



Awwa
Research
Foundation

Awwa Research Foundation

6th Annual Clean and Safe Drinking Water Workshop

Gander, Newfoundland
March 20-22, 2007

HISTORY

- Awwa Research Foundation was established in 1966 as an independent research organization
- 40th Anniversary in 2006!
- Board of Trustees appointed by AWWA, AMWA, and NAWC including a Canadian trustee (Carl Yates)

AwwaRF Mission:
**Advancing the science
of water to improve the
quality of life.**

AwwaRF Research

- Total research value - > \$ 412 million
- 2006 research value - \$24 million
- 1033 research projects
 - 710 completed (693 published)
 - 323 ongoing
 - Average project cost is > \$350,000



AwwaRF's Core Directives

- Sponsoring research
- Developing knowledge
- Promoting collaboration

AwwaRF Subscribers

- Close to 900 utilities
- 53 consultants
- 16 manufacturers

Canadian Subscribers

- Water Utilities – 35
- Consulting Firms – 8
- Manufacturers - 2

Subscriber Demographics (U/C/M)

- British Columbia - 3/3/0
- Alberta – 3/1/0
- Saskatchewan – 2/0/0
- Manitoba – 1/0/0
- Ontario – 21/4/2
- New Brunswick – 3/0/0
- Nova Scotia – 2/0/0



Projects Awarded & Value

• British Columbia – 1	\$ 329,483
• Alberta – 20	\$ 6,719,876
• Saskatchewan – 0	\$ 0
• Manitoba – 0	\$ 0
• Ontario – 19	\$ 7,485,197
• New Brunswick – 0	\$ 0
• Nova Scotia – 2	\$ 537,667
	\$ 4,062,223

**AwwaRF research is
responsible for the
introduction of new treatment
technologies (ozone,
membranes, ultraviolet
disinfection) now being used
by water utilities, i.e., St
John's**



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Emergency Response, Recovery, and Business Continuity Planning for Water Utilities: Review of Approach, Findings, and Outputs

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Emergency Response and Recovery Planning for Water Systems: A Kit of Tools

Subject Area:
Efficient and Customer-Responsive Organization

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Project Objective

Review, critique, and improve the state-of-the-practice of disaster response, recovery, and business continuity for drinking water utilities by providing usable planning tools to update existing capabilities and address new contingencies, such as domestic terrorism.

Project Drivers

- Changes in utility operational environment (domestic terrorism)
- New disaster business models
- Emergency communications, disaster response, extreme events (science and technology development)
- Business continuity planning

Some Overarching Findings

- Vulnerability assessment and emergency planning are ongoing exercises
- Domestic terrorism introduces an element of unpredictability to water sector emergency response planning
- Existing water utility emergency plans are uneven in their reliance on specified emergency scenarios; scenarios tend not to drive resource needs, action priorities, etc.
- Most emphasize training, but implementation of programs/exercises is widely variant

Some Overarching Findings (continued)

- Most utilities have not taken steps to prioritize customer needs, develop corresponding thresholds of service disruption
- Most emergency plans do not address differential impacts across stakeholder groups
- Many plans are voluminous, “usability” under stressful conditions questionable
- Need to budget for emergency response activities



Key Gaps in Water Utility Emergency Planning

- Uneven utilization of reliance on formal emergency scenarios
- Generic identification of emergency response stakeholders and their differing roles
- Bringing the plan to “life”
- Emergency communications
- Approaching service disruption/restoration prioritization



Key Gaps in Water Utility Emergency Planning (continued)

- Plan usability
- Training
- Balancing SOPs with operator “mindfulness”
- Utilization of appropriate technology
- Facility- and/or component-specific procedures

Addressing Gaps: A Kit of Tools

Framework



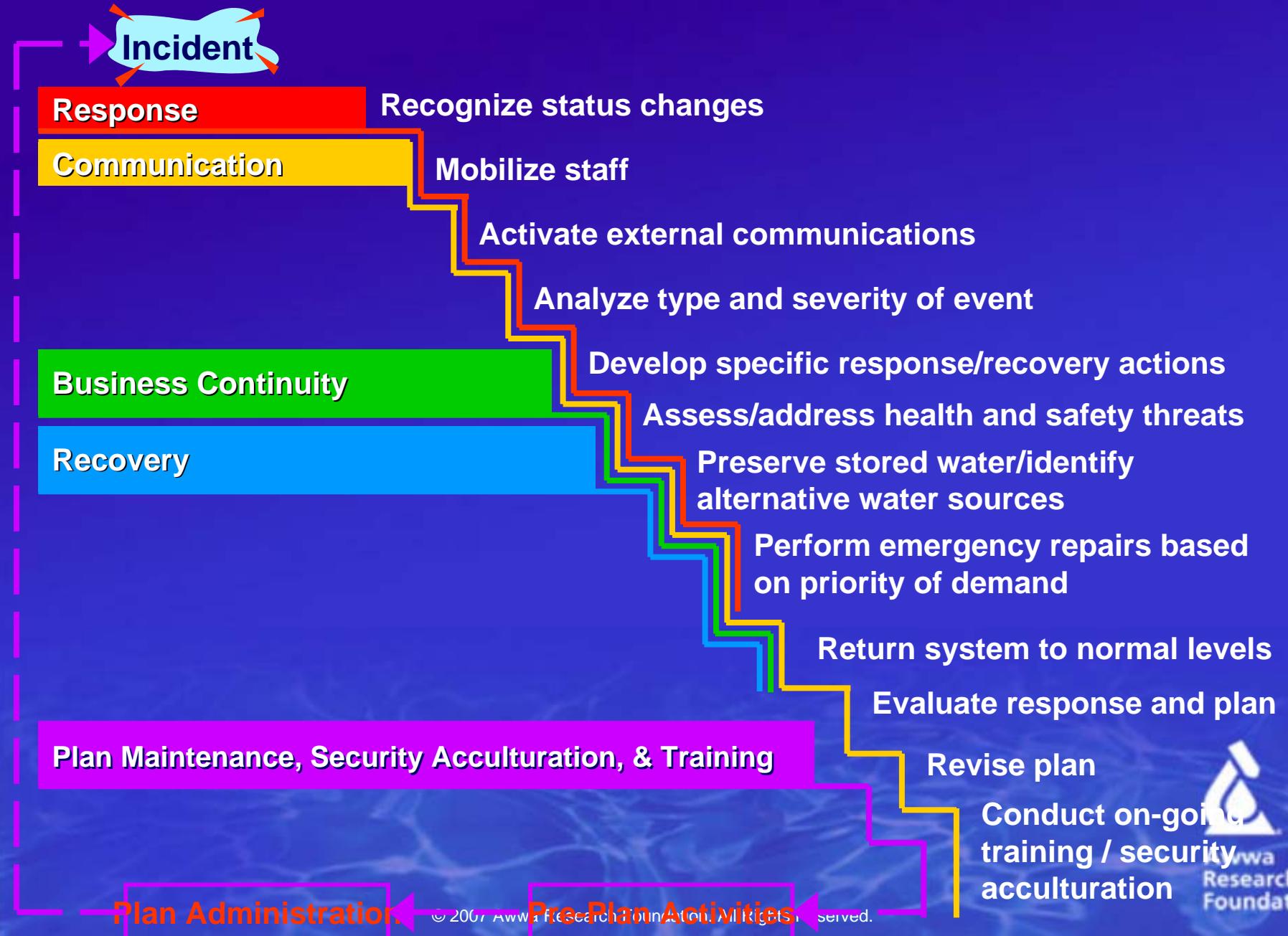
**Self Assessment Questions organized by
“Action Areas”**



**Corresponding, specific, “how to”
resources**



Emergency Response Planning Framework (A 12 step sequential logic)



Twelve Action Areas

- 1. Recognize status changes and activate plan**
- 2. Mobilize staff**
- 3. Activate external communications**
- 4. Analyze type and severity of event**
- 5. Develop specific response and recover actions**
- 6. Assess and address health and safety issues**

Twelve Action Areas

7. Preserve stored water and identify alternative water sources
8. Perform emergency repairs based on priority of demand
9. Return system to normal levels
10. Evaluate response and plan
11. Revise plan
12. Ongoing training and security acculturation

Self-Assessment Questions

E.g., Action Area 7 “Preserve stored water and identify alternative water sources...

- A. Does the plan (or annex) include a list of options for short term alternate supplies of drinking water, characterizing both type (e.g., bottled, bulk, untreated) and source (e.g., local government agencies, local retailers, military assets, neighboring water utilities)?
 - o Short Term Alternate Domestic Water Supplies
 - o Short Term Alternative Water Supplies
 - o Short Term Alternative Water Supply Options
- B. Is it clear that alternate supplies are substantiated through current mutual aid agreements, contractual arrangements, or other mechanisms?
 - Yes / No

Self-Assessment Questions (continued)

- C. Does the plan include information on provincial and federal agencies that may be called on if local sources of water prove unavailable or insufficient?**
 - Short Term Alternate Domestic Water Supplies
- D. Does the plan contain fact sheets and/or instructions that consumers can use to identify household sources (e.g., pipes, hot water tanks) of emergency water supply?**
 - Short Term Alternate Domestic Water Supplies
 - Water Storage
- E. Does the plan include fact sheets or other public guidance for water purification?**
 - Disinfection of Unsafe Drinking Water
 - Public Guidance on Water Purification

Zeroing in on the Utility's Specific Need

- Action Area 7, Question D: Does the plan contain fact sheets and or instructions that consumers can use to identify household sources (e.g., pipes, hot water tanks) of emergency water supply?
- Short term alternative supply
- Water storage

Excerpted Best Practices

Guidance for Action Area 7 – Preserve Stored Water and Identify Alternative Water Sources (cont'd)

D. Does the plan contain fact sheets and/or instructions that consumers can use to identify household sources (e.g., pipes, hot water tanks) of emergency water supply?

Potential Household Sources of Emergency Water Supply

In conjunction with providing an alternate water supply, the water utility should consider a public awareness program providing guidance to consumers on finding alternate water supply sources around the home, purifying water, and maintaining an emergency supply of water. This information could be included in pamphlet form along with the utility bill or with the CCR. Table 5-7, 5-8, and 5-9 contain information from FEMA that could be provided to the public **after** the decision has been made regarding the type of notice to post (FEMA, 2003c). This information can be provided to aid the public in meeting the restrictions of any “boil water,” “do not drink,” or “do not use” notices. Any notice to the public should include only the options listed in the following tables that are appropriate for the particular situation. For example, most of the purification techniques are only appropriate for biological contamination and would not be provided to consumers in the case of chemical or radiological contamination.

Alternate Water Sources in the Home

Any of the listed sources may contain contaminated water if filled in the timeframe of the contamination incident.

- Ice cubes
- Chilled water stored in the refrigerator
- Hot water tank – Turn off the power and let the tank cool. Place a container underneath and open the drain valve at the bottom of the tank. Do not turn the tank on again until water services are restored.
- Toilet tank – The water in the tank (**not the bowl**) is safe to drink unless chemical treatments have been added to the tank water, such as drop-in cleaners.
- Water pipes – Release air pressure into the plumbing system by turning on the highest faucet in the house; then drain the water from the lowest faucet.
- Rain water, spring water, and water from streams, ponds, rivers, lakes, and garden hoses – *Purify these water sources before use.*

Caution: Avoid water from waterbeds as a source for drinking water. Pesticidal chemicals are in the plastic casing of the bed and chemicals have probably been added to the water to prevent the growth of algae, fungi, and bacteria. The water is safe only for hand washing and laundering.

Source:

EPA. *Response Protocol Toolbox: Planning for and Responding to Drinking Water Contamination Threats and Incidents – Module 5: Public Health Response Guide*. Interim Final – December 2003
http://www.epa.gov/safewater/security/pdfs/guide_response_module5.pdf
pp. 53-55



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Security Practices Primer for Water Utilities

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Awwa Research
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Advancing the Science of Water®



Security Practices Primer for Water Utilities

Subject Area:
Efficient and Customer-Responsive Organization

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Critical Infrastructures

- **Emergency services and local government (hospitals, law enforcement, fire fighters)**
- **Energy services (electricity, gas, oil, nuclear)**
- **Transportation (trucks, railroads, airlines)**
- **Banking and monetary services**
- **Chemical industry**
- **Water**
- **Defense industries**

Project Objective

- Provide utility managers and the water community with a comprehensive, easy-to-use primer on security-related policies and procedures

Guidance in Five Major Categories

- Human resources
- Physical and Operational Security
- Internal and External Coordination
- Technical and Contamination Response
- Information and Communication Security

Research Approach

- **Review of published literature on widely used security practices**
- **Participants included five water utilities and US EPA**
- **Survey of 82 water utilities**
- **Survey of 27 of other industries with proven security practices**



Utility Strengths

- Visitor/contractor access control
- Public tour policies
- Threat levels and associated response
- Chemical delivery and testing procedures

Utility Strengths

- Coordination with external agencies, i.e. law enforcement
- Response plans for threatened or actual contamination events
- Cyber security plans and policy

Utility Weaknesses

- Employee background checks practices
- Employee security training
- Employee safety procedures in the event of a security incident
- Package/mail delivery screening

Utility Weaknesses

- Coordination with the health and medical community and pharmacies
- Neighborhood watch programs
- Information and communications security

Observations

- **Emergency procedures and security plans to be a long-term priority**
- **Written plans and procedures should model those successfully implemented by other water utilities**
- **Training is necessary to ensure the development and implementation of effective emergency and security plans**



Security Implications of Innovative and Unconventional Water Provision Options

Project #2924
Subject Area:
High-Quality Water

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Project Objectives

- **Provide utilities with evaluation of the practicalities of alternative water supply provisions**
- **Characterize pros and cons of unconventional water supply options**

Key Findings

- Point of Use (POU) highly protective against infectious/acute agents but time logistics limit applicability
- POU and Point of Entry (POE) effective against contaminants of greatest concern can mitigate risk when installed by consumer

Key Findings

- POU/POE using a train (including RO, GAC, and UV) is an excellent package but relatively costly at the household level
- POU/POE response to a terrorist threat unlikely with system flushing and bottled water more protective

Key Findings

- Large-scale POE for selected institutions to protect patients and health care staff is a reasonable approach
- POU/POE might be favorable when a system contaminant cannot be removed by flushing, is a chronic toxicant, or has detectable taste and odour.

AwwaRF Reports

- Free to AwwaRF subscribers
- Most can be purchased from AWWA
- **www.awwarf.org** for full array of AwwaRF reports (1000+)