

A Roadmap for Recovery/Decontamination Plan for Critical
Infrastructure after CBRN Event Involving Drinking Water
Utilities: Scoping Study

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IMPORTANT INFORMATIVE STATEMENTS

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Contents

Foreword.....	iii
1. Background.....	1
2. Objectives.....	1
3. Tasks Completed.....	1
4. Results.....	2
5. Significance of Results.....	4
6. Recommendations for Future Work.....	4

Foreword

The objectives of this project were: (i) to identify gaps in drinking water utilities' recovery/decontamination plan for critical infrastructure after chemical, biological, radiological, and nuclear (CBRN) events; and (ii) to create a roadmap for developing guidelines to assist water utilities in planning recovery/decontamination actions. This project was built on a previous scoping study (CRTI-3780-2011-30UA-09) undertaken in partnership with the United States Environment Protection Agency (USEPA)'s National Homeland Security Research Center. The previous project compiled existing knowledge on potential CBRN contaminants, their persistence in drinking water distribution system (DWDS), and decontamination techniques available for the specific contaminants. Information on persistence of CBRN contaminants is useful for assessing the risks to the public and the consequences of drinking water infrastructure contamination. Information on the efficiency of decontamination options for specific contaminants can help improve capabilities of drinking water utilities in planning response and recovery for CBRN incidents.

Chemical, Biological, Radiological, Nuclear and Explosives Resilience Strategy for Canada (2011) provides the policy framework and guidance to create and maintain sustainable capabilities to prevent, prepare for, response to, and recover from complex CBRNE emergencies. The CBRNE Resilience Action Plan for Canada (2011) provides guidance for the development of jurisdiction-specific CBRNE action plans to build sustainable resilience to CBRNE events locally, regionally, and across Canada.

The Strategy and the Action Plan recognize the integral relationship between CBRN and hazardous materials (HazMat) emergency managements.

Environment Canada regulates environmental emergency planning at facilities for managing toxic and other hazardous materials. The role of the Emergencies Science and Technology Section (ESTS) at Environment Canada is to provide response support (scientific and technical) advice on environmental fate and effects, dispersion and trajectory modelling, cleanup and recovery for unplanned or deliberate releases of such substances.

The overall role of Environment Canada under the CSSP program is to facilitate the collection and provision of information in response to CBRN events.

1. Background

The vulnerability of drinking water distribution systems (DWDS) to deliberate CBRN contamination is one of the main concerns for regulatory agencies and water utilities around the world. While water itself can easily be treated, the elements of DWDS may become contaminated and remain a source of secondary contamination for water over a long period of time. DWDS elements are relatively easily accessible for intruders (e.g. through firefighting hydrants, clean water tanks, household service connections).

A recent study (CRTI-3780-2011-30UA-09) compiled available information and identified most persistent potential CBRN contaminants. As found, specific techniques are required for DWDS decontamination because the common procedures used for DWDS cleanup and disinfection are generally ineffective against persistent CBRN contaminants.

Recovery of DWDS after CBRN contamination is part of emergency management, along with three other components (prevention, preparedness, and response). Guidance documents are needed to support recovery planning process by identifying key issues to be addressed and the relevant information that is required.

The present project is related to the following CSS priorities:

CBRN: Terrorism Defeat-Threats and Capabilities;

CBRN2: Responder Requirements:

- Standardized practices, protocols, and common measures for laboratory and field work, testing, validation, transition to recovery, and related activities.
- Education, Training and Awareness materials.
- Enhanced best practices, processes, tools and techniques for rapid sharing geospatial information or other information to plan or take action to mitigate/respond/recover affected areas.

2. Objectives

The objectives of this project were to:

- identify gaps in planning decontamination activities after CBRN contamination for drinking water utilities;
- address the identified gaps by creating a roadmap to develop enhanced plans and guidelines on decontamination of critical drinking water infrastructure after CBRN events.

3. Tasks Completed

The following tasks were completed:

1. Conducting literature search on existing legislation, policies, guidance, and best practices in Canada and internationally related to recovery/decontamination of drinking water infrastructure after a CBRN incident.
2. Compiling available information and analyzing the information.
3. Identifying gaps in CBRN emergency management guidelines for the drinking water sector, with a focus on infrastructure recovery/decontamination planning guidelines.
4. Developing a road map for creating Canadian guidelines for the recovery/decontamination of critical drinking water infrastructure after CBRN events.

4. Results

Information was gathered from available open sources in terms of the existing legislation, policies, guidance, and best practices in Canada and internationally with a focus on recovery/decontamination after a CBRN incident in the drinking water sector. The information was analyzed to identify gaps and create a road map for developing relevant guidelines for Canada's drinking water sector. Key Canadian sources of relevant information and a summary of the analysis are given below. Detailed information, a list of information sources, references and links used in the study are provided in the Annex.

The *Emergency Management Act (2007)* (Minister of Justice: <http://laws-lois.justice.gc.ca>) sets out the roles and responsibilities for all federal ministers across the full spectrum of emergency management, including prevention/mitigation, preparedness, response and recovery, and critical infrastructure protection.

The Public Safety Canada (PSC) provides national leadership and a clear direction for emergency management and critical infrastructure protection. The following strategic documents have been published by PSC.

An Emergency Management Framework for Canada (2011)

National Emergency Response System (2011).

Emergency Management Planning Guide 2010-2011 (2010).

Chemical, Biological, Radiological and Nuclear Strategy of the Government of Canada (2005).

Chemical, Biological, Radiological, Nuclear, and Explosives Resilience Strategy for Canada (2011).

Chemical, Biological, Radiological, Nuclear and Explosives (CBRNE) Resilience Action Plan for Canada (2011).

National Strategy for Critical Infrastructure (2009).

Action Plan for Critical Infrastructure (2009).

Risk Management Guide for Critical Infrastructure (2010).

The federal level strategic documents serve as general guidelines for the implementation of the emergency management policies and mechanisms at the provincial level. So far, provincial governments have established a number of programs and issued guidelines to assist municipal and private sector organizations (e.g., water utilities) in emergency management. For example, the following documents have been issued in Ontario:

The Emergency Management and Civil Protection Act (2006).

Ontario Critical Infrastructure Assurance Program (OCIAP) (2011).

Hazard Identification and Risk Assessment for the Province of Ontario (HIRA) (2012).

Emergency Risk Management Workbook Ontario (2012).

Ontario Hazard Identification and Risk Assessment Workbook (2012).

Emergency Response Plan for Spill and Drinking Water Emergencies (2012).

Health Canada has issued *Guidelines for Canadian Drinking Water Quality* on behalf of the Federal-Provincial-Territorial Committee on Drinking Water. The guidelines provide standards on microbiological, chemical, physical, and radiological parameters of drinking water; and contain data on acceptable levels of contaminants and information on recommended analytical methods for water treatment/cleanup. The summary tables of these guidelines are available at Health Canada's website.

The following conclusions were made based on the information analysis:

- In Canada, an emergency management framework has been well established at all FPT levels.
- Government agencies and water utilities have already had significant mechanisms in place for managing a wide range of emergencies and disasters including natural disasters, epidemic diseases and accidental releases of toxic substances into the environment.
- A number of guidelines have been issued by FPT government agencies and Canadian Water and Wastewater Association to assist water utilities with emergency planning.
- The existing strategic documents and guidelines are mainly focused on preparedness, risk management, mitigation, and response components of the emergency management. The recovery/decontamination component has not been taken into account in the emergency management framework so far.
- At the provincial level, the existing hazard identification and risk assessment tools do not consider a CBRN-related intentional contamination of water sector facilities and infrastructure (e.g., DWDS) as a possible scenario.
- The current water sector emergency plans do not contain any specific measures regarding recovery/decontamination of infrastructure from CBRN events.

- Unlike in the US and EU, no national recovery mechanisms and guidelines on recovery/decontamination exist in Canada for major emergencies, including those with CBRN elements.
- There is a lack of integrated scientific and technical information on the persistence of CBRN contaminants in water infrastructure and available technologies for their removal.
- There is a need for guidelines to assist the water utilities with CBRN emergency planning.

5. Significance of Results

This scoping study compiled information on existing legislation, policies, mechanisms and tools regarding emergency management (particularly on the recovery/decontamination phase) in Canada and internationally related to the drinking water sector.

The project identified the current gaps existing in recovery/decontamination planning which should be a part of the emergency management for Canada's water sector.

By integrating information compiled in this study and the previous scoping study (CRTI-3780-2011-30UA-09); this study raised a concern on limited capabilities of Canadian drinking water utilities in preparedness of potential CBRN contamination incidents and management of the consequences of such emergencies.

The project suggested that the existing international experience, best practices and tools in recovery/decontamination planning can be implemented in Canada to fill the identified gaps and enhance the preparedness towards the CBRN contamination events.

The project also suggested future work and a road map to create guidelines to assist drinking water utilities with emergency planning, particularly in CBRN emergency management using existing emergency management mechanisms and structures.

6. Recommendations for Future Work

In view of the above gaps, planning for recovery/decontamination of critical drinking water infrastructure after CBRN events is needed. A roadmap for such planning is proposed for relevant authorities. It includes the following steps:

- Undertake an analysis of up-to-date key scientific and technical information on chemical, biological, and radiological contaminants of concern for water security. This should include both open and restricted information sources. It may require signing agreements with international organizations to get access to their databases (e.g. WCIT).
- Identify stakeholders that are directly responsible for water security and emergency management in the water sector in accordance with Canadian emergency management frameworks, current policy and regulations.
- Provide the relevant compiled technical information to stakeholders (e.g., FPT government agencies, drinking water utility professionals, scientific and security experts) using the *Critical Information Sharing Framework* and other available tools.

- Organize a survey and discussions among stakeholders within the Water Sector Network, National Cross-Sector Forum, and Federal-Provincial-Territorial Critical Infrastructure Working Group with focus on: (1) existing gaps in capability in recovery/decontamination and (2) scientific/technical aspects of the assessment of potential threats and consequences of intentional CBRN contamination of drinking water and water infrastructure.
- Based on the results of data analysis and stakeholder discussions, consider a revision of the list of potential threats for the water sector by incorporating the threat of CBRN contamination of water infrastructure.
- Develop guidelines to assist water utilities to incorporate CBRN specific aspects into the current policy framework and emergency management practices in Canada, taking into account the worldwide experience and best practices in CBRN emergency planning (including the recovery/decontamination phase).

The guidelines can be developed by authorized government agencies (e.g., PSC) by building on similar guidelines existing in the US and UK. It may require negotiations and agreements with the respective organizations in those countries regarding the use of their products. Those products should then be adapted to Canadian situations. In order to facilitate the access of required information and guidelines on CBRN emergency management, it is recommended to establish a closer partnership with USEPA and UK GDS, for example by participating in those organizations' ongoing and future water security projects.