The Path towards Security and Resilience in the Water Sector

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Agenda

– Historical perspective of security and resilience in the Water Sector
– Evolution of risk assessment methodologies and guidance
– Trends in the industry
– Threats and hazards
– Attributes of a secure and resilient water system
– Path forward
Bioterrorism Act of 2002

– Amendment to the Safe Drinking Water Act
– Developed in response to 9/11 attacks
– Required water utilities that served greater than 3,300 customers to:
  • Perform water vulnerability assessments (VAs)
  • Submit VAs to EPA
  • Develop emergency response plans (ERPs)
– Provided funding to achieve compliance
Evolution of Water Sector Guidance


– Risk Assessment Methodology for Water (RAM-W), 2002


J100 RAMCAP Methodology

- Developed by AWWA and ASME Innovative Technologies Institute
- Adopted as a Standard by ANSI/ASME-ITI/AWWA in 2010
- Takes an all-hazards approach
- Semi-quantitative
- Intended to allow comparisons of risk across critical infrastructure sectors

\[ R = C \times V \times T \]
- \( R \) = Risk ($)
- \( C \) = Consequence ($)
- \( V \) = Vulnerability
- \( T \) = Threat likelihood
J100 RAMCAP Methodology

- Identify critical assets
- Select appropriate reference threats
- Calculate consequences for each threat-asset pair
- Estimate effectiveness of existing mitigation measures
- Calculate threat likelihood
- Calculate baseline risk
- Apply mitigation measures and re-calculate risk
Evolution of All-Hazards Perspective

– Strong security / terrorism focus after 9/11

– Evolution to all-hazards perspective after Hurricane Katrina and Superstorm Sandy
  • Natural hazards
  • Malicious threats
  • Dependency hazards
  • Proximity hazards

– All-hazards concept leads to “Resilience”
Resilience

– The ability to adapt to changing conditions and withstand or rapidly recover from disruptive events

– Elements of resilience include:
  • Preparedness
  • Mitigation
  • Response
  • Recovery

– Must consider interdependencies
Threats and Hazards

– Natural
– Malicious
– Dependency
– Proximity
– Degraded infrastructure
Natural Hazards

– Climate change
  • Sea level rise
  • Changes in flood recurrence intervals
  • Drought
  • Extreme weather events
Extreme Weather Events

–October 2015, Columbia, SC
Malicious Threats

- Cyber
- Intentional contamination
- Insider threats

295 reported cyber incidents involving critical infrastructure in the United States in 2015
Dependency Hazards

– Electrical power
– Chemical suppliers
– Communication
– Transportation
Proximity Hazards

–Jan 2014, Charleston, WV
Degraded Infrastructure

– Over $1 trillion dollars of degraded water and wastewater infrastructure in the US

2013 ASCE Report Card for America’s Infrastructure
Attributes of Secure and Resilient PWSs

- Culture
- Leadership
- Engagement
- Continuous improvement
Attributes of Secure and Resilient PWSs

– Reliable source
– Asset management program
– Redundancy
Attributes of Secure and Resilient PWSs

– Recently updated assessments and plans
  • Vulnerability assessments
  • Emergency response plans
  • Business continuity plans
  • Cyber disaster response plans
  • Security design standards

– Understands the nature of evolving threats and hazards
Attributes of Secure and Resilient PWSs

– Critical customer program
– Uses NIMS and ICS
– Participates in mutual aid programs – WARN
– Conducts training and exercises
Path Forward

– The path to security and resilience in the Water Sector is a journey, not a destination

– Threats and hazards continue to evolve

– New guidance and tools are continually being developed by AWWA, EPA, DHS, ICS-CERT

– Water Sector must be agile to adapt to these changes

– Water systems should strive for continuous improvement in a phased manner

– Critical customers must understand the security and resiliency of their suppliers and plan accordingly
Thank You

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