontamination techniques for CBR agents in drinking water utility systems.In addition to results of the USEPA 2008 study listed below and summarized briefly under Recommendation 2.2 above, results of recently completed studies indicate effective use of selective cesium removal media and concentrated salt brines to remove radionuclides from porous surfaces. Adsorbed cobalt was strongly resistant to decontamination by various physicochemical methods, while absorbed cobalt was much more effectively removed by 14.5M ammonia and 0.36M sulfuric acid than by simulated flushing and the use of free chlorine and dilute ammonia (M= moles per liter) (Szabo *et al.,* 2009a). Results of other studies indicate that germination of *Bacillus* spores and chlorination prior to flushing increased decontamination efficacy; exposure to chlorine dioxide greatly reduced *Bacillus* contamination on surfaces (Shane *et al.,* 2011; Hosni *et al.,* 2011; Hosni *et al.,* 2009). Flushing with free chlorine was more effective in removing chlordane than exposure to increased levels of chlorine without flushing, but did not impact sodium fluoroacetate (in each case, duration of flow had a greater impact than flow velocity) (US EPA 2012b). Ongoing research efforts include: testing the efficacy of acidified nitrite and atmospheric pressure microwave plasma as disinfecting agents, investigating the impact of CBR contaminants on drinking water storage tanks sediments and construction of a field test site and initial evaluation of decontamination methods at the test site (see Recommendation 2.1). ▪Report on the Workshop on Radionuclides in Wastewater Infrastructure Resulting from Emergency Situations (USEPA, 2013) ▪Germinant-Enhanced Decontamination of *Bacillus* Spores Adhered to Iron and Cement-Mortar Drinking Water Infrastructures (Szabo *et al.,* 2012) ▪Chemical Contaminant Persistence and Decontamination in Drinking Water Pipes: Results using the EPA Standardized Persistence and Decontamination Experimental Design Protocol (USEPA, 2012b) ▪Efficacy of Chlorine Dioxide as a Disinfectant for *Bacillus* Spores in Drinking-Water Biofilms (Hosni *et al.,* 2011) ▪Persistence of Non-native Spore Forming Bacteria in Drinking Water Biofilm and Evaluation of Decontamination Methods (Shane *et al.,* 2011) ▪The Disinfection Efficacy of Chlorine and Chlorine Dioxide as Disinfectants of *Bacillus globigii,* a Surrogate for *Bacillus anthracis,* in Water Networks: A Comparative Study (Hosni *et al.,* 2009) ▪Persistence and Decontamination of Surrogate Radioisotopes in a Model Drinking Water Distribution System (Szabo *et al.,* 2009a) ▪*Bacillus* Spore Uptake onto Heavily Corroded Iron Pipe in a Drinking Water Distribution System Simulator (Szabo *et al.,* 2009b) ▪Pilot-Scale Tests and Systems Evaluation for the Containment, Treatment, and Decontamination of Selected Materials from T&E Building Pipe Loop Equipment (USEPA, 2008)

Table 3: Results of Communications with Lead Agencies

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CIPAC Issues and Recommendations Status			
Status	**Time Frame**	**Lead Agencies**	**Progress and Key Outputs**
Recommendation 5.2 - Identify existing decontamination techniques and/or develop new decontamination methods for CBR agents in private plumbing			
In progress	Mid-term	EPA ORD (NHSRC)	EPA completed several studies to evaluate existing techniques and develop methods for the decontamination of CBR agents in private plumbing systems. Research evaluated the efficacy of increased flow rates during flushing, increased and varying types of chlorination, spore germination prior to flushing, and increased water temperatures on removal or inactivation of conventional and unconventional chemical contaminants and spore-forming pathogens. Contaminants addressed include: diesel fuel/gasoline, toluene, strychnine, cyanide, phorate, mercuric chloride, *Escherichia coli, Bacillus anthracis, Bacillus thuringiensis* and ricin; material substrates used include: copper, galvanized iron, polyvinyl chloride (PVC), rubber and brass. Measurements showed that most contaminants adhered to plumbing material substrates after initial exposure. Some contaminants (diesel fuel, toluene) showed a substantial reduction from flushing with clean tap water, while others required the addition of high levels of chlorine to effect removal (phorate, gasoline, biologicals) (USEPA, 2012c). Contact with germinants appeared to dramatically enhance the susceptibility of surface-associated spores to elevated water temperature and disinfectants, and (for high-flow conditions) moderate concentrations of chlorine (~ 10 mg/L) effectively disinfected spores associated with biofilms (US EPA 2011a). ▪Removing Biological and Chemical Contamination from a Building's Plumbing System: Method Development and Testing (USEPA, 2012c) ▪Development and Testing of Methods to Decontaminate a Building's Plumbing System Impacted by a Water Contamination Event: Decontamination of *Bacillus* Spores (USEPA, 2011a) ▪Association and Decontamination of *Bacillus* Spores in a Simulated Drinking Water System (Morrow *et al.,* 2008)
Priority Issue 6: Outreach and Training to Utilities, Partners, and Stakeholders			
Recommendation 6.1 - Identify the current state of decontamination and recovery knowledge for CBR agents and develop a preferred/vetted guidance to reconcile any conflicting information			
Not Started	Short-term	EPA	Efforts to address this recommendation have not been initiated.
Recommendation 6.2 - Populate and update EPA's Water Contaminant Information Tool (WCIT) to include additional fate and transport information			
In progress	Long-term	EPA OW (WSD)	There are limited data and information available on the fate and transport of CBR agents, residuals and associated decontamination agents in drinking water/wastewater systems. EPA efforts to populate fate and transport information in WCIT are ongoing as this information becomes available. Work is currently underway to update WCIT for consistency with EPA's Selected Analytical Methods for Environmental Remediation and Recovery and include decontamination and treatment information for several pathogens and chemical agents.
Recommendation 6.3 - Develop a Web-based information clearinghouse to share and disseminate decontamination and recovery information specific to the water sector			
In progress	Long-term	EPA	A comprehensive clearinghouse has not been established; however, EPA released a decontamination website in 2013. The website is updated regularly to disseminate the most current water-sector specific decontamination and recovery information. At this time, information regarding the efficacy of decontamination procedures and technologies are accessible through multiple EPA websites and databases. Examples include EPA's WCIT, EPA's NHSRC website and links from EPA's WSD Decontamination website. ▪EPA's WSD Decontamination website - http://water.epa.gov/infrastructure/watersecurity/emerplan/decon/ ▪EPA's NHSRC website - http://www.epa.gov/nhsrc/ ▪EPA's WCIT website - http://www.epa.gov/wcit/

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CIPAC Issues and Recommendations Status			
Status	**Time Frame**	**Lead Agencies**	**Progress and Key Outputs**
Recommendation 6.4 - Develop and provide two types, one each for drinking water and wastewater, of facility-based, decontamination training programs from "ground up" for water sector stakeholders and national response teams			
In progress	Mid-term	EPA SCC organizations	EPA is currently developing web-based decontamination training and plans to make it publicly available following the release of the decontamination decision-making frameworks (see Recommendations 4.1 and 11.1).
Priority Issue 7: Utility Communication to Public Officials, Responders, the Public and Others on Decontamination			
Recommendation 7.1 - Develop guidance to help utilities prepare outreach materials to educate utility personnel, law makers, and response agencies on decontamination and recovery process before an incident			
In progress	Short-term	SCC organizations	EPA developed a fact sheet (titled below) on accessing laboratory resources during response and remediation efforts to help utilities prepare for a contamination incident. EPA is also in the process of adding information to its website on how utilities can access critical assets to support decontamination activities. ▪Laboratory Resources for the Water Sector to Support Decontamination Activities (USEPA, 2012d)
Recommendation 7.2 - Develop guidelines for risk communication activities during decontamination and recovery phases			
In progress	Short-term	SCC organizations	EPA developed a guidance document (titled below) to inform crisis communication planning by water sector and other emergency management decision-makers and assist with effective communication during an incident. ▪Need to Know: Anticipating the Public's Questions during a Water Emergency (USEPA, 2012e)
Priority Issue 8: Cleanup Levels			
Recommendation 8.1 - Develop transparent process for establishing target cleanup levels that can be used on an incident-specific basis			
Significant Progress	Short-term	EPA	Although efforts to establish target cleanup levels have not been initiated specifically for the water sector, EPA continues to apply existing procedures to determine risk-based exposure levels and remediation goals for new and emerging contaminants of concern. At present, risk assessment information is provided across multiple EPA programs. For example, NHSRC provides provisional advisory levels (PALs) for approximately 100 chemicals and pathogens; and OSWER provides benchmarks and human toxicity assessment factors for more than 200 chemicals and radiochemicals in EPA's Superfund Chemical Data Matrix (SCDM), preliminary remediation goals (PRGs) for radiochemicals and regional screening levels (RSLs) for chemical contaminants. Risk assessment information and the associated exposure levels and/or remediation goals (i.e., for inhalation and oral exposure), listed below, can be used to inform and plan target cleanup levels following contamination incidents. ▪Health-Based Provisional Advisory Levels (PALs) for Homeland Security (Adeshina *et al.,* 2009) ▪Superfund Chemical Data Matrix (USEPA, 2014) ▪EPA's Preliminary Remediation Goals for Radionuclides website - http://epa-prgs.ornl.gov/radionuclides/ ▪EPA's Regional Screening Levels for Chemical Contaminants website - http://www.epa.gov/region9/superfund/prg/
Recommendation 8.2 - Pre-establish information needs to determine target cleanup levels for contaminants that address multiple water uses			
Not Started	Long-term	EPA ORD (NHSRC)	Efforts to address this recommendation have not been initiated.

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CIPAC Issues and Recommendations Status			
Status	**Time Frame**	**Lead Agencies**	**Progress and Key Outputs**
Recommendation 8.3 - Establish measurement process for cleanup and clearance that addresses extent of sampling			
Not Started	Short-term	EPA	Efforts to address this recommendation have not been initiated.
Priority Issue 9: Treatment Procedures for Contaminated Drinking Water and Wastewater			
Recommendation 9.1 - Provide information on the treatment of drinking water and wastewater contaminated with CBR agents			
In progress	Long-term	EPA ORD (NHSRC)	EPA has published the results of numerous studies (listed below) investigating the efficacy of treatment methods for contaminated drinking water and wastewater, including studies performed in collaboration with CDC. These studies evaluated the use of chlorine and monochloramine for decontamination of pathogens and chemicals in water. The efficacy of decontamination of biological agents was impacted by several factors including: ▪the microbe ▪quantity/concentration ▪concentration of disinfectant and contact time ▪spores versus vegetative cells ▪water temperature and pH ▪quality and flow of water. Current EPA research efforts include examining the effectiveness of advanced oxidation processes to treat chemically contaminated water and the effectiveness of sodium hypochlorite to inactivate *Bacillus* spores in wash down wastewater. ▪Inactivation of Bacterial Bioterrorism Agents in Water: A Summary of Seven EPA and CDC Research Studies (Minamyer & Menefee, 2013) ▪Inactivation of Bacterial Bioterrorism Agents in Water: A Summary of Seven Studies (USEPA, 2012f) ▪Chlorine Disinfection of *Francisella tularensis* (O'Connell *et al.,* 2009) ▪Variability of *Burkholderia pseudomallei* Strain Sensitivites to Chlorine Disinfection (O'Conner *et al.,* 2009)
Priority Issue 10: Agent Fate and Transport			
Recommendation 10.1 - Create a transparent and scientifically defensible process for estimating the fate and transport of contaminants in drinking water and wastewater systems in the absence of information on a specific contaminant			
In progress	Mid-term	EPA ORD (NHSRC)	EPA is planning studies that will inform the development of a scientifically defensible process for estimating fate and transport of target contaminants in a water utility system. Research being considered for the next 3 years includes developing a compendium report on drinking water distribution system fate and transport models and research on improved prediction of the hydrolysis or oxidation of selected chemicals.

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CIPAC Issues and Recommendations Status			
Status	**Time Frame**	**Lead Agencies**	**Progress and Key Outputs**
Recommendation 10.2 - Determine the persistence and interaction of CBR agents in drinking water and wastewater on pipe materials, and how chlorination affects contaminant persistence and interaction			
In progress	Long-term	EPA ORD (NHSRC)	EPA has published the results of numerous studies evaluating the persistence and interaction of CBR agents in water systems, including their interactions with pipe materials and the impacts of chlorination. Several studies have been conducted to investigate the persistence of contaminants such as *B. anthracis* , surrogates for *B. anthracis* (including *B. globigii*) and radionuclides on common pipe materials such as corroded iron, PVC, concrete, and cement. Results confirm that the absence or presence of biofilms is an important factor which may be contaminant specific (USACE, 2012; EPA, 2012b; Shane et *al.,* 2011; Arnett, 2010). Results of one study support previous bench-scale studies that show that spores can persist on corroded iron surfaces in drinking water with free chlorine concentrations up to 70 mg/L. *B. globigii* has also been shown to adsorb to biofilms on PVC pipes, decreasing spore inactivation by free chlorine (Arnett, 2010). Results of another study evaluating the persistence of *B. globigii* on biofouled concrete suggest that free chlorine can inactivate spores prior to attachment thus limiting adherence (Shane *et al.,* 2011). For sodium fluroacetate, results of one preliminary study indicated that the absence of biofilm may actually increase the adsorption of the contaminant to pipe surfaces (USEPA, 2012b). Studies assessing the persistence of cesium and cobalt were conducted in biofilm annular reactors containing heavily corroded iron surfaces. Results also indicated that competition with other ions dissolved in the drinking water effectively prevented cesium from associating with active sites in the corrosion surface at a detectable level. Conversely, cobalt persisted for at least 6 weeks on the corroded iron surface of the coupons (Szabo *et al.,* 2009b). USACE noted that current simulations of contaminant fate and transport within pipes are inadequate in that they do not incorporate sorption or chemical reactions (e.g., hydrolysis) (USACE, 2012). As methods to model and predict molecular transport and hydrolysis rates for specific contaminants improve, they can be incorporated into existing modeling software (i.e., EPANet) to inform decontamination strategies. The aforementioned studies are listed below. ▪Effect of pH on the Electrophoretic Mobility of Spores of *Bacillus anthracis* and Its Surrogates in Aqueous Solutions (White *et al.,* 2012) ▪Chemical Contaminant Persistence and Decontamination in Drinking Water Pipes: Results Using the EPA Standardized Persistence and Decontamination Experimental Design Protocol (USEPA, 2012) ▪Molecular Modeling of Chem-Bio (CB) Contaminant Sorption/Desorption and Reactions in Chlorinated Water Systems (USACE, 2012) ▪Modeling Pressure-Driven Transport of Proteins Through a Nanochannel (Carr *et al.,* 2011) ▪Persistence of Non-native Spore Forming Bacteria in Drinking Water Biofilm and Evaluation of Decontamination Methods (Shane *et al.,* 2011) ▪Influence of Bacterial Biofilms on *Bacillus globigii* spore Viability in Model Chlorinated Water Distribution Systems (Arnett *et al.,* 2010) ▪*Bacillus* Spore Uptake onto Heavily Corroded Iron Pipe in a Drinking Water Distribution System Simulator (Szabo *et al.,* 2009)

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CIPAC Issues and Recommendations Status			
Status	**Time Frame**	**Lead Agencies**	**Progress and Key Outputs**
Recommendation 10.3 - Integrate fate and transport information into hydraulic models			
In progress	Long-term	EPA ORD (NHSRC)	EPA has a suite of hydraulic modeling and simulation software tools available, which are listed below, to help water utilities detect and respond to contamination incidents. Although none of these models currently incorporate fate and transport data, EPANET-MSX (Multi-Species eXtension) is well suited to incorporate such data as they become available. EPA NHSRC's EPANET-MSX allows for the consideration of multiple interacting species in the bulk flow and on the pipe walls. This capability has been incorporated into both a stand-alone executable program as well as a toolkit library of functions that programmers can use to build customized applications. EPA published a technical brief summarizing hydraulic modeling and simulation software tools developed by EPA NHSRC to help water utilities detect and respond to incidents. Recently, EPA released the Water Security Toolkit which assists in the evaluation of multiple response actions in order to select the most beneficial consequence management strategy. It includes hydraulic and water quality modeling software and optimization methodologies to identify: ▪sensor locations to detect contamination ▪locations in the network in which the contamination was introduced ▪hydrants to remove contaminated water from the distribution system ▪locations in the network to inject decontamination agents to inactivate, remove or destroy contaminants, ▪locations in the network to take grab samples to confirm contamination or cleanup ▪valves to close in order to isolate contaminated areas of the network. ▪EPA's Water Security Toolkit website - https://software.sandia.gov/trac/wst ▪EPA's Water Security Modeling and Simulation Research (USEPA, 2011b)
Recommendation 10.4 - Determine the fate and transport of decontamination agents in drinking water and wastewater systems and persistence in pipe materials			
In progress	Mid-term	EPA ORD (NHSRC) USACE	Research efforts, mentioned below, to help determine the fate, transport and persistence of decontamination agents in water systems, including pipe surfaces, have not been initiated by EPA or USACE except as related to their impact on contaminants (see Recommendation 10.2). Research being considered by EPA for the next 3 years includes assessing the persistence of decontaminating agents and contamination residuals and by products in drinking water distribution systems. ▪Atoms-to-microns Model for Small Solute Transport through Sticky Nanochannels (Carr *et al.,* 2011)
Recommendation 10.5 - Determine fate and transport of CBR agents, residuals, decontamination agents and solid discharge to the environment including if discharged to water body or after wastewater treatment (fertilizer or the sludge application to agricultural land, landfill, etc.)			
In progress	Long-term	EPA ORD (NHSRC)	The fate of chemicals in wastewater sludge was evaluated in two studies (listed below). First, the fate of ethyl methylphosphonic acid (EMPA), a hydrolysis product of VX (O-ethyl S-[2-(diisopropylamino)ethyl] methylphosphonothioate) was studied in activated sludge from a laboratory scale sequencing batch reactor. The results suggest that the nitrifying bacteria may be responsible for the degradation via co-metabolism. Therefore, unless a suitable microbial population is present, degradation products, like EMPA, and similarly sorbed and biodegraded compounds may pass through an activated sludge wastewater treatment plant largely unchanged (Janeczko *et al.,* 2014). Secondly, the ability of activated sludge to sorb and biodegrade ethylmethylphosphonic acid (EMPA) and malathion, a degradation product and surrogate, respectively, for an organophosphate chemical warfare agent was studied. EMPA did not inhibit chemical oxygen demand (COD) oxidation or nitrification activity, although malathion did appear to induce a stress response resulting in inhibition of COD oxidation. The activated sludge reduced the malathion concentrations to nearly zero by day 10 for all retention times. (Schuldt et al., 2013) ▪Fate of Malathion and a Phosphonic Acid in Activated Sludge with Varying Solids Retention Times (Janeczko *et al.,* 2014) ▪Biodegradation by Activated Sludge from a Municipal Wastewater Plant of an Organophophonate Hydrolysis Product of VX:...But Not a Drop to Drink (Schuldt *et al.,* 2013)

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CIPAC Issues and Recommendations Status			
Status	**Time Frame**	**Lead Agencies**	**Progress and Key Outputs**
Recommendation 10.6 - Assess the aerosolization or volatilization of contaminants released from drinking water and wastewater systems			
Not Started	Long-term	EPA ORD (NHSRC)	Efforts to address this recommendation have not been initiated.
Recommendation 10.7 - Determine the risk that an aerosolized attack of CBR agents will result in concentrations of concern to drinking water or wastewater systems			
Not Started	Long-term	DHS EPA	Efforts to address this recommendation have not been initiated.
Priority Issue 11: Clarifying Roles and Responsibilities for Decontamination and Treatment			
Recommendation 11.1 - Develop a flowchart to show progression of roles and decision making authority to be used by the utilities and responding/coordinating agencies during decontamination, treatment and recovery			
In progress	Short-term	EPA DHS	EPA is developing decontamination decision-making frameworks that detail the steps involved in characterization and decontamination efforts as well as the relevant roles and decision-making authorities (Note: for practical purposes, Recommendations 4.1 and 11.1 have been combined). The draft frameworks leverage the "Planning Guidance for Recovery Following Biological Incidents" (US DHS and EPA, 2011).
Priority Issue 12: Process for Regulatory Requirements			
Recommendation 12.1 - Provide guidance on regulatory waiver process for discharge/disposal, decontamination/treatment and return to service activities during CBR incidents			
Not Started	Short-term	ASDWA ASIWPCA EPA	Efforts to address this recommendation have not been initiated.
Priority Issue 13: Resources and Assets for Decontamination and Treatment			
Recommendation 13.1 - Develop information guidelines for utilities on allocating and acquiring decontamination and treatment financial resources			
Not Started	Short-term	AWWA (DW) NACWA/WEF (WW)	Efforts to address this recommendation have not been initiated.
Recommendation 13.2 - Provide utilities with information on decontamination factors to be considered when making capital improvement decisions through best practices development organizations advising the water sector			
Not Started	Mid-term	AWWA (DW) NACWA (WW) WEF (WW)	Efforts to address this recommendation have not been initiated.
Recommendation 13.3 - Inform utilities of the critical assets available to the water sector to aid decontamination, treatment and recovery from CBR contamination			
Complete	Short-term	EPA SCC organizations	EPA developed a factsheet on how utilities can access critical assets to support decontamination activities. ▪How Can Water Utilities Obtain Critical Assets to Support Decontamination Activities? (USEPA, 2015)

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CIPAC Issues and Recommendations Status			
Status	**Time Frame**	**Lead Agencies**	**Progress and Key Outputs**
Priority Issue 14: Laboratory Analysis			
Recommendation 14.1 - Provide surface (in situ) and water analysis methods specific for CBR agents to be used during decontamination and clearance steps through existing efforts			
Significant Progress	Long-term	EPA	Development of techniques for the detection and measurement of CBR agents is ongoing by EPA. Several procedures and techniques (listed below) have been published in recent years to address target pathogens and chemical warfare agents and other target contaminants. ▪Analysis of Environmental Contamination Resulting from Catastrophic Incidents: Part 2. Building Laboratory Capability by Selecting and Developing Analytical Methodologies (Magnuson *et al.,* 2014a) ▪Quantitative Analysis and Stability of the Rodenticide TETS (Tetramine) in Finished Tap Water (Knaack *et al.,* 2014) ▪Stability of Ricinine, Abrine, and Alpha-amanitin in Finished Tap Water (Knaack *et al.,* 2013a) ▪Performance of a Novel High Throughput Method for the Determination of VX in Drinking Water Samples (Knaack *et al.,* 2013b) ▪High Throughput Determination of VX in Drinking Water by Immunomagnetic Separation and Isotope Dilution High Performance Liquid Chromatography Tandem Mass Spectrometry (HPLC/MS/MS) (US EPA and CDC, 2013) ▪Protocol for Detection of *Bacillus anthracis* in Environmental Samples During the Remediation Phase of an Anthrax Event (US EPA, 2012g) ▪Selected Analytical Methods for Environmental Remediation and Recovery (SAM) (US EPA, 2012h) ▪Comparison of Ultrafiltration Techniques for Recovering Biothreat Agents in Water (US EPA, 2011c) ▪Use of Acid Treatment and a Selective Medium to Enhance the Recovery of *Francisella tularensis* from Water (Humrighouse *et al.,* 2011) ▪Evaluation of Surface Sampling Techniques for Collection of *Bacillus* spores on Common Drinking Water Pipe Materials (Packard and Kupferle, 2010)
Recommendation 14.2 - Leverage existing efforts to identify laboratory capabilities and laboratory capacities specific to CBR agent decontamination needs			
Complete	Short-term	EPA OW (WSD)	EPA established an Environmental Response Laboratory Network (ERLN) to provide access to qualified laboratories and procedures following a contamination incident. The Water Laboratory Alliance (WLA) is included in the ERLN, and was designed specifically to address water contamination. EPA also published a fact sheet describing available laboratory capabilities and capacities specific to CBR decontamination needs. Recently, EPA published a paper summarizing activities and programs that it has implemented to ensure capability and capacity for the analysis of contaminated environmental samples following catastrophic incidents. USEPA's focus has been on building capability for a wide variety of contaminant classes and on ensuring national laboratory capacity for potential surges in the numbers of samples that could quickly exhaust the resources of local communities. USEPA's efforts have been designed to ensure a strong and resilient laboratory infrastructure in the United States to support communities as they respond to contamination incidents of any magnitude. The aforementioned items are listed below. ▪Analysis of Environmental Contamination Resulting from Catastrophic Incidents: Part 1. Building and Sustaining Capacity in Laboratory Networks (Magnuson *et al.,* 2014b) ▪Laboratory Resources for the Water Sector to Support Decontamination Activities (USEPA, 2012d) ▪EPA's ERLN website - http://www2.epa.gov/emergency-response/environmental-response-laboratory-network ▪EPA's WLA website - http://water.epa.gov/infrastructure/watersecurity/wla/

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CIPAC Issues and Recommendations Status			
Status	**Time Frame**	**Lead Agencies**	**Progress and Key Outputs**
Priority Issue 15: Health and Safety Assessment for Drinking Water and Wastewater Treatment Plant and Field Staff			
Recommendation 15.1 - Develop detailed, risk-based frameworks for health assessments of drinking water and wastewater treatment plant and field staff that are consistent in approach across all EPA regions and states			
In progress	Mid-term	CDC OSHA	In 2012, CDC held a meeting with relevant stakeholders to address this recommendation. The outcome from this meeting was a series of detailed, risk-based frameworks to be used for health assessment of affected staff.
Priority Issue 16: Overarching Decontamination Needs			
Addressed by other recommend-ations	N/A	N/A	Issue 16 describes overarching needs identified by the Working Group including: ▪addressing the needs of drinking water and wastewater utilities of all sizes ▪leveraging existing efforts ▪broadening assessment to international efforts ▪leveraging DHS national planning scenarios, where applicable. Because these needs were seen to affect and be part of other issues, no specific recommendations were put forth and progress is therefore reflected in key outputs for other recommendations.

III. CONCLUSIONS

The compiled information presented in this document indicates progress towards addressing the water security priorities set forth in the *Recommendations and Proposed Strategic Plan: Water Sector Decontamination Priorities* report. As detailed in Section II, a significant amount of work has been undertaken by various members of the Water Sector to further support decontamination research and policy needs, as well as communicate these efforts to Water Sector stakeholders. Of the 35 recommendations listed in the report, 23 are in progress and 3 have been identified as completed. As a result of work conducted by the Water Sector since 2008, many resources are now available or under development to address the recommendations. These resources address important data gaps within the Water Sector, including:

- providing guidance regarding decontamination, containment and disposal of contaminated water;
- planning documents to facilitate preparation and response to a contamination event;
- study results evaluating the persistence of target contaminants in water systems and the efficacy of treatment technologies and protocols;
- the availability of Web-based resources;
- and training.

Collectively, these key outputs represent a notable increase in the amount of information and data available to support Water Sector preparation, response and recovery from potential contamination incidents. If the agencies referenced within this report were not previously aware of each other's efforts, this report provides a thorough update with links to resources and the potential to identify areas of collaboration in the future. Through the release of this report and subsequent efforts, lead agencies may also identify additional ways to propagate and disseminate information effectively to water utilities and responders.

Although the numerous outputs described in Table 3 are concrete indications of progress, several recommendations remain unaddressed. Specifically, based on available information, 9 of the 35 recommendations are labeled "Not Started." These recommendations include developing supporting decontamination information and capabilities (10.6, 10.7, 13.1, 13.2), establishing decontamination and treatment methods and technologies (8.3), addressing policy decisions (1.1, 8.2, 12.1) and providing outreach and communications (6.1). Available resources and funding, as well as the existence of competing priorities, may have constrained the ability of lead agencies to fully address recommendations within the past 7 years. Following the release of this report, a discussion among involved agencies may also provide the opportunity to refine existing priorities and identify any new priorities that may have emerged since 2008. This dialogue would further enhance water security efforts as related to decontamination and recovery capabilities.

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