Water Sector Coordinating Council Strategic Roadmap

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Executive Summary

Of all the critical infrastructures, the security of the drinking water and wastewater industries (water sector) have the most immediate and pervasive impact upon the public's health and welfare.[1] Accordingly, an unprecedented level of industry-government cooperation is necessary to effectively plan, prepare, respond, and recover from terrorist attacks and natural disasters.

While industry representatives have expended considerable effort to participate in the full range of infrastructure protection activities associated with mitigating risk in the Nation's water sector—and achieved substantial progress in doing so—there is a sense that progress may be too slow and the response may be incomplete. A comprehensive strategy that streamlines and drives the efforts of industry and government is needed to prepare for the needs of tomorrow.

> "One of the challenges we face is...defining what it means to be prepared, so as to transform awareness into action."
>
> — *Benjamin H. Grumbles, Assistant Administrator for Water, U.S. EPA, The CIP Report, October 2007*[2]

An Urgent Need

Infrastructure protection is a shared responsibility; the Water Sector Coordinating Council (WSCC) represents the industry side of the water sector's industry-government partnership. The WSCC provides the means to quickly bring together sector leaders and essential resources when needed to address critical issues and act quickly and decisively. However, implementing the escalating multitude of security improvements required by homeland security-related national strategies, presidential directives, and drinking water and wastewater environmental laws may soon overwhelm WSCC members, who volunteer their time and resources. The urgent need to operate efficiently and focus on the priority issues of the water sector has prompted the WSCC to develop a unified strategy.

Industry Leadership

WSCC efforts have produced this *WSCC Strategic Roadmap*, which presents a vision and supporting framework of goals and tactics for securing the water sector over the next 12 months. This strategic framework enables industry and government to align their programs and investments to improve critical infrastructure protection in an expedient and efficient manner. This strategic roadmap integrates the insights and ideas of WSCC members, owners and operators, and associations who met during workshops held in February and May 2008.

The Vision

By implementing this Strategic Roadmap, the WSCC believes that the sector can uphold its vision for security:

> The water sector's security vision is a secure and resilient drinking water and wastewater infrastructure that provides clean and safe water as an integral part of daily life.

This vision assures the economic vitality of and public confidence in the Nation's drinking water and wastewater through a layered defense of effective preparedness and security practices in the sector.[3]

A Strategic Framework

The WSCC will pursue the following strategic goals in an effort to realize the sector's vision for security. These goals will drive development of protective programs and measures of success.

Sustain protection of public health and the environment. The WSCC aims to help water sector utilities complete and exercise consequence management and security preparedness plans.

Recognize and reduce risks in the water sector. To better inform decision makers on the appropriate levels and allocation of risk mitigation

Strategic Roadmap Scope

This Strategic Roadmap considers all variables for improving the preparedness and security practices in the sector, including:

- Water and wastewater infrastructures
- Physical, human, and cyber applications
- Full spectrum of protective activities: prevention, detection, response to, and recovery from terrorist attacks, other intentional acts, natural disasters, and other hazards
- Priority security issues for the WSCC
- One-year time frame

measures, the WSCC will facilitate the exchange of screened, validated, and timely vulnerability and threat information among sector partners.

Maintain a resilient infrastructure. The WSCC will facilitate the completion and practice of business continuity and emergency response plans to optimize the business operations of water sector utilities and ensure their economic vitality, as well as the communities they serve.

Increase communication, outreach, and public confidence. To foster public confidence, the WSCC will aid in the development of crisis communication plans and collaborative emergency preparedness and incident response networks.

Top Priority Activities

The WSCC believes the following top priority actions must be pursued to significantly mitigate risk in the water sector:

Top Priority Activities (in alphabetical order)

- Align security partner (i.e., U.S. Environmental Protection Agency [EPA] and Department of Homeland Security [DHS]) priorities with water sector needs.
- Develop strategy for managing government (i.e., EPA, DHS) workload.
- Engage with local emergency managers.
- Maximize response to Critical Infrastructure Partnership Advisory Council (CIPAC) Metrics Survey.
- Promote to government a flexible and scalable approach to the Risk Assessment Methodology for Critical Asset Protection.
- Provide guidance on business continuity/continuity of operations planning in the water sector.
- Provide guidance on consequence management plan detection of contamination protocols.
- Provide guidance on water and wastewater utility responder communications.

The WSCC plans to take immediate action and execute these top priority activities. On an annual basis, the WSCC will refine and adapt its security efforts to accelerate progress toward a more resilient water sector today and in the future.

I. Introduction

With the publication of this document, the drinking water and wastewater industries (water sector) continue a process begun decades ago to protect human health and the environment. This document applies the framework of Sector-Specific Plan (SSP) goals and objectives to secure critical infrastructures in the water sector.

Infrastructure protection is a shared responsibility; the Water Sector Coordinating Council (WSCC) represents the industry side of the water sector's industry-government partnership. As shown in Table 1.1, the WSCC provides the means to quickly bring together sector leaders and essential resources when needed to address critical issues and act quickly and decisively. However, implementing the escalating multitude of security improvements required by the National Infrastructure Protection Plan (NIPP) and other homeland security-related national strategies, presidential directives, and drinking water and wastewater environmental laws may soon overwhelm WSCC members, who volunteer their time and resources.

To streamline and drive ongoing and future efforts, the WSCC developed this *WSCC Strategic Roadmap*. The roadmap focuses on the highest priority activities needed to improve the security of the water sector during the years 2008–2009. The roadmap content is the result of two meetings held by members of the WSCC Strategic Planning Working Group (SPWG). For more information on the strategic roadmap development process, please refer to Appendix A.

Purpose

This strategic roadmap builds on existing government and industry efforts to improve the security of the water sector. The purposes of this strategic roadmap are as follows:

- Define a consensus-based strategy that articulates the priorities of owners and operators in the water sector to manage and reduce risk.
- Produce an actionable path forward for the WSCC to improve the security, preparedness, resilience, and response/recovery of the water sector in 2008–2009.

Table 1.1 WSCC Takes Action, Provides Results

WSCC Takes Action, Provides Results

In September 2004, the WSCC was formed by eight of the preeminent water and wastewater organizations: American Water Works Association (AWWA), AWWA Research Foundation (AwwaRF), Association of Metropolitan Water Agencies (AMWA), National Association of Clean Water Agencies (NACWA), National Association of Water Companies (NAWC), National Rural Water Association (NRWA), Water Environment Federation (WEF), and Water Environment Research Foundation (WERF). The WSCC consists of 16 owner/operator representatives and eight association staff. All members are volunteers and have no budget provided specifically for WSCC initiatives.

The WSCC has taken strides to mitigate risk in the water sector. To date, the WSCC has developed several key documents:

- *Water Sector Coordinating Council; The First Eighteen Months; input to the 2007 Water Sector Annual Report*
- *Recommendations of the Critical Infrastructure Protection Advisory Council (CIPAC) Metrics Workgroup for Water*, WSCC CIPAC Metrics Workgroup
- *Roadmap to Secure Control Systems in the Water Sector*, WSCC Cyber Security Working Group

The WSCC has also provided great support to the development of the following documents and programs: NIPP, Water SSP, National Response Framework, Water/Wastewater Agency Response Network (WARN), Pandemic – DHS Annex, Credentialing – National Incident Management System (NIMS) Public Works, and Water Contaminant Information Tool.

- Guide efforts by the WSCC to plan, develop, and implement water security measures.
- Promote industry-government partnership and collaboration to effectively and efficiently implement security throughout the water sector.
- Encourage extensive engagement among key stakeholders to accelerate security advances throughout the water sector.

Scope

The strategic roadmap aims to provide a comprehensive strategy to address the most urgent needs—including physical, human, and cyber elements—for mitigating risk in the water sector. It is consistent with the SSP risk management framework and full spectrum of protective activities: prevention, detection, response to, and recovery from terrorist attacks, other intentional acts, natural disasters, and other hazards as defined in the NIPP. This roadmap covers goals, tactics, and activities over the next 12 months. Security activities encompass planning, guidance documents, outreach, training, risk assessment tools, metrics, and implementation.

Strategic Roadmap Organization

The remainder of this document is organized as follows:

- Section II identifies top priority activities that emerged from the strategic roadmapping process and outlines the key action plans to address those priorities.
- Section III describes a process for turning the elements of the strategic roadmap into actions and proposes the main implementation steps, including: (i) socialize strategic roadmap, (ii) form Top Priority Teams, (iii) implement top priorities, (iv) communicate results, and (iv) sustain momentum.
- Section IV provides water sector contacts to find more information about this strategic roadmap.
- Appendix A describes the strategic roadmapping process in greater detail.
- Appendix B discusses the fundamental trends driving water sector security that the WSCC must consider while preparing for the future, including: (i) utility resources, (ii) cross-sector interdependencies, (iii) legislation and policy, (iv) public awareness and outreach, (v) owner/operator business environment, and (vi) sector-wide issues.
- Appendix C describes a comprehensive framework for water security, outlining the sector's vision and goals, including: (i) sustain protection of public health and the environment; (ii) recognize and reduce risks in the water sector; (iii) maintain a resilient infrastructure; and (iv) increase communication, outreach, and public confidences.

II. Top Priority Activities

To embark on its water sector planning and preparedness efforts, the WSCC has set eight top priority activities out of the more than 50 needed activities (listed in Appendix C) identified by the working group. The working group established the following criteria for selecting priority activities:

- Priority activities must be aligned with the WSCC's mission.
- Priority activities should result in a significant and needed contribution to the water sector's security posture.
- Priority activities should have a high probability of successful implementation within a reasonable timeframe (about one year) from project initiation.

The WSCC believes these top priority actions must be pursued to significantly mitigate risk in the water sector. If achieved, these activities together will strengthen the sector's ability to anticipate security incidents, plan for effective response and recovery, and initiate partnerships that facilitate a comprehensive approach to preparedness, prevention, and response.

WSCC Mission

To serve as a policy, strategy, and coordination mechanism and recommend actions to reduce and eliminate significant homeland security vulnerabilities to the water sector through interactions with the Federal government and other critical infrastructures.

The top priority activities for the WSCC are listed in Table 2.1. A series of one-page action plans for each are shown on the following pages. Each action plan provides a more detailed description of the goal for each priority; identifies the key challenges addressed by the activity; articulates the benefits of the WSCC's involvement; and provides preliminary lists of tasks, potential partners, key milestones, and immediate next steps. The WSCC can use these plans to take immediate action and accelerate progress toward a more resilient water sector.

Table 2.1 Top Priority Activities for the Water Sector

Top Priority Activities for the Water Sector (in alphabetical order)
▪ Align security partner (i.e., U.S. Environmental Protection Agency [EPA] and Department of Homeland Security [DHS]) priorities with water sector needs.
▪ Develop strategy for managing government (i.e., DHS, EPA) workload.
▪ Engage with local emergency managers.
▪ Maximize response to Critical Infrastructure Partnership Advisory Council (CIPAC) Metrics Survey.
▪ Promote to government a flexible and scalable approach to the Risk Assessment Methodology for Critical Asset Protection (RAMCAP).
▪ Provide guidance on business continuity/continuity of operations planning in the water sector.
▪ Provide guidance on consequence management plan detection of contamination protocols.
▪ Provide guidance on water and wastewater utility responder communications.

Align security partner (i.e., EPA, DHS) priorities with water sector needs.

Factor sector needs into security partner (i.e., EPA, DHS) priorities to ensure resources are adequate for maintaining the resilience of the water sector critical infrastructures.

Background

Many agree that the cost of implementing adequate security measures across the water sector could cost billions of dollars. While no crisis exists today for the majority of systems, one could develop for many utilities if they do not substantially increase their level of investment in security measures from what it is today. Yet utilities are faced with the challenge of balancing efforts to keep water rates low with the need for rate increases to fund security enhancements. Although EPA and DHS have made Federal resources available to help secure the water sector, competing Federal priorities often consume most of the funds and little remains for the utilities' use.

The WSCC recognizes that key judgments need to be made about who should receive priority for Federal resources, and how those resources should be used, as the water sector faces uncertainties about the threat of an attack or natural disaster. With knowledge and technical expertise across the full range of critical infrastructure protection activities and issues, the WSCC can assist EPA, DHS, and other security partners as they seek the best way to allocate limited resources to reduce the risk to the Nation's drinking water supply and wastewater infrastructure.

Key Challenges

- Staggering scale of investment needed to improve security in the water sector
- Competing priorities constrain security improvements
- Lack of awareness and understanding by Federal agencies and public officials on the critical needs of the water sector
- Limited awareness and understanding by the water sector on Federal priorities
- Limited resources for training and conducting emergency simulations at the utility level

Benefits

- Increased opportunities to leverage EPA and DHS resources and address unmet needs
- Accelerated progress to enhanced water security postures by addressing needs with adequate resources
- Greater impact and reach of Federal resources
- Improved workflow between EPA and DHS through improved understanding of sector security requirements

Tasks

1. Form joint working group to cross-walk SCC priorities with GCC priorities.
2. Identify opportunities to partner with EPA, DHS, and other stakeholders on sector priorities.
3. Develop approach to collaborate and leverage resources for each priority.
4. Prepare and submit resource plans to increase stakeholder buy-in.
5. Manage and direct resources to implement priorities.
6. Track progress and develop methods to improve success rate.

Champion

- Rick Karlin, AwwaRF

Potential Partners

- WERF

Key Milestones

- Resource partners identified
- Resource requests submitted
- Resources awarded
- Priorities developed and implemented

Immediate Next Steps

- Form joint working group
- Identify partnership opportunities

Develop strategy for managing government (i.e., EPA, DHS) workload.

Develop an appropriate process within the water sector to prioritize new government security initiatives and manage the potential barrage of requests.

Background

The WSCC serves as the mechanism to facilitate organization and coordination of security implementation activities with EPA and DHS.[4] Since 2004, the WSCC's workload has quadrupled and it has processed hundreds of requests for information. To manage this workload and establish priorities, dialogue with owner-operators, associations, and subject matter experts is crucial. While the WSCC already works closely with its members, efforts must be more concrete and directed. A Security Water Association Team (SWAT), composed of representatives from the SCC associations was formed in 2008 to begin addressing these issues. While progress has been made, the sector needs to recognize the roles and responsibilities of SWAT and understand how the sector should respond when they receive requests initiated by SWAT.

A government workload strategy that optimizes the efforts of the WSCC and expertise of the sector can provide a mutually efficient means to interact with the government. The strategy can also help to address the growing government demand for vital security information.

Key Challenges

- Difficult to cope with burgeoning workload
- Information overload limits sector uptake of and response to security initiatives
- Lack of time and clarity from government hampers industry's ability to generate comprehensive and useful reports

Benefits

- Ensure the responsiveness, efficiency, and effectiveness of WSCC
- Increase awareness and implementation of critical security issues throughout the water sector
- Increase quality of information flowing between government and industry

Tasks

1. Form an internal working group, known as Security Water Association Team (SWAT), to determine monthly workload strategy and collaborate with ongoing efforts.
2. Announce the formation of SWAT and communicate expectations of this initiative.
3. Assess government requests and available resources.
4. Determine process and structure for managing government workload
5. Prepare and communicate requests to appropriate stakeholders, including annual government requirements and expected WSCC response.
6. Gather information and respond to government requests accordingly.
7. Assess and promote progress on a regular basis.

Champions

- Paula Dannenfeldt, NACWA
- Lynn Stovall, Greenville Water System
- Bill Komianos, American Water

Potential Partners

- AMWA, AWWA, AwwaRF, NACWA, NAWC, NRWA, WEF, and WERF

Key Milestones

- Internal working group (SWAT) formed
- SWAT role, responsibilities, and expectations developed
- Requests coordinated and addressed

Immediate Next Steps

- Communicate role of the SWAT to the water sector
- Assess government requests

Engage with local emergency managers.

Foster greater partnership between utilities and local emergency responders to improve local preparedness and improve National Incident Management System (NIMS) compliance.

Background

To successfully prepare for, respond to, and recover from emergencies, utilities must engage in adequate emergency response planning and training, while developing ongoing relationships with local emergency responders. Stronger relationships within a utility (internal and cross-organizational) and between utilities and local responders reinforce response roles and improve trust and confidence that duties will be implemented effectively during an emergency. However, utilities have made only modest outreach to local emergency responders, hampering emergency response plan (ERP) development and understanding of how to react to a crisis.

Confusion about how to make ERPs comply with the NIMS has further complicated ERP development and prevented utilities from accessing Federal preparedness assistance to support training. Improved, NIMS-compliant ERPs will enable utilities to access financial assistance that will aid training activities to prepare the workforce with the knowledge and skills to fully engage in emergency planning and response.

Key Challenges

- Lack of partnership between utilities and local emergency responders creates confusion
- Limited resources for emergency response training
- Difficulty of NIMS language and concepts; lack of clear government training on NIMS

Benefits

- Stronger emergency response through improved relationships and trust among local emergency responders and utilities
- Problems anticipated during planning and training exercises
- Bolstered utility readiness to effectively respond to an emergency through increased competence and confidence

Tasks

1. Form internal working group to review and assess current state of partnerships among utilities and local emergency responders, including progress with mutual/aid assistance (i.e., Water Wastewater Agency Response Network [WARN]).
2. Develop guidance materials to help utilities address partnership development needs.
3. Team with associations to provide training on ERP/NIMS terminology and compliance.
4. Promote and disseminate guidance materials throughout the water sector.
5. Assess and revise the guidance materials on a regular basis.

Champion

- Internal Working Group

Potential Partners

- AMWA, AWWA, AwwaRF, NACWA, NAWC, NRWA, WEF, and WERF

Key Milestones

- Working group formed
- Partnership-building needs assessed
- ERP/NIMS training delivered
- Partnership guidance disseminated

Immediate Next Steps

- Form internal working group
- Begin developing partnership-building strategy

Maximize response to CIPAC Metrics Survey.

Encourage strong response to the first CIPAC Metrics Survey to increase understanding of the water sector's security posture.

Background

While vulnerability assessments have improved a utility's understanding of the risk to its critical systems, the capabilities to fully understand the risk at the local, regional, and national level have just begun to take shape. To gain a full understanding of risk, the water sector requires quantifiable data. A lack of data hampers the sector's ability to build a compelling business case for security improvements. Without data, it is difficult to convince the government that the sector needs more resources to maintain an adequate security posture. Worse yet, poorly defined risk makes it difficult for utilities to convince the public that it is doing a good job.

Utilities will have an opportunity to report on their security posture with the release of the first CIPAC Metrics Survey in fall 2008. By facilitating a sector-wide response to this first Metrics Survey, the sector can better quantify a utility's risk, establish a baseline of security measures implemented, and develop a data set for measuring and communicating future progress toward achieving sector security goals.

Key Challenges

- Lack of data to measure progress toward water-sector security goals
- Limited acceptance of a consistent reporting structure for collection, retention, and protection of information/reports
- Utilities' concern about reporting data that might uniquely identify their performance

Benefits

- Improved understanding of risk for improved decision making
- Increased resources to address priority security needs
- Established mechanism for tracking progress toward a secure and resilient water sector
- Improved ability to manage public expectations

Tasks

1. Develop and execute an outreach strategy to encourage utilities to respond to the Metrics Survey.
2. Collaborate with associations to provide training on survey features and the metrics themselves to increase comfort with the terminology and demonstrate action.
3. Encourage continued response to the Metrics Survey in future data collection years.
4. Analyze data regularly to identify strengths and weaknesses in the water sector's overall security posture.

Champions and Potential Partners

- AMWA, AWWA, AwwaRF, NACWA, NAWC, NRWA, WEF, and WERF

Key Milestones

- Metrics Survey letter sent
- Training on survey features and metrics given
- Survey data analyzed

Immediate Next Steps

- Initiate outreach efforts to improve response to Metrics Survey
- Identify association champions to deliver survey training

Promote to government a flexible and scalable approach to the Risk Assessment Methodology for Critical Asset Protection (RAMCAP).

Ensure implementation of RAMCAP is workable and cost-effective in all water systems—especially small systems—by supporting a flexible and scalable approach to vulnerability assessment (VA).

Background

VAs help utilities evaluate their susceptibility to threats and identify corrective actions that might reduce or mitigate the risk of serious consequences from adversarial actions. As required under the Bio-Terrorism Act of 2002, water-sector utilities have completed their VAs. However, different models were used depending on utility size, treatment method, and population served. Since then, RAMCAP was developed to provide a consistent measurement system and produce results that are comparable at the sector and cross-sector levels. Although utilities are not required to use RAMCAP, government agencies are using it to help prioritize Federal resource allocations.

Small systems make up more than 90% of the country's approximately 50,000 community water supplies and are less able to pay for additional Federal initiatives. However, to be compatible with RAMCAP, small systems may need to reconstruct their VAs and use a model designed for larger systems. This model is more complex and expensive than their current model and may be beyond a small system's technical capabilities.[5] To address these issues, a RAMCAP working group composed of representatives from WSCC and GCC, and subject matter experts was formed in 2007. While significant progress has been made, improved VA models and additional resources are needed to ensure widespread adoption of RAMCAP in the water sector.

Key Challenges

- Difficult to apply uniform VA models to large number of diverse water and wastewater utilities
- VA tools are not fully effective across the sector
- Lack of technical capacity and resources at small systems to address complex VA models

Benefits

- Increased alignment and support of RAMCAP
- Reduced burden on small systems
- Improved information for better risk management decisions

Tasks

1. Continue development of RAMCAP working group plan.
2. Review draft *RAMCAP Plan for the Water Sector* and gain consensus.
3. Prepare final RAMCAP Plan.
4. Find resources and secure funding.
5. Implement plan.
   - Conduct training through regional workshops.
   - Provide on-site assistance.
6. Assess progress.

Champions

- Bruce Larson, American Water
- Ed Thomas, NRWA
- RAMCAP Working Group

Key Milestones

- RAMCAP Working Group Plan developed
- Training conducted
- RAMCAP adopted throughout the water sector

Immediate Next Steps

- Complete RAMCAP working group Plan

Provide guidance on business continuity/continuity of operations planning in the water sector.

Develop a viable and reasonable approach to developing business continuity plans (BCPs) for private utilities and continuity of operations plans (COOPs) for public utilities throughout the water sector.

Background

Closely related to consequence management plans, BCPs/COOPs ensure a utility's essential functions and critical resources continue to perform during and after an emergency situation. BCPs/COOPs define how a utility will continue its everyday business functions in a not-so-everyday environment. Plans address the potential financial effects of a crisis, as well as the utility's flexibility to adapt human resource policies to meet the changing needs of employees.[6]

Although utilities recognize that BCPs/COOPs help to manage risk, there is a lack of clear and simple information on plan design, and many utilities simply do not know where to start. Guidance that includes information on how to access Federal funding is an essential first step. Best practices for training and testing will avoid complacency and help to identify weak and unworkable contingencies within the plan.

Key Challenges

- Limited resources available for BCP/COOP development, training, simulations, etc.
- Limited awareness of the need to show conformance with National Incident Management System (NIMS) to access funding
- Municipalities and states have not approved BCPs/COOPs across the sector or made plan requirements consistent
- Small utilities often mistake BCPs/COOPs for emergency response plans

Benefits

- Accelerated development of BCPs/COOPs throughout the water sector
- Enhanced resilience of water service
- Improved disaster preparedness
- Increased potential to survive an emergency
- Enhanced decision making during a crisis
- Improved protection of the value of water

Tasks

1. Form internal working group to review available BCP/COOP.
2. Assess the current state of BCP/COOP development among utilities, including lessons learned from responding to recent natural disasters.
3. Develop guidance materials to help utilities address BCP/COOP needs.
4. Promote and disseminate guidance materials at conferences, through associations, websites, etc.
5. Assess progress and revise annually.

Champion

- Alan Roberson, AWWA

Potential Partners

- AMWA, AwwaRF, NACWA, NAWC, NRWA, WEF, and WERF

Key Milestones

- Working group formed
- Guidance drafted
- Final guidance released
- Guidance implemented

Immediate Next Steps

- Form internal working group
- Integrate existing efforts

Provide guidance on consequence management plan detection of contamination protocols.

Enhance consequence management planning to position the water sector to identify and respond to a wide variety of water quality contaminants/anomalies.

Background

Consequence management plans (CMPs) outline protocols governing the response, recovery, and remediation actions that a utility will take when it receives a threat warning from its contamination warning system.[7,8] A major challenge for utility staff is to effectively manage multiple product quality, delivery, and security objectives while maintaining regulatory compliance and affordability of drinking water and wastewater services. The interrelationships of these objectives are complex, and available literature can be confusing. Supplemental monitoring costs are difficult to justify, especially in a small system. In addition, the mix and number of contaminants are extremely diverse and numerous, making it impractical to manage the risk of all possible contamination events.

Water and wastewater utilities lack both adequate guidance on the scope of data collection required for contamination detection, and clear, well-defined CMPs (and other tools) that define roles and responsibilities in decision-making and response. By developing clear guidance for utilities and associations on consequence management planning, the WSCC can help utilities evaluate and prioritize treatment and monitoring options for multiple interdependent product quality objectives. In addition, utilities will be better prepared to quickly and effectively determine the credibility of a detected threat and take appropriate response, recovery, and remediation actions.

Key Challenges

- Protocols for water quality anomalies are not well defined
- Limited focus on intentional contamination
- Poorly defined roles/responsibilities and lack of decision support tools for credibility determination, threat assessment, and transition from standard operations management to consequence management
- Lack of performance standards for contamination detection

Benefits

- Increased preparedness and resiliency to ensure continuity of services
- Improved decision-making about, and response to, detected contaminant events
- Rapid and effective transition from routine operations to consequence management actions
- Effective coordination of activities among organizations with a decision/response role

Tasks

1. Form internal working group to review available consequence management planning materials, (i.e., EPA's *Water Sector Interim Consequence Management Plan Guidance).*
2. Assess the current state of consequence management planning among utilities, including lessons learned from responding to recent natural disasters.
3. Develop guidance materials to help utilities address partnership development needs.
4. Promote and disseminate guidance materials throughout the water sector.
5. Assess awareness and status of implementation among operations.
   - Gather utilities' feedback and revise the guidance materials on a regular basis.
6. Assess progress and revise annually.

Champions

- Don Broussard, Lafayette Utilities System
- Patty Cleveland, Trinity River Authority of Texas

Potential Partners

- AMWA, AWWA, AwwaRF, NACWA, NAWC, NRWA, WEF, and WERF

Key Milestones

- EPA CMP guidance promoted
- Workshops conducted
- Supplemental CMP tools developed

Immediate Next Steps

- Monitor the release of EPA CMP guidance
- Form detection standards working group
- Form decision support working group

Provide guidance on water and wastewater utility responder communications.

Develop materials to guide utilities in communicating during a crisis and maintaining outreach during non-crisis periods.

Background

Risk communication—whether effective or not—will directly influence what happens following a potentially compromising event. For example, an effective message can provide needed information to garner support or calm a nervous public, while a poor statement can undermine public trust or confidence and possibly aggravate a situation. To be effective, a utility responder communications plan should include a chain-of-command that clearly defines the roles and responsibilities of all personnel during crisis and non-crisis periods. By establishing who does what and when, a utility will be able to rapidly notify the appropriate personnel to activate and execute a timely and effective response to an emergency. Ongoing two-way communication among the public, news media, policy makers, water/wastewater utilities, regulatory agencies, public health officials, emergency responders, and other authorities involved in emergency response and recovery will greatly improve relationships over time.

Currently there are utilities with limited awareness of available resources and appropriate outlets for public communication. Others have difficulty determining if and when to communicate. In addition, there is confusion over who "owns" which piece(s) of the message. By guiding utilities to develop comprehensive utility responder communication plans, the WSCC can strengthen local networks in the water sector and ensure utilities receive the help they need in an emergency situation.

Key Challenges

- Negative relationship with media limits outreach
- General public mistrust; difficulty of restoring public confidence
- Release of fragmented messages from various agencies
- Uncertainties about how best to communicate with the public and emergency response personnel

Benefits

- Maintained and enhanced public confidence in the water sector
- Simpler crisis communication decision making; defined communication roles and responsibilities ensure a unified message
- Rapid communication response during crises effectively supports health and safety interests

Tasks

1. Form internal working group to review available communications materials (i.e., EPA's message-mapping activities).
2. Assess the current state of crisis and non-crisis communication planning among utilities, including lessons learned from responding to recent natural disasters.
3. Develop guidance materials to help utilities address communication needs.
4. Promote and disseminate guidance materials at conferences, through associations, on websites, etc.
5. Build a network of communicators across utilities, agencies, and local emergency personnel to enhance communication, clarity, and feedback.

Champion

- Paul Bennett, New York City Department of Environmental Protection

Potential Partners

- AMWA, AWWA, AwwaRF, NACWA, NAWC, NRWA, WEF, and WERF

Key Milestones

- Working group formed
- Communication analysis completed
- Communication guidance materials developed
- Communication published and disseminated
- Communicator network established

Immediate Next Steps

- Form internal working group
- Begin communication analysis efforts

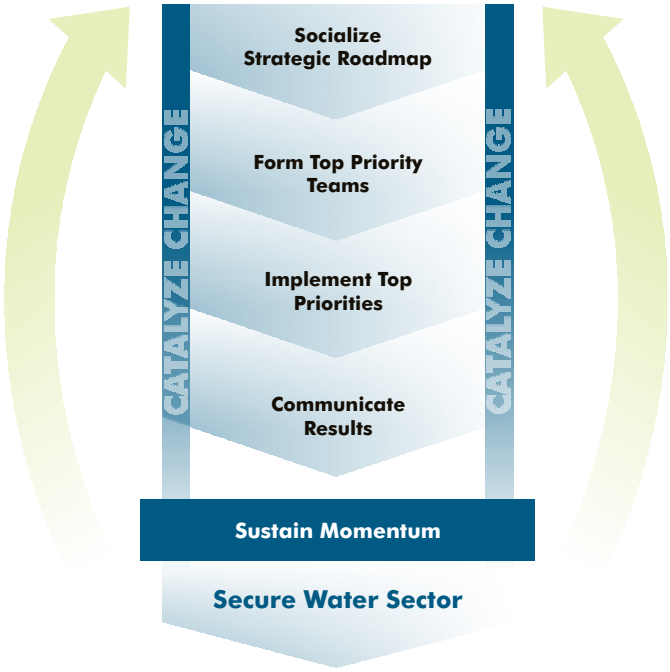
III. Implementation

The *WSCC Strategic Roadmap* will continue to evolve as industry reacts to business pressures, security threats, operational constraints, public demands, and unanticipated events. While this strategic roadmap does not include all possible pathways to securing the sector, it provides what the WSCC believes to be a sound path forward for the industry that identifies both immediate steps and long-term goals to frame the sector's actions over the next year. It will guide owners and operators, industry associations, and government and commercial partners in planning, training, and preparing for potential water emergencies so that the sector can become more proactive in managing its risk and remain appropriately reactive and responsive during an event.

By working together to develop this strategic roadmap, the WSCC has leveraged a broad range of operational experience to identify the most pressing industry needs and prioritize actions the WSCC can take to begin immediately enhancing water sector security. Utilities face a unique responsibility to efficiently provide the public with clean, safe water. Though all utilities have taken steps to meet this responsibility, without a collective, concerted effort among all industry stakeholders, utilities—especially smaller ones—cannot take advantage of all the security capabilities available to them. Moving forward, the WSCC must provide strong leadership, action, and persistence to ensure that the actions laid out in this strategy are implemented to the sector's best ability.

Figure 3.1 outlines the main strategic roadmap implementation steps. These steps are designed to catalyze buy-in with the strategic roadmap, and subsequently launch and manage the WSCC's top priority projects.

Figure 3.1 Strategic Roadmap Implementation Process



Catalyze Change

To speed implementation of water sector security initiatives, the WSCC will act as the catalyst for change by helping the water sector initiate and implement top priority security programs that empower utilities, advance credible security agendas, and lead toward a secure and resilient drinking water and wastewater infrastructure.

Socialize Strategic Roadmap

To encourage buy-in and motivate sector champions to step forward, the WSCC will widely disseminate the plan and engage leaders across the sector to participate in priority activities.

Form Top Priority Teams

Led by sector champions, the WSCC will form Top Priority Teams to work with key stakeholders to provide the oversight and collaboration needed to act on the top priority activities identified in this plan. Teams will work to obtain sufficient resources and capabilities required for taking action.

Implement Top Priorities

Top Priority Teams will create work plans, execute the plans, assess progress, make necessary adjustments, and deliver tangible results.

Communicate Results

The WSCC will develop a communications strategy that facilitates active stakeholder participation, creates metrics for success, and informs the public and its security partners about positive results to ensure a secure and resilient water sector.

Sustain Momentum

On an annual basis, the WSCC will measure the impact of the strategic roadmap and will refine and adapt its security efforts to fulfill its mission and improve water-sector security today and in the future.

V. For More Information

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Appendix A. Strategic Roadmapping Process

The *WSCC Strategic Roadmap* was developed according to the process shown in Figure A.1 and described below.

Establish Vision and Goals

In 2006, under Homeland Security Presidential Directive 7 (HSPD-7), the U.S. Department of Homeland Security (DHS) developed the National Infrastructure Protection Plan (NIPP) to protect the Nation's critical infrastructures, the water sector being one of them.[9] As part of the implementation of the NIPP, each sector developed a Sector-Specific Plan (SSP) outlining goals and objectives to secure the sector. In 2007, the water sector released its SSP, which establishes a vision and broad-based framework for addressing water sector security needs.

The vision and goals for the strategic roadmap came from the Water SSP.

Establish Tactics

In February 2008, the U.S. Critical Infrastructure Partnership Advisory Council (CIPAC) Metrics Workgroup for Water recommended guidelines for the water sector to report security measures in *Recommendations of the CIPAC Metrics Workgroup for Water.*[10] These measures are aligned with the "Ten Features of an Active and Effective Security Program" identified in the *Findings of the Measures Testing Group for National Aggregate Measures of Water Security*[11] and the Water SSP goals and objectives. The tactics for this strategic roadmap were drawn from the CIPAC initiative to be consistent with the Water SSP framework.

Identify Trends and Drivers

To provide a context for planning and gain perspectives on the key concerns, trends, and drivers that will affect the WSCC and its public-private partnership in 2008 and beyond, the WSCC Strategic Planning Working Group (WSCC-SPWG) held its first Strategic Roadmapping Session on February 12, 2008, at the Grand Hyatt in Washington, D.C. During the session, 19 participants from the water sector, including

Figure A.1 Strategic Roadmapping Process

WSCC members, owners and operators, associations, and subject matter experts, offered collective insight on the high-level security needs of the sector. The workshop results were published in *Water Sector Coordinating Council Strategic Roadmapping Session I Summary Results*[12] and were presented to the council for review and comment.

Establish Priorities

A second Strategic Roadmapping Session was held on May 13, 2008, at the National Association of Clean Water Agencies in Washington, D.C., to develop a comprehensive plan that identifies both the challenges to implementing the identified tactics, and the activities needed to address those

challenges. The 19 participants, including WSCC members, owners and operators, associations, and subject matter experts, identified the top priorities for the WSCC to implement in 2008–2009. The workshop results were published in *Water Sector Coordinating Council Strategic Roadmapping Session II Summary Results*[13] and were presented to the council for review and comment.

Prepare, Review, and Publish the Strategic Roadmap

The draft strategic roadmap was developed and circulated among all participants from both meetings, and to other key stakeholders for added insight and clarification. The comments of all reviews have been integrated into this final strategic roadmap document.

Appendix B. Trends & Drivers Influencing Water Sector Security

The emergence of a national multi-organizational risk management system is impacting the water sector in every area of its operation. Implementing the NIPP and adopting security practices consistent with the National Incident Management System (NIMS) and the Risk Analysis and Management for Critical Asset Protection (RAMCAP) is complex, involves financial risk, and requires cultural change. As such, the WSCC frequently operates in a vicious cycle rather than moving forward (see Figure B.1). A formidable barrier to positive change is the escalating multitude of security improvements the sector needs to implement using its severely limited resources—a challenge that has substantial impact on what services and upgrades the sector can undertake. Competing demands to modernize/repair an aging infrastructure and meet increasing regulatory requirements place even higher demands on the sector, making significant security improvements practically impossible.

Utility Resource Constraints

The aging workforce is rapidly reaching retirement.[14] Training programs will need to increase and occur more regularly to address rising security needs and turnover in experienced staff. A National Infrastructure Advisory Council (NIAC) study estimated that the cost of attaining a baseline security posture across the water sector could exceed $750 billion.[15] The American Water Works Association (AWWA) estimates that municipal water systems would spend more than $1.6 billion just to ensure control of access to critical water system assets.[16] Yet, Congress still has not provided funding specifically for security improvements. Although some funding has been made available through the U.S. Environmental Protection Agency (EPA) and DHS, competition for funds is severe, and most funds continue to go to first responders.[17] In addition, the costs of replacing aging water distribution pipelines and upgrading wastewater systems are measured in tens of billions of dollars.

Figure B.1 Demands on WSCC

Cross-Sector Interdependencies

Residents, businesses, and emergency responders throughout the Nation will always depend on water to fight fires. Water and energy are inextricably linked. Increasing demand for energy translates into increasing demand for water to cool electric generation stations. Water treatment and distribution are becoming more energy intensive as water quality standards improve and water recycle/reuse practices increase. To become more efficient, water and wastewater systems will increasingly rely on and become more interconnected with cyber systems and telecommunications. Additional interdependencies of the water sector include emergency management services, health care, natural gas, and petroleum liquids.

Table B.1 Trends and Drivers Influencing Water Sector Security

Utility Resource Constraints	▪ Increasing training needs due to aging workforce, staff turnover, and reduction in experienced personnel ▪ Changing regulations and increasing public demands challenges utilities at the local level ▪ Competing capital and operating investments
Cross-Sector Interdependencies	▪ Increasing complexity and interconnection of the Nation's infrastructure ▪ Increasing dependency of multiple sectors to respond to and recover from emergencies ▪ Increasing reliance on rapidly evolving communication systems ▪ Increasing convergence of water and energy operations
Legislation and Policy Changes	▪ Legislation and policy decisions are driving RAMCAP consistency to access Federal resources ▪ Increasing requirements, if included, of the water sector in Chemical Facility Anti-Terrorism Standards (CFATS) ▪ Changing political climate ▪ Increasing reach of Federal strategies ▪ Evolving partnership model ▪ Impending change in administration
Public Awareness and Outreach	▪ Rapid pace of information exchange is diminishing the public's attention to security ▪ Ongoing conflicts in media messages confuse the public ▪ Balancing risk communication with information protection is difficult ▪ Evolving communication channels challenges message delivery
Owner/Operator Business Environment	▪ Integrating security culture into business culture ▪ Increasing supply chain issues, such as water scarcity and meeting growing demand ▪ Increasing economic sensitivity to loss of service ▪ Approaching limits of self-reliance ▪ Increasing water monitoring requirements
Sector-wide Issues	▪ Sustaining interest in security over time is increasingly difficult ▪ Accelerating amount of information to comprehend and deliver ▪ Managing risk in dynamic "all-hazards" environments ▪ Keeping pace with a rapidly changing threat environment ▪ Keeping pace with technology ▪ Growing need to address climate change, and prepare for potential pandemic ▪ Acculturating the National Response Framework (NRF) in critical infrastructure/key resources (CIKR) and the response community

Legislation and Policy Changes

Policy makers want a consistent method to measure and compare the security needs of the Nation's critical infrastructures, and so are driving RAMCAP consistency to enable priority setting. Some drinking water and wastewater treatment methods require the use of hazardous chemicals. As a result, many systems may need to meet new Chemical Facility Anti-Terrorism Standards (CFATS), which will take resources away from security activities. The dynamic political climate and pending change in the presidential administration raises uncertainties about future legislative requirements and allocation of resources.

Public Awareness and Outreach

It is well known that the public has a short attention span. With the rise of the information age, this attention span has decreased, while the amount of information has exponentially increased. Mixed media messages continue to confuse the public. Information protection requirements are evolving, while consumers are demanding access to more information about the water they drink. The rapid pace of communications technologies makes it difficult to choose the best method to deliver messages concerning drinking water and wastewater risks.

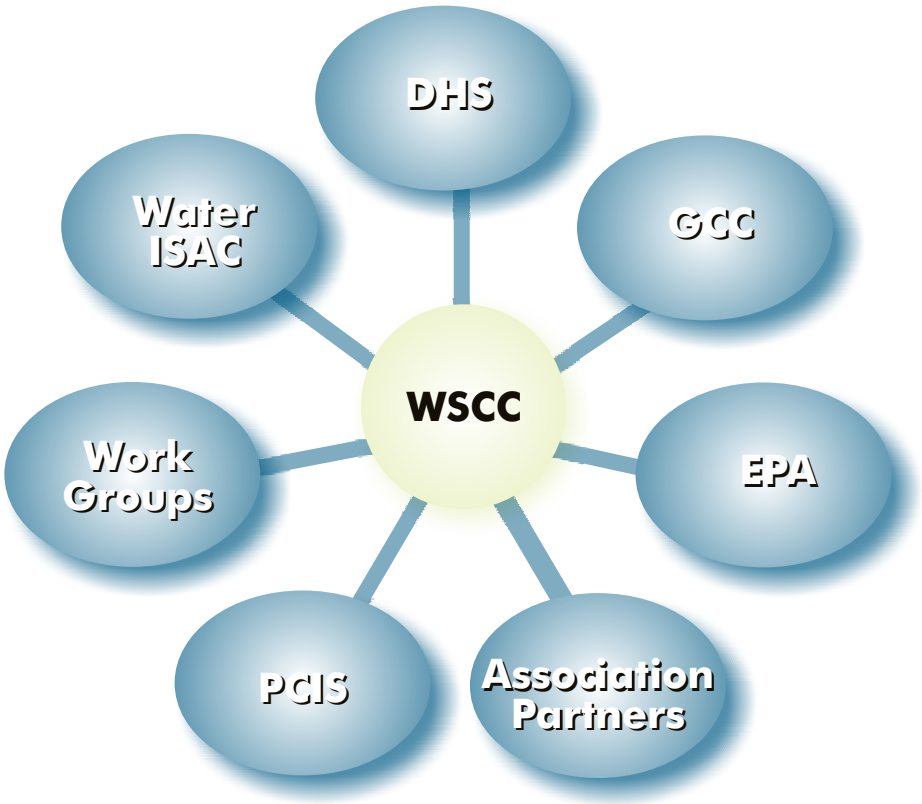
Owner/Operator Business Environment

Making a major culture change takes significant time and resources, slowing uptake of security throughout the business environment. Population growth, combined with source water limitations, is creating supply chain issues. The current cost structure of the water sector is approaching its limits of self reliance; many businesses and production facilities that increasingly rely on water cannot afford to shut down due to a loss of water service. To improve water quality and service, online monitoring needs will exponentially increase in the next few years.

Sector-Wide Issues

It is increasingly difficult to manage the vast amount of security information flowing between the tens of thousands of public water systems and wastewater utilities and the growing network of emergency responders, threat analysts, and government needed to secure the water sector. A sample of key stakeholder groups that coordinate with the WSCC is shown in Figure B.2. Both the threat environment and advances in water technologies are rapidly changing. Public awareness of the risks associated with climate change and pandemic flu is increasing. In addition, more national risk management issues need to be integrated into the water sector, including the National Response Framework (NRF) into critical infrastructure/key resources (CIKR) and the response community.

Figure B.2 Sample Key Stakeholder Groups



Appendix C. A Framework for Securing the Water Sector

Of all the critical infrastructures, the security of the water sector has the most immediate and pervasive impact upon the public's health and welfare. While public- and private-sector utilities have focused—both within their organizations and across industry and sector boundaries—on improving security through multiple initiatives, there is a sense that progress may be too slow and the response may be incomplete. Security challenges will continue to overburden the stakeholders in the Nation's water and wastewater infrastructure, unless the WSCC moves forward with more concrete and directed efforts toward securing the water sector. A comprehensive strategy that streamlines and drives the efforts of industry and government is needed to prepare for the needs of tomorrow.

Some of the most capable experts in water security, quality, management, engineering, operations, and maintenance disciplines work within the WSCC and its network of associations, owner/operators, and subject matter experts; however, they are widely dispersed and fragmented across the United States. A coordinated strategy that can align these experts along a strategic path to mitigating risk in the water sector will help change the water sector's security approach from reactive to proactive.

Vision

As defined in the Water SSP, the water sector has developed the following vision for security:

> The water sector's security vision is a secure and resilient drinking water and wastewater infrastructure that provides clean and safe water as an integral part of daily life.

This vision assures the economic vitality of and public confidence in the Nation's drinking water and wastewater through a layered defense of effective preparedness and security practices in the sector.

Security Goals

The Water SSP identifies four security goals outlining the comprehensive protective posture that the government and infrastructure owner/operators are striving toward. These goals will drive development of protective programs and measures of success. As shown in Table C.1 and described below, a framework emphasizing specific WSCC objectives and an actionable set of priorities will provide a solid foundation for water sector security initiatives.

- **Sustain protection of public health and the environment.** Water sector systems will have a security culture integrated into daily business operations; adequate security capabilities to recognize infrastructure risk that affects public health and economic viability; and sufficient capabilities to analyze threats to water quality.
- **Recognize and reduce risks in the water sector.** Water sector systems will be able to identify vulnerabilities based on knowledge and best available information; recognize potential threats through sector partners' knowledge base and communications; and determine public health and economic impact consequences of man-made and natural incidents.
- **Maintain a resilient infrastructure.** All utility emergency preparedness, response, and recovery plans will emphasize the continuity of drinking water and wastewater service. Mutual aid agreements among utilities and states will be established and implemented with adequate reach throughout the sector. Water sector systems will develop and implement key response and recover strategies, and have deep understanding of cross-sector interdependencies.
- **Increase communication, outreach, and public confidence.** Water sector systems will prepare local communities to be able to respond to a natural disaster or man-made incident. Federal, state, and local officials and agencies will effectively communicate and coordinate threat information to relevant utilities, government, and the public.

These goals provide a comprehensive framework for organizing the collective efforts of industry, government, and other key stakeholders to achieve the vision. To be successful, however, specific tactics must be executed to achieve each goal. Projects, activities, and initiatives that result from the strategic roadmap should be tied to the tactics shown in Table C.1.

Strategies for Securing the Water Sector

Strategies for accomplishing the four water sector goals presented in Table C.1 are summarized in Tables C.2 through C.5. Each goal presents distinct obstacles that must be overcome, requires specific achievements, and recommends the highest priorities for the WSCC. The rapid pace of change in adversarial capabilities, public perceptions, and technologies, combined with uncertainties in weather, markets, regulations, and risk, require that the water sector stay vigilant and responsive to a variety of plausible futures. As such, the WSCC will review, assess, and adjust the mix of activities on an annual basis.

Table C.1 Strategy for Securing the Water Sector

Vision

The water sector's security vision is a secure and resilient drinking water and wastewater infrastructure that provides clean and safe water as an integral part of daily life.

Challenges

- Severe competition for funds limits resources available for planning, training, simulations, and other security activities
- No clarity about what an adequate level of security means
- Impact of the loss of water service is not well understood
- Difficult to apply uniform requirements to large number and highly diverse type of water and wastewater utilities for Risk Analysis and Management for Critical Asset Protection compliance
- Lack of utility awareness about the opportunity to access funds through National Incident Management System compliance
- Limited awareness in the funding community and among public officials on the critical needs of water and wastewater systems
- Information overload limits sector uptake of and response to security initiatives; makes it difficult to uncover relevant information
- Uncertainties about how best to communicate with the public

Goals

Sustain Protection of Public Health and the Environment	Recognize and Reduce Risks in the Water Sector	Maintain a Resilient Infrastructure	Increase Communication, Outreach, and Public Confidence

Tactics

Product Quality

- Conduct routine supplemental monitoring or more in-depth analysis beyond what is required to identify abnormal water quality conditions
- Establish relationships with public health networks to interpret public health anomalies for the purpose of identifying waterborne public health impacts
- Monitor and evaluate customer complaints for possible indications of water quality or other security threats
- Establish protocols (i.e., consequence management plans) for interpreting and responding to indications of water quality anomalies, including events where the source and impact on water are uncertain

Security Preparedness

- Integrate security and preparedness into budgeting, training, and management responsibilities
- Incorporate security into planning and design protocols applying to all assets and facilities

Risk Assessment

- Evaluate disinfection methods considering water quality, public health, and security issues

Vulnerabilities

- Review vulnerability assessments annually and update periodically
- Establish physical and/or procedural controls to safeguard hazardous chemicals (including gaseous chlorine)

Threats

- Receive screened, validated, and timely threat information from one or more trusted sources
- Develop plan to increase utility security in response to a threat

Intrusion Detection

- Enhance intrusion detection capability of critical assets

Business Continuity

- Develop written business continuity plans
- Install redundancy, such as backup power, for critical operations

Emergency Response

- Develop emergency response plans and maintain them (conduct training and exercise; review and periodically update)
- Adopt National Incident Management System
- Begin process of establishing aid or assistance agreements, such as a Water/Wastewater Agency Response Network membership
- Determine percent minimum daily demand with a non-functional primary production/treatment plant

Networking

- Engage in emergency preparedness networking activities
- Engage in collaborative response networking activities

Crisis Communications

- Develop crisis communication plans

WSCC Objectives

The water sector will have consequence management and security preparedness plans to maintain public health and environmental protection.	The water sector will have screened, validated, and timely vulnerability and threat information to make informed risk management decisions.	The water sector will have business continuity and emergency response plans to ensure the economic vitality of the utilities and the communities they serve.	The water sector will have crisis communication plans and engage in collaborative emergency preparedness and incident response networks to foster public confidence.

Goal: Sustain Protection of Public Health and the Environment

Water and wastewater systems seek to provide the highest possible quality of product economically and reliably, while facing a myriad of chemical and biological threats to their infrastructures. A well-defined consequence management plan (CMP) ensures utilities are prepared to interpret and respond to indications of product quality anomalies. Product quality is defined as potable water, treated effluent, and process residuals that are in full compliance with regulatory and reliability requirements and consistent with customer, public health, and ecological needs. Security preparedness ensures leadership and staff work together to anticipate and avoid problems. A comprehensive security plan proactively identifies, assesses, establishes tolerance levels for, and effectively manages a full range of business risks (including legal, regulatory, financial, environmental, safety, security, and natural disaster related) in a proactive way consistent with industry trends and system reliability goals.[18]

> To maintain public health and the environment, the WSCC aims to help water sector utilities complete and exercise consequence management and security preparedness plans.

An overview of the challenges, tactics, and needed activities for achieving this objective is shown in Table C.2.

Challenges

A major challenge for utility staff is to effectively manage multiple product quality, delivery, and security objectives while maintaining regulatory compliance and affordability of drinking water and wastewater services. The interrelationships of these objectives are complex, and available literature can be confusing. Supplemental monitoring costs are difficult to justify, especially in a small system. In addition, the mix and number of contaminants are extremely diverse and numerous, making it impractical to manage the risk of all possible contamination events.

Needed Activities

Product quality. A top priority for the WSCC is to provide guidance on developing CMP detection of contamination protocols. To avoid confusion, the roles and responsibilities of all security partners must be clarified. Clear guidance for utilities and associations on consequence management planning can help utilities evaluate and prioritize treatment and monitoring options for multiple interdependent product quality objectives.

Security preparedness. Security awareness is critical to obtaining buy-in organization wide and sector wide. The WSCC can draw from its network of experts and public-private resources to coordinate the appropriate training, but it must be understandable and relevant enough to everyone to influence action. Ensuring the sector has adequate tools to design, prioritize, and audit security against other business and operational issues will enable utilities to integrate security into everyday operations and prepare the sector for not-so-everyday events, such as pandemic flu.

Table C.2 Priority Activities Needed to Sustain Protection of Public Health and the Environment (Bold blue text indicates top priority)

Goal — Sustain Protection of Public Health and the Environment

WSCC Objective

The water sector will have security preparedness and consequence management plans to maintain public health and environmental protection.

Challenges

Security Preparedness & Water Quality

- No clarity as to what level of security is appropriate with design
- Separating voluntary framework from due diligence
- Defining due diligence
- Getting sufficient metrics reporting to help the sector define practices
- Dealing with incomplete information for establishing protocols
- Routine supplemental monitoring proves a very difficult value proposition for small utilities
- Impact of the loss of water service is not well understood

Needed Activities

Product Quality

- **Provide guidance on consequence management detection of contamination protocols**
- Define a clear consequence management plan that determines "who makes the call"
- Determine what security level is "enough" and consider due diligence issues
- Provide decision aid for characterizing an incident and determining an appropriate level of response
- Develop performance standards for contamination detection both inside and outside the sector, incorporated through DHS/EPA
- Promote the Sector-Specific Plan (SSP)
- Promote the "10 Features of an Active and Effective Security Program" identified by the National Drinking Water Advisory Council
- Socialize the "features" and metrics to increase comfort and demonstrate action

Security Preparedness

- Simplify security culture
- Improve security training exercises and integrate security management into operations
- Institute risk-reduction training on both general awareness and issue-specific levels
- Integrate security into all aspects of business and operations planning
- Optimize security planning in the context of asset management
- Develop a tool to prioritize security against other issues (infrastructure, regulations, original equipment manufacturers [OEM], etc.)
- Institute security management programs that include security design and security audit
- Define and estimate the regulatory impacts and relief requirements during a pandemic flu

Goal: Recognize and Reduce Risks in the Water Sector

Risk analysis is the process through which the three components of risk—threat, vulnerability, and consequence—will be collectively analyzed to determine the utility's and sector's security posture. All risk assessments are conducted at the asset level; local conditions dictate the priority of the components. Threat information is provided by the Federal government. Water sector risk-assessment tools enable drinking water and wastewater utilities to identify, inventory, and assess the criticality of utility-specific components in detail.

> To better inform decision makers on the appropriate levels and allocation of risk mitigation measures, the WSCC will facilitate the exchange of screened, validated, and timely vulnerability and threat information among sector partners.

An overview of the challenges, tactics, and needed activities to achieve this objective is shown in Table C.3.

Challenges

While vulnerability assessments have improved a utility's understanding of the risk to its critical systems, the capabilities to fully understand the risk at the local, regional, and national level have just begun to take shape. Lacking the ability to determine risk, utilities cannot build a compelling business case for security improvements and risk unknowingly leaving their most critical assets vulnerable to attack. In addition, a lack of clearly defined security requirements hampers the sector's ability to convince the public that it is doing a good job. Without defined requirements, it is difficult to convince the government that the sector needs more resources to maintain an adequate security posture.

Needed Activities

Risk Assessment. A top priority for the WSCC is to encourage a strong response to the Critical Infrastructure Partnership Advisory Council (CIPAC) Metrics Survey. A response that includes the majority of the sector will provide a solid baseline to measure the security posture of today and progress in the future. Shifting perspectives from vulnerabilities assessment to risk management will enable the development of a common framework and facilitate RAMCAP compliance.

Vulnerabilities. A top priority for the WSCC is to promote a flexible and scalable approach to RAMCAP. One approach is to develop an efficient, accepted methodology based on existing models. Supported by the WSCC, the RAMCAP Working Group has been designing this approach and will be ready to deploy a refined RAMCAP model in 2009.

Consequences. Water is inextricably linked to most of the U.S. critical infrastructures. Yet many outside the sector still do not understand the interdependencies with water. By conducting a study of economic impacts caused by the loss of water service and defining the risk of distribution and collection systems, the sector will be able to develop a better business case to EPA and DHS for allocating resources and funding for security improvements in the water sector. The WSSC should also continue to support the WSCC Cyber Security Working Group in developing and implementing the near-term milestones of the *2008 Roadmap to Secure Control Systems in the Water Sector*.

Intrusion Detection. An acute situational awareness is essential to interpreting and responding to attacks or accidental disruptions of water and wastewater service. Reliable and effective sensors need to be developed to establish an early warning system of a possible contamination event to increase the speed of the response.

Table C.3 Priority Activities Needed to Recognize and Reduce Risks in the Water Sector (Bold blue text indicates top priority)

Goal — Recognize and Reduce Risks

WSCC Objective

The water sector will have screened, validated, and timely vulnerability and threat information to make informed risk management decisions.

Challenges

Risk Assessment

- Issues remain that hinder Risk Analysis and Management for Critical Asset Protection (RAMCAP) compliance
- Vulnerability Assessment (VA) tools not as effective as they need to be
- Difficult to know how far to go with corrective actions from VAs

Vulnerabilities

- Difficult to convince the public we are doing a good job

Threats

- Not all utilities are submitting incident information because it is not a requirement and there is a lack of awareness
- Cyber issues dominate incident/threat reporting
- Difficult to uncover relevant information

Intrusion Detection

- Technology limitations (e.g., sensors)

Needed Activities

Risk Assessment

- **Maximize response to CIPAC Metrics Survey**
- Shift vulnerability assessment discussion to risk management
- Institute a common risk assessment framework

Vulnerabilities

- **Promote to government a flexible and scalable approach to RAMCAP**
- Develop an efficient, accepted methodology and an appropriate schedule for conducting vulnerability assessments
- Provide guidance for protection of hazardous chemicals
- Define vulnerabilities and threats to distribution and collection systems
- Increase use of existing and new simulation and security self assessment tools through education/outreach

Consequences

- Better understand economical and physical interdependencies to determine consequences
- Integrate the *Roadmap to Secure Control Systems in the Water Sector*
- Educate people outside of the sector about interdependencies
- Conduct study to measure economic impact of the loss of water service and enable tiering

Intrusion Detection

- Develop and implement improved sensors for contaminant monitoring/detection
- Develop real-time reliable sensors with robust communication to identify/monitor contamination

Goal: Maintain a Resilient Infrastructure

A proactive approach to security requires ongoing, timely, cost-effective, reliable, and sustainable performance and security improvements in all facets of operations in all-hazard conditions. To further optimize business operations, a well-defined business continuity plan (BCP) for the private sector (also known as a continuity of operations plan [COOP] for the public sector) factors in the potential financial, human effects, and cross-sector impacts of a potential crisis. Different from a BCP/COOP, an emergency response plan (ERP) has eight core elements: system specific information; community water system (CWS) roles and responsibilities; communication procedures (who, what, and when); personnel safety; identification of alternate water sources; replacement equipment and chemical supplies; property protection; and water sampling and monitoring.[19]

> The WSCC will facilitate the completion and practice of business continuity and emergency response plans to optimize the business operations of water sector utilities and ensure their economic vitality, as well as the communities they serve.

An overview of the challenges, tactics, and needed activities to achieve this objective is shown in Table C.4.

Challenges

Competing Federal priorities and limited understanding by the Federal government of critical water sector needs has left few resources for implementing security initiatives, such as training and simulations. While some BCPs/COOPs have been developed, few municipalities/states have approved these plans and BCP/COOP requirements are not consistent among them. Information overload has bombarded utilities with new terminology, plans, and regulations to learn and comply with, causing confusion and making it difficult to uncover the most relevant information. Unfortunately, many utilities miss opportunities to receive Federal funding because they still do not understand what it means to be consistent with the NIMS (National Incident Management System).

Needed Activities

Business continuity. A top priority for the WSCC is to provide guidance on BCP/COOP development in the water sector. To augment these plans, a cross-sector interdependency assessment, supply-chain analysis, and power reliability evaluation should be conducted.

Emergency response. A top priority for the WSCC is to encourage utilities to engage with local emergency responders as a first step to developing ERPs and mutual- and aid-assistance agreements, which are essential to be consistent with NIMS. It is necessary to find and obtain more resources for utilities to conduct training and simulations to ensure they have the knowledge and skills to fully engage during an emergency. The WSCC can build on strategies, experience, and networks already in place to accelerate these efforts.

Table C.4 Priority Activities Needed to Maintain a Resilient Infrastructure
(Bold blue text indicates top priority)

Goal — Maintain a Resilient Infrastructure

WSCC Objective

The water sector will have business continuity/continuity of operations plans and emergency response plans to ensure the economic vitality of the utilities and the communities they serve.

Challenges

- BCP/COOP
- Limited resources available for COOPs, including training, simulations, etc.
- Limited awareness of need to show conformance with National Incident Management System (NIMS) to access funding
- Municipalities/states have not approved plans
- No consistency in COOP requirements between states
- COOP is often confused with Emergency Response Plan (ERP) in small utilities

Backup Power

- Lack of clarity in defining "critical operations" and "essential services" (redundancy is more important than just backup power)
- Inconsistent requirements among states
- Implications for interdependent operations are uncertain
- Security does not drive design
- "Uneven" business case for backup power—partly due to lack of understanding of resources

Emergency Response Plans

- Access to funds requires compliance with NIMS
- Government training is confusing

Adoption of NIMS

- Misunderstanding of what NIMS compliance means
- Lack of common terminology

Needed Activities

Business Continuity

- **Provide guidance on business continuity/continuity of operations planning in the water sector**
- Conduct a cross-sector interdependency assessment
- Conduct supply-chain analysis
- Update or develop a handbook to evaluate power reliability

Emergency Response

- **Engage with local emergency responders**
- Join or help establish mutual aid/assistance (i.e., Water/Wastewater Agency Response Network [WARN])
- Improve training for emergency response personnel and determine the right terminology
- Learn the language of ERP and NIMS
- Build on strategies and experience we have in place
- Increase resources to utilities to conduct simulations
- Develop readily acceptable, multi-jurisdictional, universal credential
- Institute a functional and reliable communication system for all first responders

Goal: Increase Communication, Outreach, and Public Confidence

Risk communication—whether effective or not—will directly influence what happens following a potentially compromising event. For example, an effective message can provide needed information to garner support or calm a nervous public, while a poor statement can undermine public trust and confidence and possibly aggravate any situation. To be effective, communication plans designed for crisis conditions must have established networks of two-way communication among the public, news media, policy makers, water/wastewater utilities, regulatory agencies, public health officials, emergency responders, and other authorities involved in emergency response and recovery.[20] Trust takes time and is difficult to earn. Because the most trusted partnerships are built over time, water sector utilities should communicate regularly with their community, especially when good news is available.

> To foster public confidence, the WSCC will aid in the development of crisis communication plans and collaborative emergency preparedness and incident response networks.

An overview of the challenges, tactics, and needed activities for achieving this objective is shown in Table C.5.

Challenges

Although most utilities recognize the importance of communicating risk with the public, many do not have the expertise or resources to develop crisis communication plans. Trust is a sensitive issue that can be lost in an instant from just one piece of poorly delivered or misguided information. Overcoming public mistrust is an uphill battle. The high level of emotions and stress in emergency situations, combined with the diverse audiences requiring communication, has left utilities wondering where to begin when developing a crisis communication strategy. Unfamiliarity of process and staff among the vital communication channels inhibits cooperation among all involved.

Needed Activities

Networking. Top priorities for the WSCC include aligning EPA and DHS priorities with water sector needs to increase resources for sector security initiatives, and developing a strategy to manage government workload to increase council effectiveness. The WSCC needs to educate utilities on the limitations of sharing information to maintain trust among the sector and its partners. Education and training on cross-sector interdependencies is also needed. To foster its security partnerships, the WSCC will should develop better relationships with other Sector-Coordinating Councils, Information Sharing and Analysis Center (ISAC) Councils, and the Partnership for Critical Infrastructure Security (PCIS).

Crisis communication. A top priority for the WSCC is to facilitate the development of utility responder communication plans that can reach large numbers of people with clear and credible health, safety, and security messages. With guidance from the WSCC, utilities can enhance knowledge and understanding of a well-constructed responder communication plan that, when practiced and implemented, will inform the public, reduce misinformation, and provide a valuable foundation for informed decision making. As a first step, WSCC can leverage EPA's message-mapping activities. In addition, efforts must be made to balance public-relation efforts with information protection at all levels, and ensure information is timely.

Table C.5 Priority Activities Needed to Increase Communication, Outreach, and Public Confidence (Bold blue text indicates top priority)

Goal — Increase Communication, Outreach, and Public Confidence

WSCC Objective

The water sector will have crisis communication plans and engage in collaborative emergency preparedness and incident response networks to foster public confidence.

Challenges

Networking and Crisis Communication

- Limited cooperation among communication channels
- Difficult to communicate directly with customers and restore public confidence due to communications personnel having limited awareness of resources
- Limited awareness in the funding community and among public officials
- Calming the media and managing the message
- Limited awareness in the emergency response community
- Overcoming public mistrust

Needed Activities

Networking

- **Align security partner (i.e., EPA, DHS) priorities with water sector needs**
- **Develop strategy to manage government (i.e., EPA , DHS) workload**
- Educate utilities on limitations of sharing information
- Promote cross-sector interdependency awareness training; educate other sectors on the value of water
- Develop ongoing forum to resolve interdependency concerns and risk reduction needs
- Develop better relationships with other Sector-Coordinating Councils (SCCs)
- Determine how to better leverage the Information Sharing and Analysis Center (ISAC) Council and the Partnership for Critical Infrastructure Security (PCIS)
- Refine the NIPP partnership model

Crisis Communication

- **Provide guidance on water and wastewater utility responder communications planning**
- Promote, support, and join the Water ISAC; encourage incident reporting to Water ISAC
- Create communication/outreach metrics that will provide benchmarking for utilities to assess programs and needs
- Leverage EPA's message-mapping activities
- Maintain communication during good times and stay engaged with the public
- Balance public relation efforts with information protection
- Integrate and protect information at all levels, and ensure it is timely

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Appendix E. Acronyms

AMWA	Association of Metropolitan Water Agencies
AWWA	American Water Works Association
AwwaRF	AWWA Research Foundation
BCP	business continuity plan
CFATS	Chemical Facility Anti-Terrorism Standards
CIKR	critical infrastructure/key resources
CIPAC	Critical Infrastructure Partnership Advisory Council
CMP	Consequence Management Plan
COOP	continuity of operations plan
CSWG	Cyber Security Working Group
CWS	community water system
DHS	U.S. Department of Homeland Security
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
ERP	emergency response plan
GCC	Government Coordinating Council
HSPD-7	Homeland Security Presidential Directive 7
ISAC	Information Sharing and Analysis Center
NACWA	National Association of Clean Water Agencies
NAWC	National Association of Water Companies
NIAC	National Infrastructure Advisory Council
NIMS	National Incident Management System
NIPP	National Infrastructure Protection Plan
NRF	National Response Framework
NRWA	National Rural Water Association
NYC DEP	New York City Department of Environmental Protection
PCIS	Partnership for Critical Infrastructure Security
RAMCAP	Risk Analysis and Management for Critical Asset Protection
SCC	Sector Coordinating Council
SPWG	Strategic Planning Working Group
SSA	Sector-Specific Agency
SSP	Sector-Specific Plan
VA	vulnerability assessment
WARN	Water/Wastewater Agency Response Network
WEF	Water Environment Federation
WERF	Water Environment Research Foundation
WSCC	Water Sector Coordinating Council