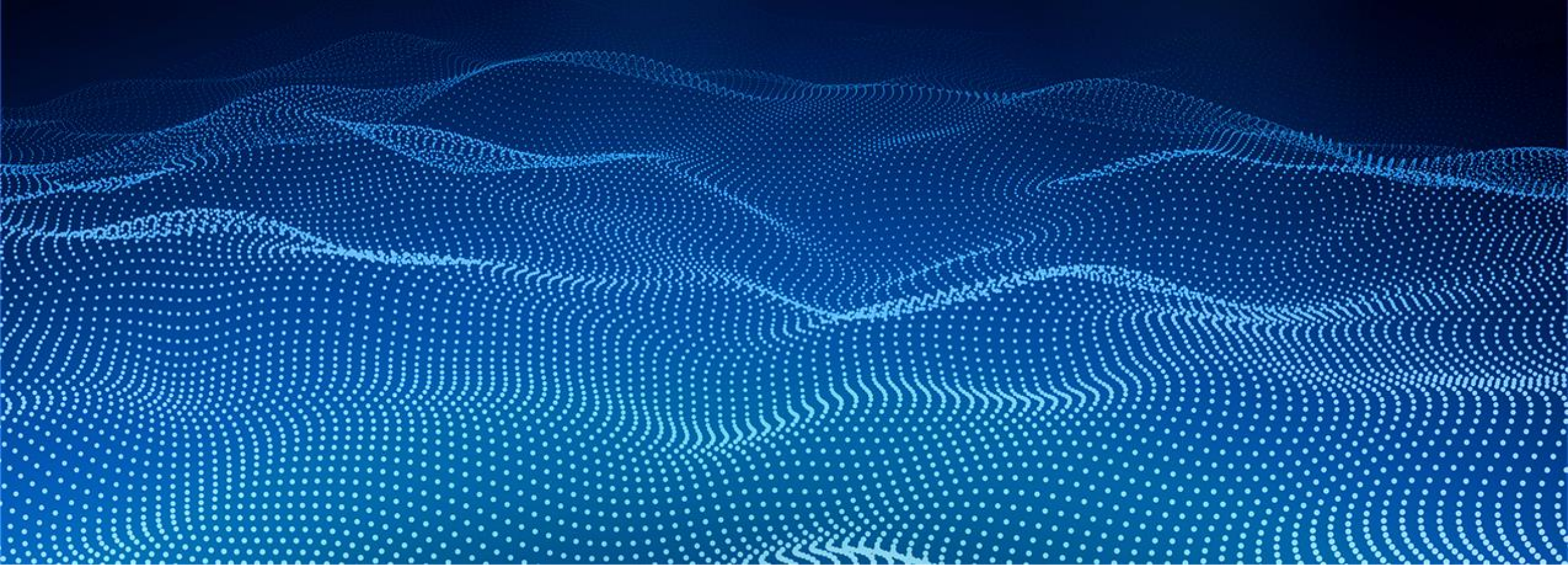


Utility Risk and Resilience Assessments: America's Water Infrastructure Act (AWIA) Lessons Learned from the Trenches

June 17, 2020

THE Water Research FOUNDATION

BLACK & VEATCH

Welcome and Introductions

Introductions

Jian Zhang, Water Research Foundation – Research Program Manager

Will Williams, Black & Veatch – Associate Vice President, Planning & Asset Management

Ahmet Ozman, Black & Veatch – Senior Consultant, Planning & Asset Management

Kevin Harper, Black & Veatch – Senior Technical Advisor, Planning & Asset Management

Project Participants

Participating Utilities

Kansas City Board of Public Utilities, KS	Hampton Roads Sanitation District, VA	City of Tulsa, OK	South East Water Corporation (Australia)
Loudoun Water, VA	California Department of Water Resources, CA	Colorado Springs Utilities, CO	Great Lakes Water Authority, MI
Lansing Board of Water and Light, MI	Coachella Valley Water District, CA	American Water, multiple states	City of Phoenix, AZ
City of Topeka, KS	Charlotte Water, NC	County of San Diego, CA	Miami Dade County, FL
City of Griffin, GA	Town of Cary, NC	Forsyth County, GA	Irvine Ranch Water District, CA

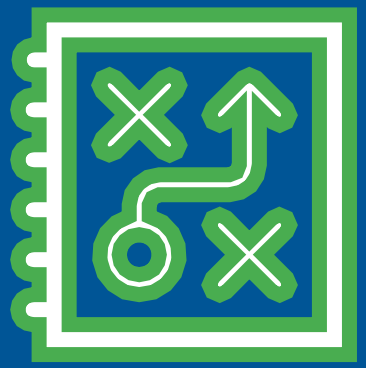
- Project Advisory Committee (PAC) Members
  - Mike Britch, Tulatin Valley Water District
  - Bart Weiss, Hillsborough County Water
  - Gabe Mussio, City of Houston, Dept. of Public Works
  - Alan Cohn, NYC DEP
  - Erica Brown, AMWA
- Technical Advisory Committee (TAC) Members
  - Sunil Sinha, Virginia Tech University
  - Kevin Morley, AWWA

Today's Discussion

- WRF Project 5014 Overview and Webinar Objectives
- AWIA Overview
- AWIA Execution Lessons Learned
  - Overview
  - General – AWIA Scope and Recertification, Recommended Utility Resources, and Document Management
  - Risk and Resilience Assessments
  - Emergency Response Plans
  - Risk Assessment Tools
- Key Takeaways

WRF Project 5014 Overview and Webinar Objectives

WRF 5014 Project Overview



- Focus: Development of a practical framework for assessing resilience
  - Water, Wastewater, Stormwater utilities
- Need: Complexity of resilience and risk management
  - Challenges interpreting & responding to AWIA requirements
  - Plethora of regulations, guidelines, standards and tools
  - Utilities need help navigating these
  - Opportunity to learn from other infrastructure industries
- Continuing to build upon previous WRF resilience-related projects

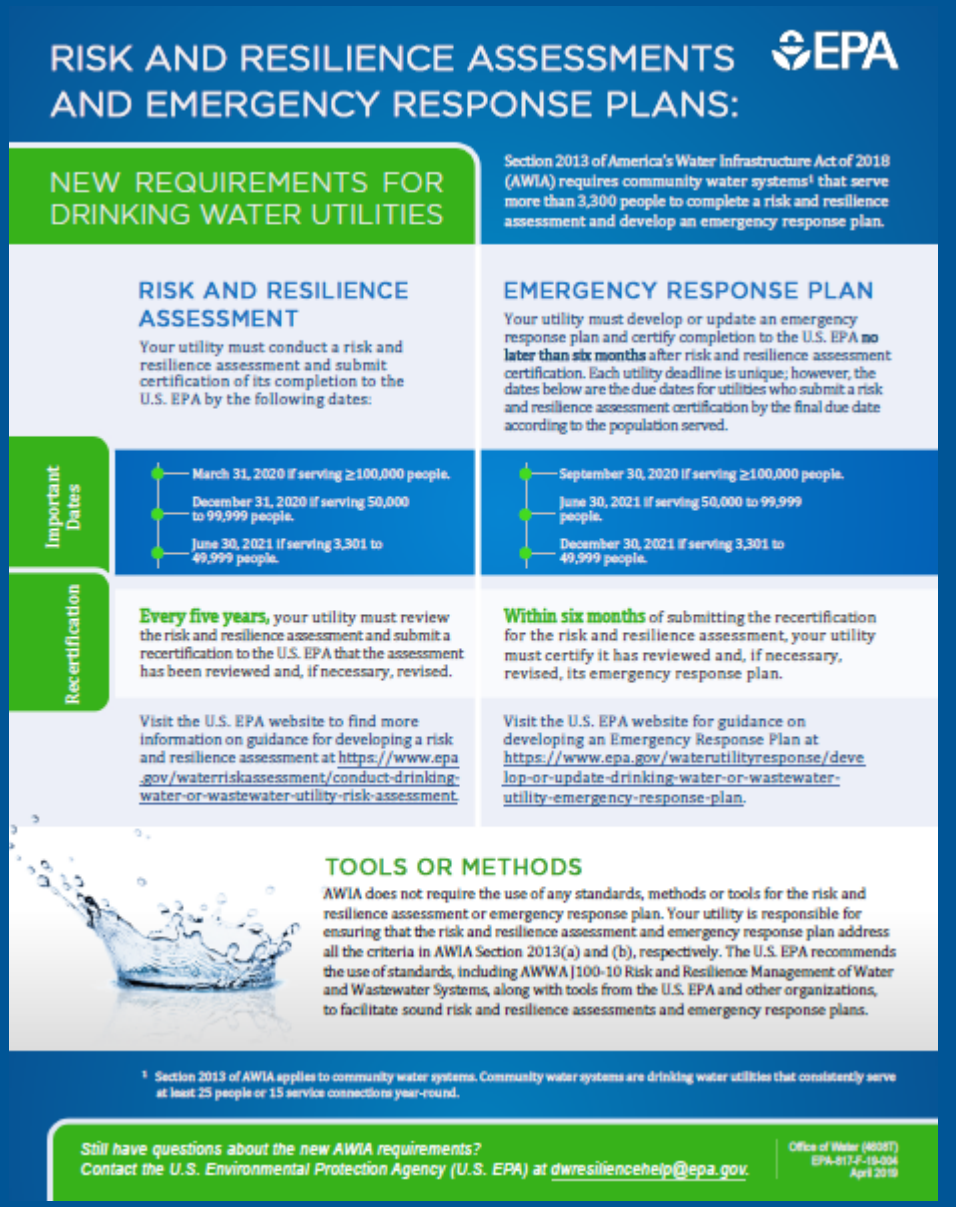
Webinar Objectives

- Provide a high-level overview of AWIA requirements
- Discuss execution lessons learned in the trenches
- Help participants identify path forward

Two Important Notes:

- **WRF 5014 = AWIA Compliance + Resilience Best Practices**
- **Today's Webinar Focus = AWIA Compliance Only**

AWIA Overview



https://www.epa.gov/sites/production/files/2019-04/documents/awia_factsheet_04-16-2019_v2-508.pdf

What Is AWIA?

- America's Water Infrastructure Act of 2018 (AWIA) was passed into law in October 2018
- AWIA Section 2013 replaced the earlier provisions in SDWA regarding bioterrorism threat and created a new requirement for water systems serving more than 3,300 persons to:
  - Conduct a Risk and Resilience Assessment (RRA)
  - Prepare/revise an Emergency Response Plan (ERP) incorporating RRA findings
  - Certify completion of RRA and ERP to EPA

Q When will RRAs and ERPs need to be completed?

A The utilities must certify to EPA that that have completed RRAs and ERPs by specific dates below:

Served Population	Risk and Resilience Assessment	Emergency Response Plans
100,000 or more	3/31/2020 (2025)	9/30/2020 (2025)
Between 50,000 – 99,999	12/31/2020	6/30/2021
Between 3,301 – 49,999	6/30/2021	12/31/2021

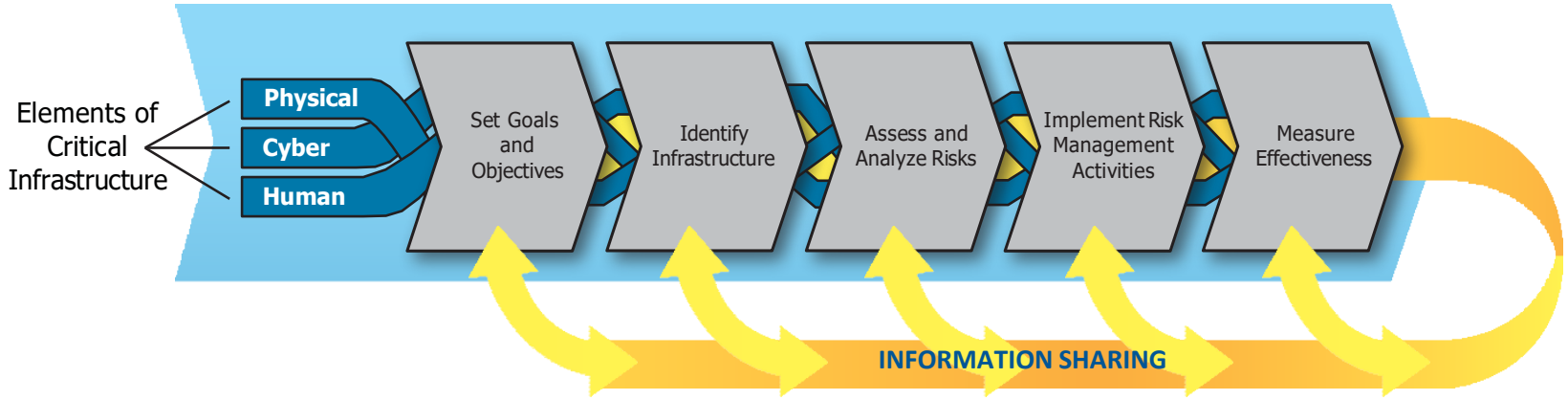
Review/revise RRA and ERP as needed; re-certify every 5 years

Other Requirements

- Certification to EPA required for compliance – no supporting documents to be submitted to EPA
- Meet the requirements of AWIA Section 2013
- No standard, method or tool specified by EPA
- Certification through online portal, email, or regular mail
- Keep copy of both documents for five years after certification
- Coordination – to the extent possible, coordinate with existing local emergency planning committees when preparing or revising RRA and ERP

Where Is the Water Industry Headed?

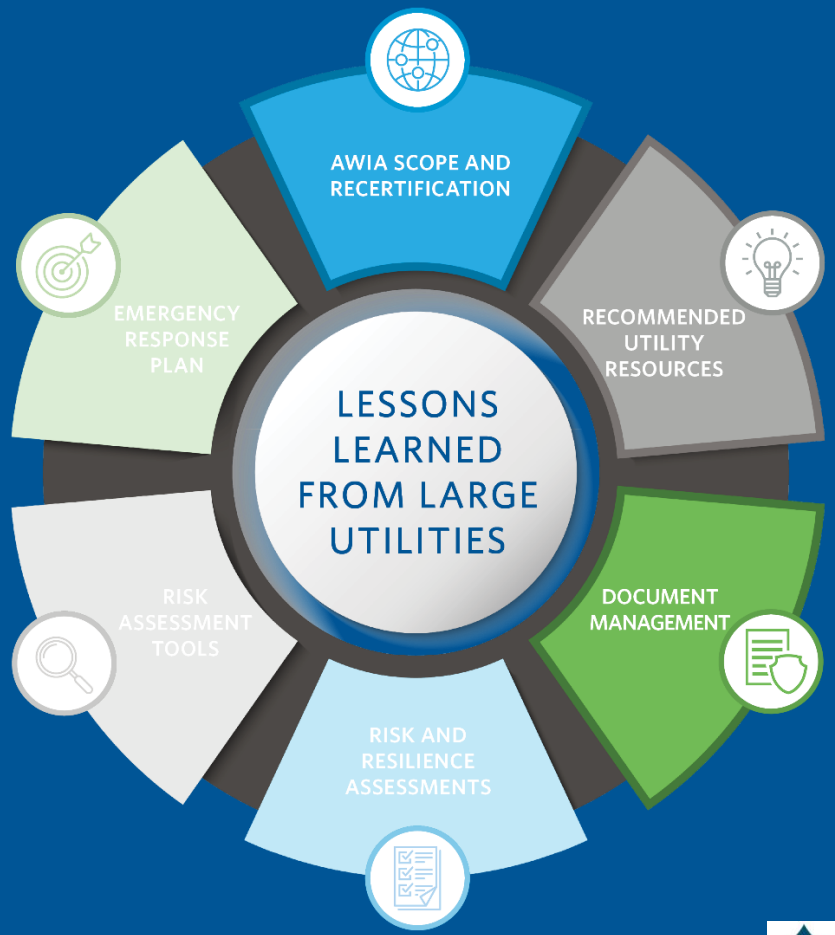
- All-hazards risk assessment (acute and chronic risks)
- Emergency response plan informed by risk assessment
- Risk-based approach to identification and assessment of proactive risk mitigation opportunities
- Continuous improvement within a risk management framework



*Adapted from DHS/EPA Water and Wastewater Systems Sector-Specific Plan (2015)

AWIA Execution Lessons Learned

Lessons Learned - General



AWIA Scope and Recertification

- Requirements apply only to water utilities; framework is applicable to all types of utilities
- Taking an “all hazards approach” is very important
- RRA ≠ VAs by another name
- RRAs → RMPs → ERPs
- Importance of regular updating (minimum requirement: every 5 years)

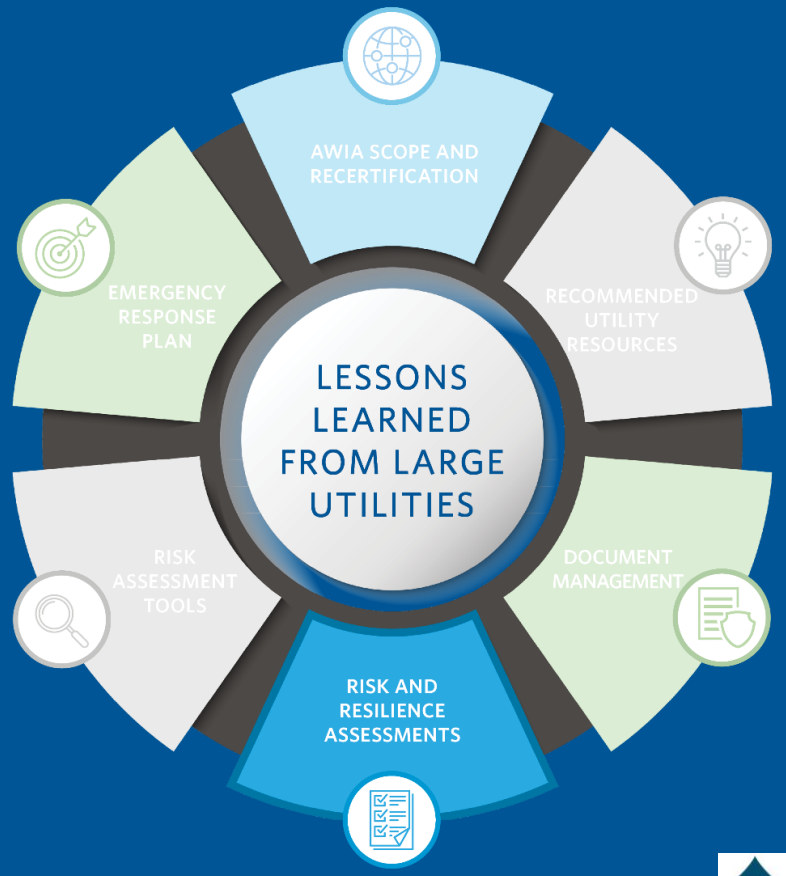
Recommended Utility Resources

- Appropriate management personnel and cross-section of system/technical experts
- Good management development opportunity
- Good training options are available from the EPA and AWWA (e.g., AWWA Risk and Resilience Certificate Program - EL260+)

Document Management

- Critical information – adequate protection measures need to be taken
  - Secure filesharing
  - Use passwords
  - Consider use of Non-Disclosure Agreements
- Communicate and enforce data management strategies to be used
- Elected officials – need to balance informational value vs. FOIA realities

Lessons Learned – Risk and Resilience Assessments



Q What will risk and resilience assessments cover?

A

Risks to the system: from malevolent acts and natural hazards

Assets/systems: resilience of all physical assets from source water to distribution system, (including security of) electronic, computer and automated systems

Assessment of: monitoring practices, financial infrastructure, chemical use, storage and handling, and O&M of the system

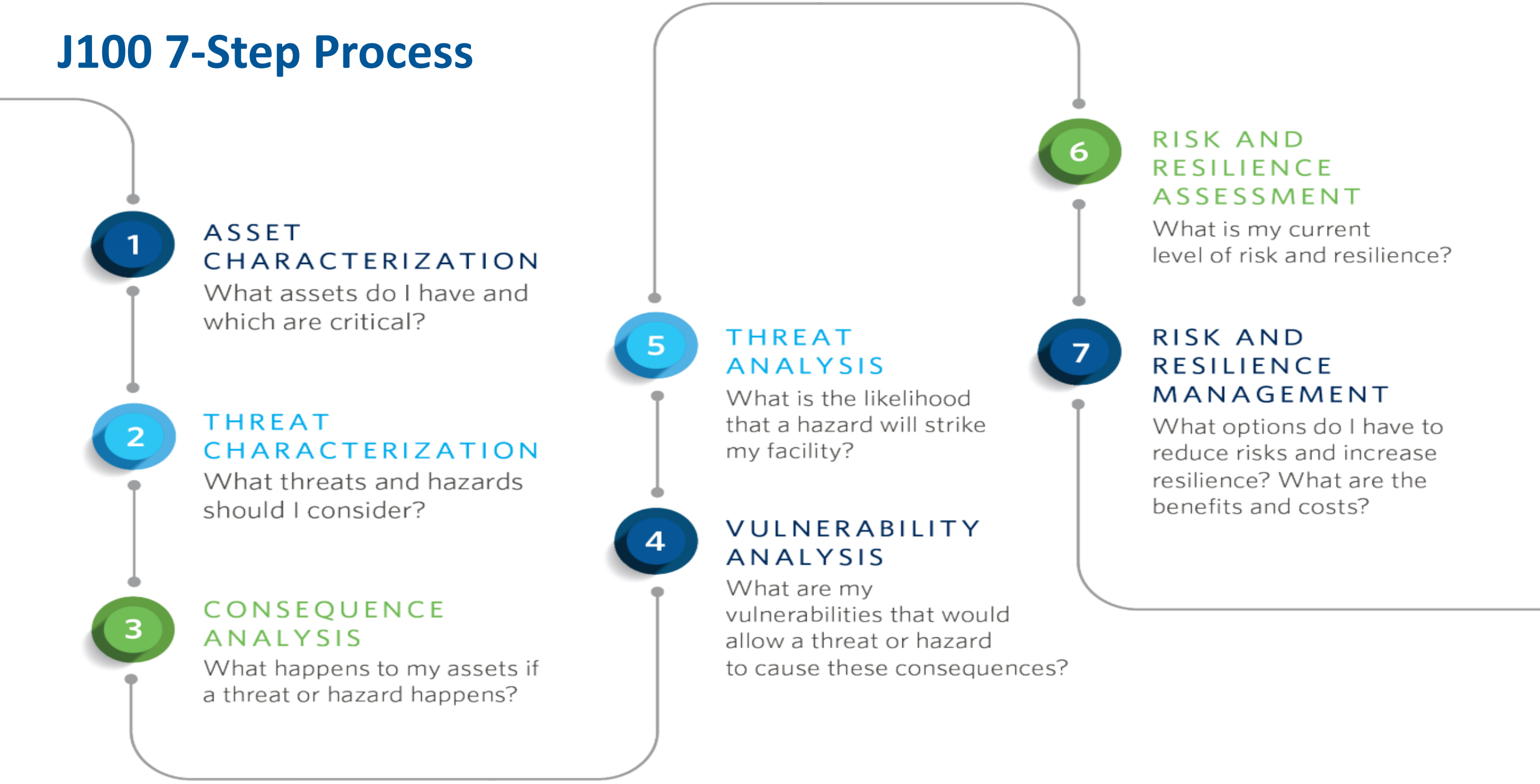
May include evaluation of capital and operational needs

Focus broadened from terrorism to all-hazards

Risk and Resilience Assessment

- Interpretation of intent and requirements of AWIA still requires management judgement
- Most common reference documents:
  - Risk Analysis and Management for Critical Asset Protection (RAMCAP®) Standard for Risk and Resilience Management of Water and Wastewater Systems (ANSI/AWWA J100-10 (R13)), July 2010)
  - Baseline Information on Malevolent Acts for Community Water Systems (EPA, July 2019)

J100 7-Step Process



Risk and Resilience Assessment – Asset Considerations

- Previous VAs can be useful … to a point
- Identify reasonable number of Threat-Asset Pairs (TAPs)
- Critical assets
  - Consider defining at a system level
  - Do not include back-up or other redundancy-related measures

Definition of Critical Asset (*Source: J100)*

An asset whose absence or unavailability would significantly degrade the ability of a utility to carry out its mission or would have unacceptable financial or political consequences for the owner or the community.

Risk and Resilience Assessment – Threat Considerations

Natural Hazards

- Management judgment and experience is critical
- Use state and federal sources of information on different types of natural hazards (e.g., USGS, FEMA, NOAA)

Risk and Resilience Assessment – Threat Considerations

Malevolent Acts

- EPA's baseline information:
  - Starting point likelihood estimates for different types of threats
  - Tend to be conservative
  - Adjust as appropriate
- Many utilities and EPA believe insider threats >> than outsider threats
- Need to understand how security-related subcategories (deterrence, detection, delay, and response) and how they relate to vulnerability score

Risk and Resilience Assessment – Threat Considerations

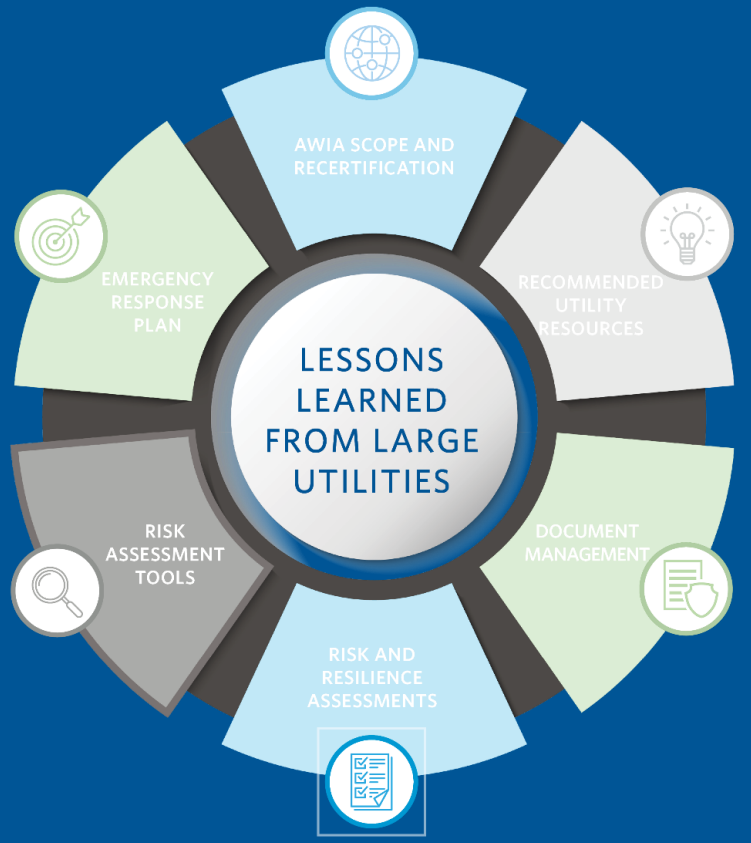
Cybersecurity

- Include both SCADA and Enterprise Systems (Finance, Billing, CIS)
- Maintaining the same measures of consequence, vulnerability, and likelihood allows comparison of all risks equally
- Most common reference documents:
  - NIST Cyber Security Framework 1.1 for IT/Enterprise Systems
  - AWWA Cybersecurity Guidance and Assessment Tool 2.0 for OT/SCADA

Risk and Resilience Assessment – Risk Mitigation Plans

- Broad array of countermeasures should be considered, including organizational
- Utility Resilience Index (URI) can provide useful information (operational- and financial-related resilience measures
- Develop “implementation initiatives” (costs, prioritization, schedule)

Lessons Learned – Risk Assessment Tools



Risk Assessment Tools

- Most common risk assessment tools:
  - EPA Vulnerability Self -Assessment Tool (VSAT Web 2.0)
  - EPA Guidance for Small Community Water Systems on Risk and Resilience Assessments
  - Utility Resilience Index (URI)
  - Utility or consultant-developed spreadsheet tools
  - AWWA Cybersecurity Guidance and Assessment Tool 2.0 for OT/SCADA
  - NIST Cyber Security Framework 1.1 for IT/Enterprise Systems

EPA Guidance for Small Community Water Systems on Risk and Resilience Assessments

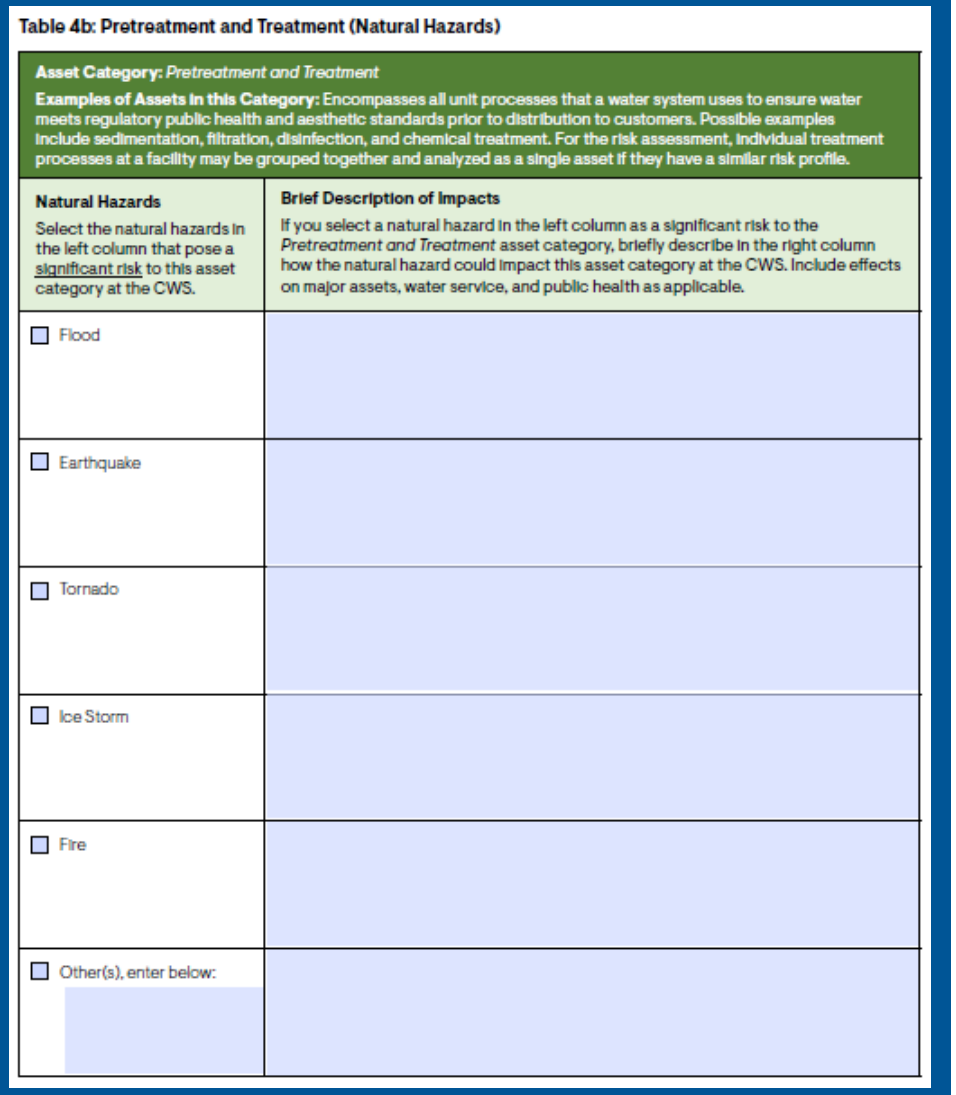


Table 4b: Pretreatment and Treatment (Natural Hazards)

Asset Category: *Pretreatment and Treatment*

Examples of Assets in this Category: Encompasses all unit processes that a water system uses to ensure water meets regulatory public health and aesthetic standards prior to distribution to customers. Possible examples include sedimentation, filtration, disinfection, and chemical treatment. For the risk assessment, individual treatment processes at a facility may be grouped together and analyzed as a single asset if they have a similar risk profile.

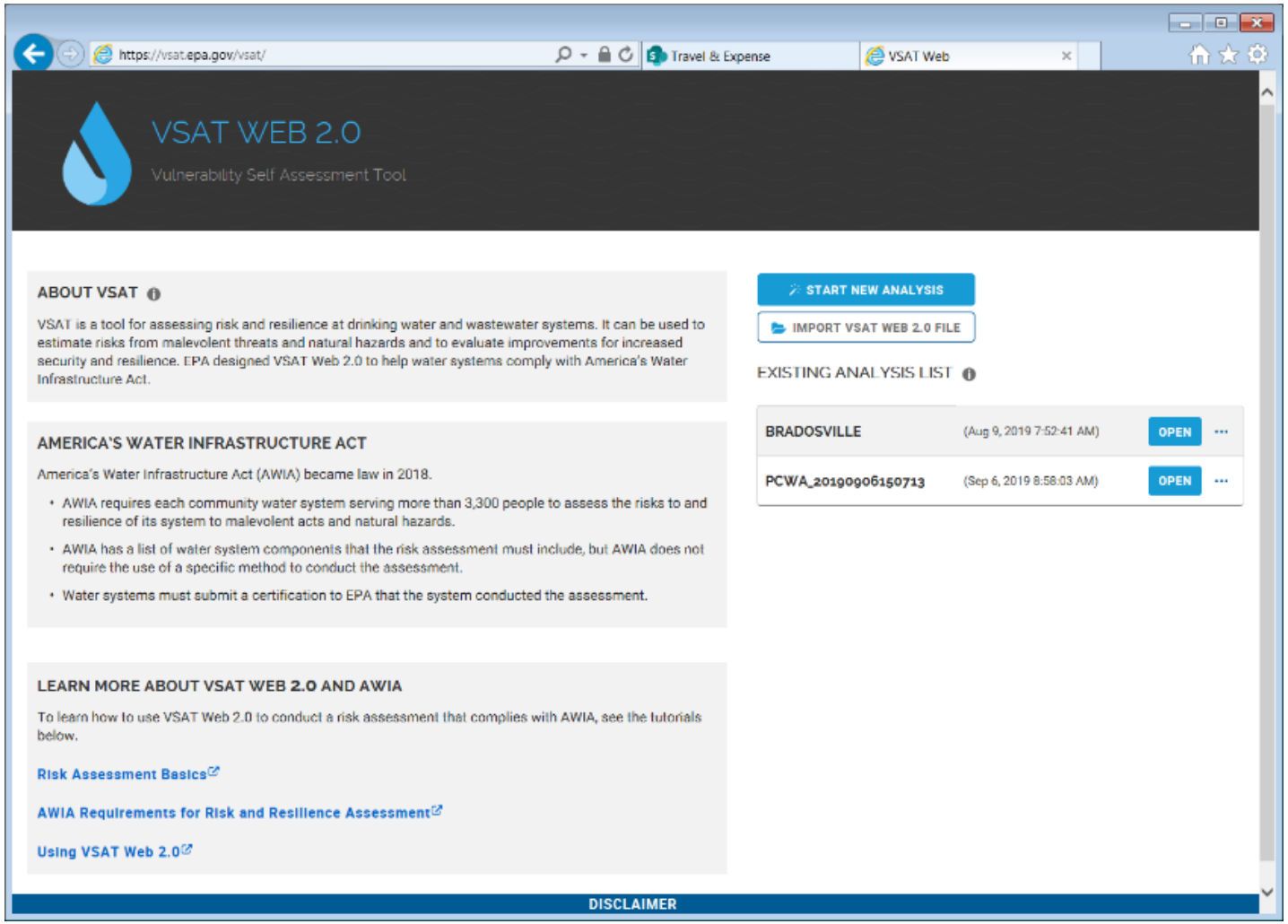
Natural Hazards Select the natural hazards in the left column that pose a significant risk to this asset category at the CWS.	Brief Description of Impacts If you select a natural hazard in the left column as a significant risk to the *Pretreatment and Treatment* asset category, briefly describe in the right column how the natural hazard could impact this asset category at the CWS. Include effects on major assets, water service, and public health as applicable.
☐ Flood	
☐ Earthquake	
☐ Tornado	
☐ Ice Storm	
☐ Fire	
☐ Other(s), enter below:	

- Intended for small community water systems serving less than 50,000 people
- Checklist approach (fillable pdf or word document available)
- Description of potential impacts by critical asset and threat
- List of countermeasures (optional)

https://www.epa.gov/waterresilience/small-system-risk-and-resilience-assessment-checklist

EPA VSAT WEB 2.0

- Web-based tool for assessing risk and resilience
- Resilience assessment at utility level (URI)
- Risk assessment follows the J100 process
- Consequence analysis uses the EPA WHEAT engine
- Baseline risk monetized to $/year
- Provides a pdf report



Resilience Assessment

- **Utility Resilience Index (URI) – a score between 0 – 100%**

Operational Indicators

O1: Emergency Response Plan (ERP)
O2: National Incident Management System (NIMS) Compliance
O3: Mutual Aid and Assistance
O4: Emergency Power for Critical Operations
O5: Ability to Meet Minimum Daily Demand (Water) or Treatment (Wastewater)
O6: Critical Parts and Equipment
O7: Critical Staff Resilience

Financial Indicators

F1: Business Continuity Plan (BCP)
F2: Utility Bond Rating
F3: GASB Assessment
F4: Unemployment
F5: Median Household Income

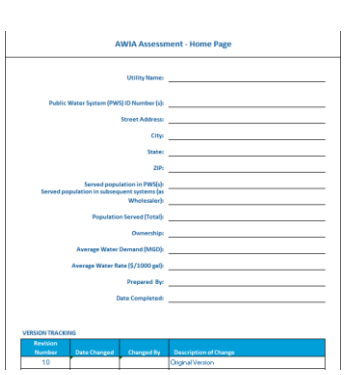
Operational indicators reflect the utility's tactical capacity to react quickly and/or cope with various incidents that have the potential to disrupt service.

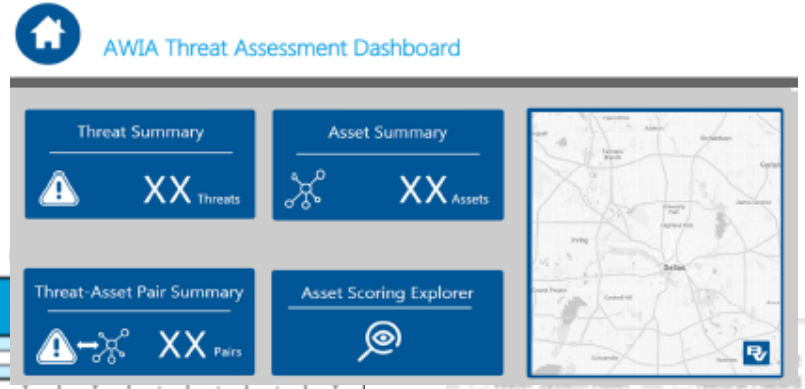
Financial indicators reflect the utility's fiscal capacity to react quickly and/or cope with various incidents that have the potential to disrupt revenue and costs.

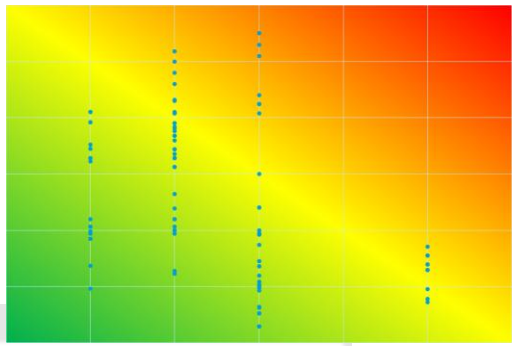
AWWA J100 Appendix H, Kevin M. Morley, AWWA Opflow August 2019

Utility or Consultant-developed Spreadsheet Tools

- Large systems
- Large amount of data available
- Ability to customize criteria and easily update data
- Query, summarize, report results
- Integration with other systems







Advantages of NIST/NCSR for IT/Enterprise Systems

- Focused on enterprise systems. Can be used for SCADA as well.
- Some utilities have already used the NCSR to meet a DHS grant program requirements
- For HIPPA compliant organizations, can translate the NCSR scores to HIPAA Security Rule scores
- National NCSR database allows baseline comparison

Advantages of AWWA for OT/SCADA Systems

- Focused on industrial control systems (SCADA) with some enterprise questions.
- SCADA terms and examples are used in the questions
- Easily maps to J100 and VSAT

Both are self assessments, 100+ questions
Scanning of networks / penetration testing if desired

Lessons Learned – Emergency Response Plans

Q What should emergency response plans cover?

A

Strategies and Resources

- Roles and responsibilities, Incident Command System, communications

Emergency Plans and Procedures

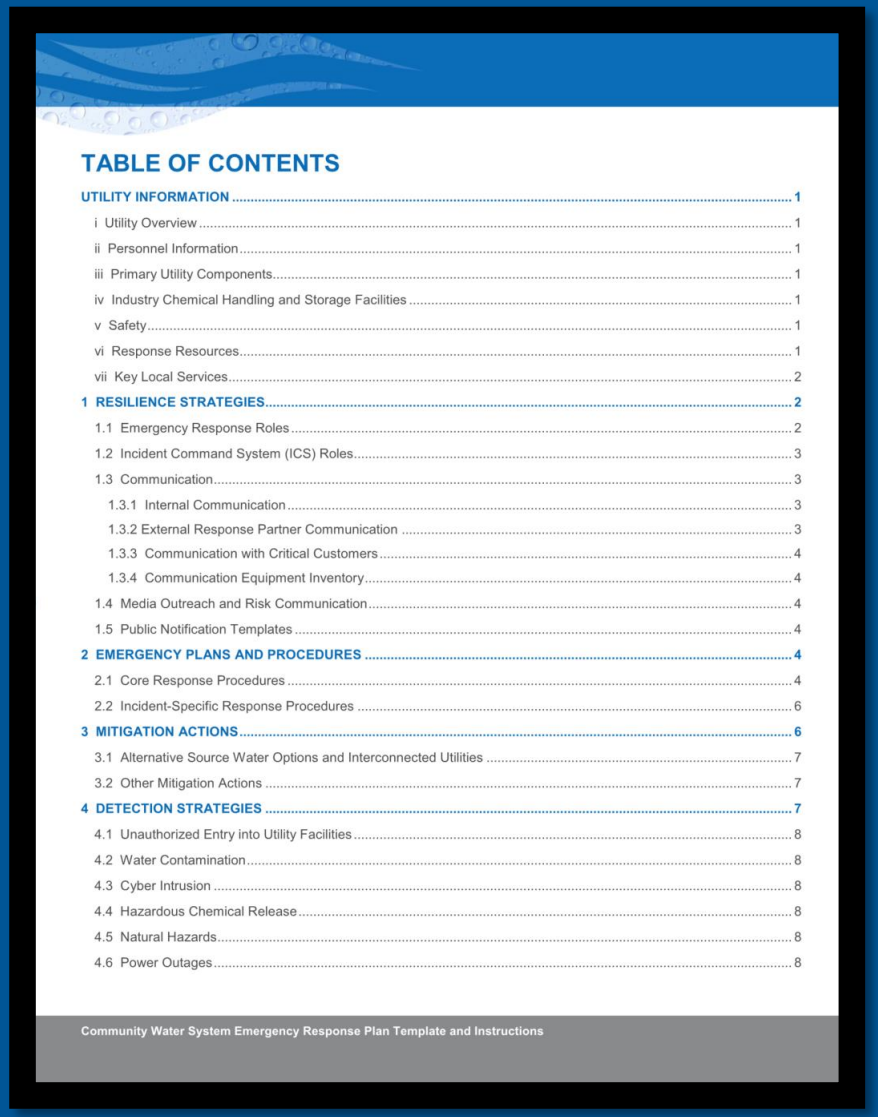
- Response plans and procedures (core and incident specific), list of equipment

Risk Mitigation Actions

- Alternative source water, interconnections, redundancy improvements, asset hardening, physical and cybersecurity countermeasures

Detection Strategies

- Intrusion detection, source water contamination, cyber intrusion, chemical release, etc.



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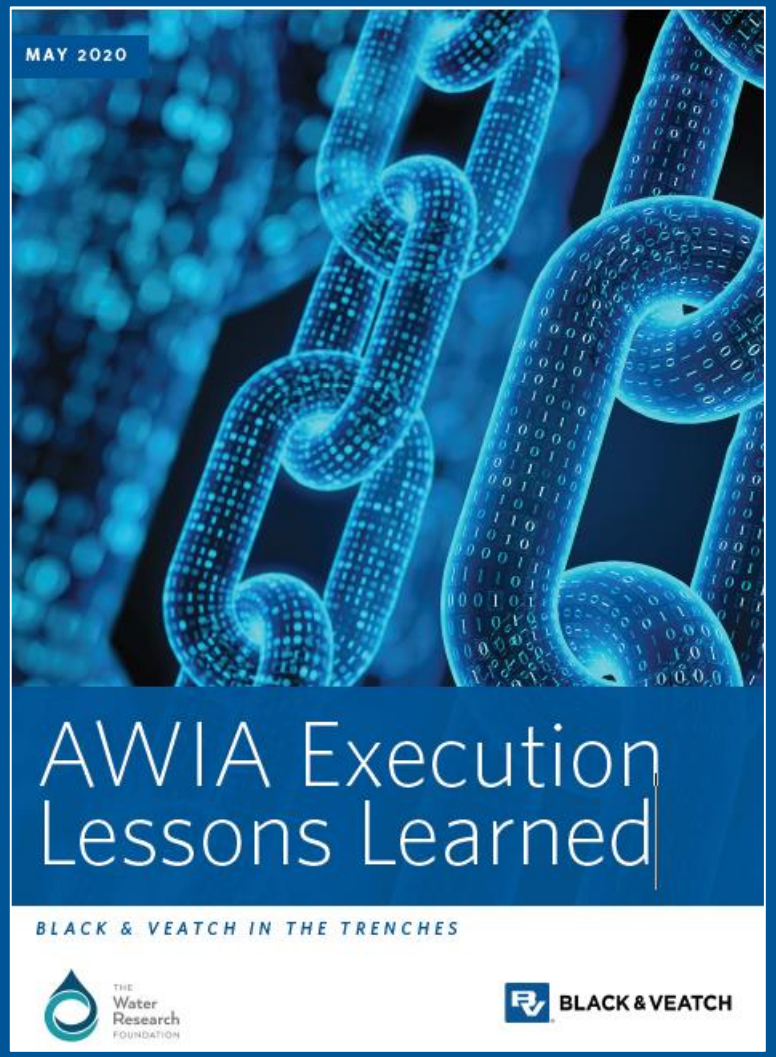
Community Water System Emergency Response Plan Template and Instructions

https://www.epa.gov/sites/production/files/2019-07/documents/190712-awia_erp_template_instructions_kab_508c_v6.pdf

Emergency Response Plans

- Most common reference documents:
  - Emergency Planning for Water and Wastewater Utilities (AWWA, M19, 2018)
  - EPA Emergency Response Plan Template and Instructions
  - EPA Incident Action Checklists for Water Utilities
- Consider state regulatory requirements
- Update annually or after each major event or significant change



https://www.waterrf.org/resource/awia-execution-lessons-learned

Additional Resources on RRAs and ERPs

- EPA – AWIA Section 2013 Technical Assistance Primer
- EPA – Risk Assessment and ERP Requirements Training
- AWWA Utility Risk and Resilience Certificate Program
- WRF 5014 – AWIA Execution Lessons Learned

Key Takeaways

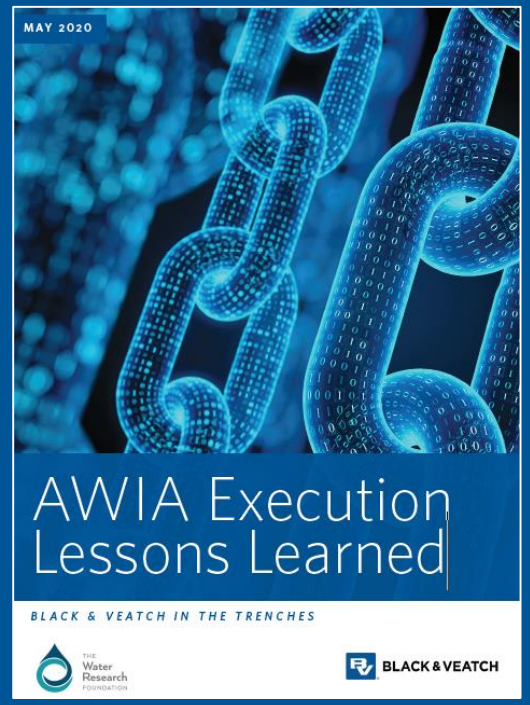
Key Takeaways

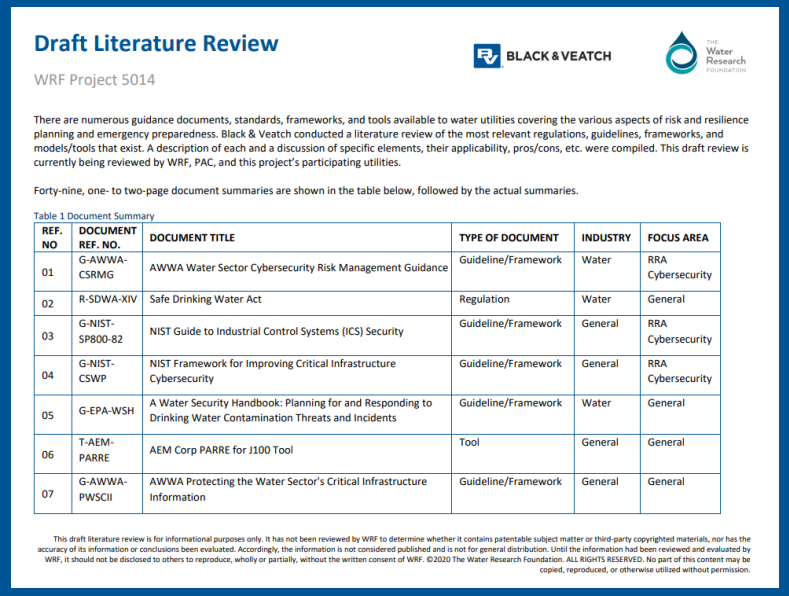
- Start early
- Get the right managerial/technical resources in place
- RRA ≠ VAs by another name
- RRAs → RMPs → ERPs (RMP level of detail/timing)
- Match tools and approach to the size and complexity of your organization
- Use of AWWA and EPA guidance documents and tools is great place to start
- Leverage the experience of others

WRF 5014 PROJECT DELIVERABLES AND DEADLINES

Deliverable	Deadline
Case Studies	October 2020
Practical Framework	December 2020
Final Project Presentation	February 2021

Please check WRF 5014 website for updates





Draft Literature Review

BLACK & VEATCH

WRF Project 5014

There are numerous guidance documents, standards, frameworks, and tools available to water utilities covering the various aspects of risk and resilience planning and emergency preparedness. Black & Veatch conducted a literature review of the most relevant regulations, guidelines, frameworks, and models/tools that exist. A description of each and a discussion of specific elements, their applicability, pros/cons, etc. were compiled. This draft review is currently being reviewed by WRF, PAC, and this project's participating utilities.

Forty-nine, one- to two-page document summaries are shown in the table below, followed by the actual summaries.

Table 1 Document Summary

REF. NO	DOCUMENT REF. NO.	DOCUMENT TITLE	TYPE OF DOCUMENT	INDUSTRY	FOCUS AREA
01	G-AWWA-CSRMG	AWWA Water Sector Cybersecurity Risk Management Guidance	Guideline/Framework	Water	RRA Cybersecurity
02	R-SDWA-XIV	Safe Drinking Water Act	Regulation	Water	General
03	G-NIST-SP800-82	NIST Guide to Industrial Control Systems (ICS) Security	Guideline/Framework	General	RRA Cybersecurity
04	G-NIST-CSWP	NIST Framework for Improving Critical Infrastructure Cybersecurity	Guideline/Framework	General	RRA Cybersecurity
05	G-EPA-WSH	A Water Security Handbook: Planning for and Responding to Drinking Water Contamination Threats and Incidents	Guideline/Framework	Water	General
06	T-AEM-PARRE	AEM Corp PARRE for J100 Tool	Tool	General	General
07	G-AWWA-PWSCII	AWWA Protecting the Water Sector's Critical Infrastructure Information	Guideline/Framework	General	General

For More Information Regarding Execution Lessons Learned

- BV's AWIA Execution Lessons Learned Guide
  - https://www.waterrf.org/system/files/resource/2020-06/ProjectPaper-5014-2.pdf

- BV's Resilience Literature Review Summary
  - https://www.waterrf.org/system/files/resource/2020-05/ProjectPaper-5014-1.pdf

Questions?

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