



America's Water Infrastructure Act (2018)

Risk Assessments and Emergency Response Plans

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America's Water Infrastructure Act (AWIA)

- America's Water Infrastructure Act of 2018 (AWIA) is a federal law that provides for water infrastructure improvements throughout the country.
- Replaces SDWA Section 1433 (from 2002 Bioterrorism Act)
- Section 2013 of AWIA includes newly enacted requirements for community water systems serving more than 3,300 people.

Overview

AWIA Section 2013 (a) – (f)

- Applies to all community water systems serving more than 3,300 people
- Conduct Risk and Resilience Assessments and update Emergency Response Plans
- Submit **Certifications to EPA** by specified deadlines
- Discussion of Resources and Techniques to assist with compliance

Additional AWIA Requirements

- Review, update, revise as necessary and submit a recertification for both plans at least every 5 years thereafter
- Coordinate with local emergency planning committees
- Maintain records (keep copies of RRA and ERP and any updates 5 years after certification submittal)

Risk and Resilience Assessment

- Evaluate the risk to the system from malevolent acts and natural hazards that include:
 - The resilience of the pipes and constructed conveyances, source water, water collection/intake, pretreatment, treatment, storage and distribution, electronic, computer or other automated systems (including security);
 - The monitoring practices of the system
 - The financial infrastructure of the system
 - Chemical use, storage and handling
 - Operation and maintenance

Risk and Resilience Assessment Cont.

- May include review of capital and operational needs for risk management.
- Review of Water Model and As-built Mapping:
- Review of Asset Management Plans and Inventories
- GASB 34 Inventory if Available

Financial Risk Analysis

- Continuity of Operations for attacks that threaten fiscal operations
- Ability to collect data and provide billing
- Cybersecurity



Risk and Resilience Assessment Steps

- Characterize Utility Assets
 - Define Critical Functions
 - Determine Critical Assets that if lost, could have major impacts
 - Determine existing security mechanisms
 - Ranking/Prioritization of Critical Assets
- Characterize Security Threats
 - Define Malevolent Threats
 - Identify Natural Hazards
 - Identify Internal/Accident Hazards
 - Ranking of Threats to Assets

Risk and Resilience Assessment Steps

- Consequence Analysis
 - Identify Consequence of Significant Events
 - Develop Worst Case Scenarios
 - Develop Consequence Rankings
- Vulnerability Analysis
 - Identify Vulnerable Assets, equipment, piping, processes
 - Review facility plans, as-built drawings, internal processes
 - Conduct Inspections to Verify Preliminary Determinations to Assess Vulnerability
 - Ranking of Vulnerability of Assets

Risk and Resilience Assessment Steps

- Threat Analysis
 - What is likelihood of event occurring
 - Statistical Probability of Natural Events
 - Analyze Dependency Hazards
 - Ranking of Threats to Assets
- Risk and Resilience Analysis
 - $Risk = Consequence \times Vulnerability \times Threat$
 - Calculate Resilience level for Water System

Risk and Resilience Management

- Management of Risk and Resilience
 - Acceptable Level of Scores
 - Identify Options for Security, Process, Training, etc. to head-off or mitigate significant events
 - Develop Estimated Cost for Mitigation Measures
 - Calculate Benefits vs Cost Ratios for Measures
 - Prioritize Measures through Capital Funding, SOP's, Operational upgrades, Management Commitment, Mission Statements, etc.

Risk and Resilience Resources

- www.epa.gov/waterresilience
- www.vsat.epa.gov
- www.awwa.org/risk
- www.awwa.org/resilience
- www.awwa.org/cybersecurity
- www.dhs.gov
- www.waterisac.org
- www.nationalwarn.org
- www.fema.gov

Emergency Response Plans

- Prepare or Revise an ERP that incorporates findings from the Risk and Resiliency Assessment
- Include:
 - Strategies and resources to improve resilience, including security and cybersecurity
 - Plans for responding to natural disasters or malevolent acts

Emergency Response Plans Cont'd

- Also Include:
 - Actions and equipment to lessen the impacts of malevolent acts or natural hazards
 - Strategies to detect malevolent acts or natural hazards
 - Intermunicipal Agreements
 - Secure Location of Plans and Records

Coordination

- Coordinate with local emergency planning committees when preparing or revising the risk assessment **and** ERP
 - EPA recommends coordination with federal, state, local, and private sector partners

Record Maintenance

- Maintain the risk assessment and ERP for 5 years after the due date for certification

Certification

- Each CWS must certify to EPA that the CWS completed the risk assessment and ERP
 - Do NOT need to send the actual risk assessment or ERP
 - Include only the CWS name, date of completion, and statement of completion
 - EPA may provide an optional certification template for the risk assessment and ERP

Completing and Submitting Reports

- Use Vulnerability Self-Assessment Tool (VSAT)
(<https://vsat.epa.gov/vsat/>)
- Emergency Response Plan template available on EPA website
- Both certifications can be submitted online or via mail
- EPA can assess a penalty of up to **\$25,000/day** for non-compliance
- Detailed information on submittal on EPA Website,
www.epa.gov/waterresilience

Certification Due Dates

Population
served
≥100,000

**March 31,
2020**



Population
served
50,000-99,999

**December
31, 2020**

Population
served
3,301-49,999

**June 30,
2021**

ERP

- Certify ERP not later than 6 months after completion of the risk assessment

5 Year Review and Revision

- Each CWS must review and, if necessary, revise the risk and resiliency assessment every five years after the certification deadline
 - Submit a certification to EPA that the CWS has reviewed and, if applicable, revised the risk and resiliency assessment
- Each CWS must review and, if necessary, revise the ERP every five years following review of the risk assessment
 - Incorporate any revisions to the risk assessment into the ERP
 - Submit a certification to EPA that the CWS has reviewed and, if necessary, revised the ERP not later than 6 months after the CWS has reviewed the risk assessment

Use of Previous Risk Assessment and ERP

- A CWS may use a risk assessment or ERP developed prior to enactment of the AWIA
- To meet certification requirements, a previous risk assessment or ERP must:
 - ✓ Include all assessment or response components listed in the law; and
 - ✓ Reflect the current condition of the CWS.
- If required assessment or response components have been omitted, the CWS may add those components
- If the CWS has undergone modifications, the CWS may update the risk assessment or ERP where needed

Use of Standards and Tools

- EPA does not require the use any standards or tools to develop a risk assessments or ERP under AWIA
 - CWS are only required to follow the law
- The use of standards (e.g., AWWA methods) and tools from EPA and others is recommended
 - Methods and tools can facilitate the development of sound risk assessments and ERPs
- No method or tool “guarantees” compliance with AWIA
 - The CWS must ensure it complies with all AWIA requirements
 - Alternate methods cannot be used in place of AWIA requirements

Resiliency



Certifications submitted...now what?

- Completing AWIA Risk and Resilience Assessment is a good start to identify problem areas
- A hydraulic model, or “digital twin,” takes resilience one step further and gives detailed, quantifiable information
- Emergency responses can be simulated and planned accordingly
- Keep Asset Management Plans Updated

Hydraulic Models and Digital Twins

- A digital twin is a hydraulic model that allows a utility to simulate events such as pipe failure, power outages, fires, or contamination
- Such models can be used to identify previously obscure risks, determine ways to build in resilience, and provide more precise inputs for emergency plans
- Managers can incorporate the model into control room operations where an operator can simulate an action before making any operational changes

Pipe Breaks

- Hydraulic models can simulate combinations of pipe breaks and valve conditions to identify which areas of the network are most at risk
- Replacement piping is often the solution to improving system resilience. Hydraulic modeling can help determine critical locations and the right pipe size
- If a major distribution system pipe breaks, operators can simulate how they might move water around the shut-down area to cause minimal disruption in the system

Power Outages

- Simulating power outages, operators can assess impacts of standby power generators or water in elevated storage tanks
- An emergency connection to a neighboring system can be installed; a hydraulic model can determine how much water can be moved while taking into account mismatched hydraulic grades or pipe diameters

Fires

- Hydraulic models can help identify the flow that can be delivered to any hydrant in the system and pinpoint weak areas
- With fire flow added to the digital twin, areas of the system with decreased pressure can be identified
- When elevated storage is marginal, a model can calculate the time it will take to drain any tanks

Contamination

- The usual response is to try isolating the contaminant plume and then flushing the water out of the system
- Digital twins can show which hydrants are likely to be in the center of the contaminant plume and result in the fastest cleaning of the pipes when flushed
- Operators would only need to input the extent of plumes, established by sampling

Become More Resilient!

- Details make a difference

Without model: *“If we do the shutdown, the pressure will drop in the south side of town”*

With model: *“If we do the shutdown, the pressure on the hill will drop from 42 psi to 23 psi, and the south side tank will drain by 7:40 pm if we don’t turn things back on.”*

Details...

- Without model: *“If we turn on the number 3 pump during the fire, the flow to the fire will increase”*
- With model: *“If we turn on the number 3 pump, the available fire flow will increase from 1,250 gpm to 2,100 gpm.”*

References:

Walski, Tom. “Risk and Resilience Assessment Isn’t Optional Anymore.” *Opflow*. Volume 45, No. 9. September 2019: p. 22-25

EPA Water Resilience website: <https://www.epa.gov/waterresilience>

Conclusions

- 2018 AWIA Requirements Can Help your Water Utility become more resilient by planning for Malevolent Acts and Natural hazards.
- A large amount, if not all of the required assessment and planning work can be done in house with existing staff and resources;
- It can be a long process to gather the data and complete the required plans. Small to medium size community water systems should begin the process as soon as possible to meet the 2020 and 2021 deadlines.
- Utilize Water Models, Asset Management software and other available tools to keep on top of water system changes and regulatory updates

Questions?

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<https://www.epa.gov/waterresilience/americas-water-infrastructure-act-2018-risk-assessments-and-emergency-response-plans>

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