

Water Sector Emergency Preparedness and Response Standards & Resources – How an All-Hazards Approach Supports Seismic Preparedness and Response

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ABSTRACT

This paper addresses the standards and resources that have been developed to support an all hazards preparedness planning and response framework for seismic hazards in the United States. The American Water Works Association (AWWA) has developed several standards that support the water sector to be prepared to respond to incidents, regardless of the type of hazard. This all-hazards approach enables utilities to efficiently and effectively prepare for and respond to the vast array of utility specific hazards, vulnerabilities, and consequences that they may face. Many of these standards can help utilities form a strong foundation for a seismic specific preparedness and response program. This presentation will provide an overview of these standards and explain their applicability to seismic events. The standards to be presented include: AWWA J100-10 (R13) Risk and Resilience Management of Water and Wastewater Systems (RAMCAP); AWWA G430-14 Security Practices for Operation and Management; AWWA G440-11 Emergency Preparedness Practices.

To support the implementation of these standards, the water sector in the United States has implemented a number of preparedness and response practices through mostly voluntary efforts. Many of these practices have been supported by tools, guidance and training developed by the federal government, state governments, water associations, individual utilities themselves, and other water sector entities. These products support an all-hazards approach that enables utilities to efficiently and effectively prepare for and respond to the vast array of utility specific hazards, vulnerabilities, and consequences that they may encounter. Many of these resources can help utilities form a strong foundation for a seismic specific preparedness and response program. This paper will provide an overview of the available tools and resources and explain their applicability to seismic events.

INTRODUCTION

Standards play a critical role in water utility planning and operations. Standards provide a baseline and target for performance to guide how a utility approaches different issues. While used by water utilities for decades and longer, most recently the water sector has developed standards that support an all-hazards approach to emergency preparedness and response. Led by AWWA, and using input from expert advisory committees, these standards were developed to fill a critical gap in the water sector's standards portfolio. These standards provide a flexible and adaptable approach to preparedness and response that are critical to a more resilient water sector. While developed with

an all-hazards perspective, they are also very valuable for utilities with concentrated efforts on individual hazard types such as seismic events.

AWWA J100-10 (R13) RISK AND RESILIENCE MANAGEMENT OF WATER AND WASTEWATER SYSTEMS (RAMCAP)

The J100 standard was developed by AWWA to provide the water sector with a technically sound and consistent methodology to identify, analyze, quantify, and communicate the risks to operations from natural or manmade hazards (Morley, 2010). While several risk assessment methodologies were implemented by the water sector after the September 11th terrorist attacks, the J100 take an all hazards approach and provides a resilience assessment feature to enhance water sector preparedness and response. The three main upgrades include guidance for calculating the probability of an attack, calculating the probability of a specific natural hazard, and guidance for calculating asset and utility resilience.

The J100 standard is based on the seven step RAMCAP process (Morley, 2010).

1. Asset Characterization – What assets do I have and which are critical?
2. Threat Characterization – What threats or hazards may occur at my facility?
3. Consequence Analysis – What happens to my assets if a threat happens and how much money, lives, or injury damages will occur?
4. Vulnerability Analysis – What are my vulnerabilities that make a threat more likely to occur?
5. Threat Analysis – What is the likelihood of an incident at my facility?
6. Risk/Resilience Analysis – Risk is a combination of consequence, vulnerability and threat. Resilience is a combination of service outage, vulnerability, and threat.
7. Risk/Resilience Management – How you my utility reduce risk and increase resilience, and at what cost/benefit?

AWWA G430-14 SECURITY PRACTICES FOR OPERATION AND MANAGEMENT

The G430 standard defines the minimum requirements for a proactive security program at a drinking water or wastewater facility. It addresses key elements including worker safety, public health, public safety and confidence. The G430 standard is based upon the Key Features of An active and Effective Utility Security Program, which was originally developed by a workgroup formed by EPA's National Drinking Water Advisory Committee. The standard addresses many key areas for utilities to consider when developing their preparedness and response programs.

The elements addressed by the standard include the following (McLaughlin, 2010).

1. An explicit commitment to security – This would include something as simple as including security as part of a utilities vision, mission, or strategic planning efforts, or committing resources to a security program.

2. Maintaining a security culture – Does the utility maintain an active security program?
3. Defined security roles and employee expectations – Does utility staff know their role and have they been trained?
4. Maintaining an up-to-date vulnerability assessment – The standard recommends a specific timeline and triggers for when a vulnerability assessment should be updated.
5. Dedicated resources to security and implementation of key security priorities – Not only does the utility spend the time to identify its security issues, it also spends resources to address key vulnerabilities.
6. Access control and intrusion detection – Cyber security threats are growing and need to be a part of any security program.
7. Contamination, detection, monitoring and surveillance – The threat of intentional contamination is still active, and utilities need to take steps to prepare and respond to this threat.
8. Information protection and continuity – Utilities need to take steps to protect sensitive utility information, but also maintain access to key documents should there be an incident that disrupts normal means of access.
9. Design and construction – Security needs to be an explicit element in any new construction or utility asset.
10. Threat-level based protocols – EPA’s small and medium sized utility guidance for emergency response planning includes protective measures utilities should take based on the level of threat currently being experienced.
11. Emergency response and recovery plans – These plans need to be maintained, updated, and exercised.
12. Internal and external communications – The utility needs to know who to call and how to communicate with key people during an emergency. This includes its own employees.
13. Partnerships – This includes participating in mutual aid and assistance networks, such as WARN.

The USEPA maintains a webpage of helpful utility resources that can support implementation of G430. A number of tools and guidance documents exist for each element of G430 that utilities can utilize. Those resources can be found here: <http://water.epa.gov/infrastructure/watersecurity/features/utilitiesresources.cfm> .

AWWA G440-11 EMERGENCY PREPAREDNESS PRACTICES

Once a utility has identified their risks, they need to implement and maintain an emergency preparedness and response program to address these risks. G440 establishes the minimum requirements for a utility when developing these preparedness programs. Some of the elements overlap with G430, like maintaining an explicit commitment to emergency preparedness and making employees aware of this commitment and programs that support it. G440 adds a level of

specificity to some of the elements of G430. For example, utilities should not only perform a risk assessment, but this should be updated periodically when major systems changes or threats to the system occur, or no less than every 5 years. G440 identifies several types of preparedness plans, and recommends these plans are updated a minimum of once a year. It also states these plans should follow the National Incident Management System concepts and incorporate the Incident Command System into these plans. G440 addresses internal and external communication related to preparedness so customers and response partners are aware of the utilities preparedness plans. Another element in G440 is training, including exercises. Utilities should be trained on their role in the preparedness plan, and this training should be offered as a refresher at least once a year. The utility should have an exercise once a year, and an operation exercise with response partners every three years. The exercises should include an after-action report to ensure follow up actions to improve the preparedness plans are followed up on. Key partners should be identified and utilities should participate in mutual aid and assistance programs, such as a state based Water and Wastewater Agency Response Network (WARN).

While some of these elements may seem fundamental to some more advanced utilities, documenting these basic preparedness standards is a key action for the water sector. Following this standard should provide for a more resilient and robust utility if they were to be impacted by a seismic event.

RESOURCES AND PROGRAMS TO SUPPORT WATER SECTOR SEISMIC PREPAREDNESS

PLANNING TOOLS

Several guidance documents exist that help utilities develop plans to support their preparedness, response and recovery to seismic events. EPA offers two different guidance documents for developing emergency response plans, one tailored to large systems, and the other for small systems. One of the key elements of this guidance is the development of incident-specific emergency action procedures (EAPs). While the base part of the emergency response plan will contain information such as emergency contacts, partners, available equipment, chain of command, communication procedures, and basic system information, EAPs provide a plan of how to implement the plan for specific emergencies. Having an EAP for seismic events is something every utility with seismic risks should consider.

Another type of plan that utilities should consider for their seismic preparedness is a consequence management plan. Consequence management planning compliments other utility preparedness and response plans. Rather than focusing on an individual hazard, a consequence management plan focuses on the resulting problems or consequences that result from that hazard. Consequences that utilities may want to consider including service disruptions, infrastructure damage, loss of revenue or economic impacts, loss of power, and impacts to the workforce. Seismic events have the potential to cause many different consequences, but other disasters will also result in similar

impacts. By taking a consequence based approach, utilities may be able to plan more efficiently because preparedness measures for these consequences will support many different disaster types.

Planning for recovery is also very important and guidance is available for utilities in the form of business continuity planning (BCP). BCPs help utilities maintain or restore normal financial, managerial, and functional operations after an incident. A few key elements of a BCP related to seismic events include: access to vital records, backup operating facilities, backup customer billing procedures, emergency acquisition protocols, and teleworking arrangements for displaced employees.

Key Resources:

[Emergency Response Plan Guidance for Small and Medium Community Water Systems](#)

[Large Water System Emergency Response Plan Outline: Guidance to Assist Community Water Systems in Complying with the Bioterrorism Act](#)

[All-Hazard Consequence Management Planning for the Water Sector](#)

[Business Continuity Planning for Water Utilities: Guidance Document](#)

RESPONSE TOOLS

After a seismic event, a utility may be short of staff, equipment, or other resources. One of the best ways to acquire support is through mutual aid and assistance. Essentially, prior to an emergency utilities make arrangements with other utilities to provide support to one another should they need it. This is extremely common in the fire and law enforcement sectors and has been steadily growing with the water sector within the United States since Hurricane Katrina in 2005. Referred to as WARNs, Water and Wastewater Agency Response Networks, exist in every state, but one, and ensure a more immediate and coordinate response to incidents.

Sometimes when an emergency happens, it is good to have a reminder of what actions are needed. EPA has created incident specific checklists, including one for earthquakes, which provides key examples of actions to take in responding to a seismic event. These checklists, along with other resources have been added to a smart phone application called, Water Utility Response On-The-Go. From a user's smart phone or tablet, they can access their key contacts, emergency response forms, and weather forecasting information. This is one of the first water utility specific disaster preparedness and response phone applications.

After a seismic event, there may be a disruption to water service. Although customers have been advised to have an emergency supply in their homes, many people will require water, especially if the disaster lasts for more than a few days. AWWA has developed a helpful guidance manual, *Planning for and Emergency Water Supply*, which contains information utilities can use to provide alternative water service during prolonged outages. One of the key takeaways from this document is that coordination with local and state emergency management agencies and public health

departments is key to a successful operation. Also, planning for where people can get the water and how they will receive the water is also critically important. Some utilities have had practice drills to access the effectiveness of their alternative water delivery plans.

One key customer that relies on water utilities to keep operations going are hospitals. A guidance document has been created, *Emergency Water Supply Planning Guide for Hospitals and HealthCare Facilities*, to specifically address alternative water supplies for hospitals. This document contains an extensive list of alternative water supplies hospitals could potentially consider for use during normal supply disruptions. Case studies are also presented to show how other facilities have dealt with this issue.

Key Resources:

[Utilities Helping Utilities: An Action Plan for Mutual Aid and Assistance Networks for Water and Wastewater Utilities](#)

[Water Sector Incident Action Checklist – Earthquake](#)

[Water Utility Response On-The-Go](#)

[Planning for and Emergency Water Supply](#)

[Emergency Water Supply Planning Guide for Hospitals and HealthCare Facilities](#)

LEARNING FROM RECENT INCIDENTS

The AWWA, *Superstorm Sandy After-Action Report*, identifies a number of key lessons to improve on for future incidents. One of the key lessons was the need to increase coordination with the emergency services sector. In order to access resources to recover in a timelier manner utilities need to be connected to this group. This is particularly important for backup power and fuel, personnel access to utility facilities, and coordination on damage assessments. A guidance document was created to help support this improved coordination, *Coordination of the Water and Emergency Services Sectors: An Important Step to Better Response*, which provides easy to reference steps, case studies, and another mechanisms to improve this coordination. One key coordination step can be to have a water sector representative participate in the emergency management agencies emergency operations center. This help ensure the water sector is consulted on important decisions impacting their operations.

Key Resources

[Superstorm Sandy After-Action Report](#)

[Coordination of the Water and Emergency Services Sectors: An Important Step to Better Response](#)

CONCLUSION

This paper highlights the standards and just a few of the many resources that exist for water utilities to support their preparedness to seismic events. Capacity to implement these programs varies across utilities, with some being more sophisticated in their preparedness than others. Even without a sophisticated program, implementing actions from just a few of these resources will help a utility's preparedness to seismic events.

WORKS CITED

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