



Operational Resiliency for Rural and Small Systems

Now that you have completed your *Rural and Small Systems* “Self-Assessment” exercise and determined that Operational Resiliency is important to your utility, this handout can help you get started on improving your Operational Resiliency practices. It describes some of the key “Building Blocks” of resiliency success for small utilities, giving you a starting place to improve utility resiliency practices. The handout also includes specific suggestions on how to measure a utility’s resiliency, and it lists a number of free resources with practical information on how to improve practices. Successful Operational Resiliency management is also highly dependent on successful management of a utility’s infrastructure. A complementary handout for *Infrastructure Stability* is available from USDA and EPA as a part of this resource series. For more information on the Operational Resiliency management area, please refer to the *Rural and Small Systems Guidebook to Sustainable Utility Management*.

OPERATIONAL RESILIENCY: The system ensures that its leadership and staff members work together to anticipate and avoid problems. It proactively identifies legal, financial, non-compliance, environmental, safety, security, and other natural threats to the system. It has conducted a vulnerability assessment for safety, natural disasters, and other environmental threats, and has prepared an emergency response plan for these hazards.

– *Rural and Small Systems Guidebook to Sustainable Utility Management*

Additional Information

EPA website: <https://www.epa.gov/sustainable-water-infrastructure/tools-effective-water-and-wastewater-utility-management>

USDA website: <https://www.rd.usda.gov/programs-services/services/sustainable-management-tools>



EMERGENCY PREPAREDNESS TOP TEN LIST

10. Prepare (or update) an emergency response plan. Make sure all employees help to create it and receive training on the plan.

9. Post updated emergency 24-hour numbers at your facilities in highly visible areas and give them to key personnel.

8. Get to know your local police and ask them to add your facilities to their local routine rounds. Practice emergency response procedures with local police and emergency response officials.

7. Fence and lock your facilities and vulnerable areas.

6. Lock all entry gates and doors, and set alarms to indicate illegal entry. Do not leave keys in equipment or vehicles at any time.

5. Install good lighting around your facilities and parking lots.

4. Identify existing and alternate supplies and maximize use of backflow prevention devices and interconnections.

3. Work with any businesses or homeowners that could be potential sources of contamination or damage to your infrastructure to reduce risk.

2. Lock monitoring wells and manholes to prevent vandals or terrorists from pouring contaminants into groundwater near your source, or accessing your underground infrastructure.

1. In case of an emergency, first call "911," and then follow your emergency response plan.

Source: Adapted from "Drinking Water Security and Emergency Preparedness Top Ten List" (EPA)

Building Blocks of Operational Resiliency

RISK ASSESSMENT AND REDUCTION PLAN

The first step in improving a system's resilience is to identify the threats that could affect the system, followed by creating a plan to reduce the risk of those threats. Utilities should first focus on high-consequence assets (those that have the largest impact to the system if they fail) when undertaking risk-reduction planning. As the utility works through the risk assessment and reduction process, its ability to understand and detect threats will increase, helping to improve resiliency over time.

EXAMPLE ACTIVITIES

- Conduct an all-hazards vulnerability assessment
- Create a risk reduction plan with counter-measures (including internal safety measures)
- Create a prioritized list of mitigation projects for high-consequence assets

EMERGENCY RESPONSE PLANNING

An Emergency Response Plan (ERP) is a documented plan that describes the actions that a utility would take in response to various major incidents. These could include natural disasters or emergencies (e.g., storms, earthquakes, floods, fires), incidents that lead to mass damage or disruption to the community or system, or even terrorism.

EXAMPLE ACTIVITIES

- Prepare an all-hazards ERP, including all associated documents (e.g., shut-off checklists, notices, emergency contact information)
- Conduct internal training and exercises on the ERP, including making staff aware of who is responsible for each activity
- Coordinate the utility's ERP with other local response partners, such as police and fire departments

RECOVERY AND MITIGATION

To recover quickly from any kind of disaster or emergency incident, the utility should be aware of mitigation and recovery activities that it would need to undertake for a range of threats in case the need should arise. This includes having reserve funds for system restoration (for more information, refer to the *Financial Viability* handout in this series).

EXAMPLE ACTIVITIES

- Identify resources that may be available to the utility for recovery after an emergency (e.g., FEMA or a local Mutual Aid Network (see page 4 of this document for more information))
- Predict maintenance and upgrade costs and incorporate these costs into financial plans
- Identify funding programs and understand required documentation for those that might be needed in a system recovery context

Measures

To gather information on a system’s resilience, it is necessary to use the measures most appropriate to the utility goals for resiliency performance. Below are several measurement areas, with specific example metrics for each.

RECORDABLE INCIDENTS

These measures allow utilities to understand how internal incidents may affect the system’s overall health and resilience.

EXAMPLE METRICS

- Annual number of work-related injuries
- Annual number of “near misses” (a “near miss” is an unsafe situation or condition where no injury occurred and no property was damaged, but where an injury or damage could have occurred with a slight shift in time or position)

RISK ASSESSMENT AND RESPONSE PREPAREDNESS

This measure helps utilities to understand how completely they have assessed their vulnerabilities, and how completely they have put plans into place to respond to those threats, should they occur.

EXAMPLE METRICS

- Does the utility have an ERP in place? (yes/no)
- Number of years since the last ERP update – less than five? (yes/no)
- Annual number of ERP trainings or exercises held
- Is there a process in place to identify and address new risks? (yes/no)

OVERALL OPERATIONAL RESILIENCY

This measure assesses a utility’s operational resiliency during ongoing operations (non-emergency conditions) and during emergencies.

EXAMPLE METRICS

Ongoing Operational Resiliency

- Period of time (hours or days) that minimum daily demand can be met with the primary water source unavailable
- Uptime for critical utility components on an ongoing basis:

$$100 \times \frac{\text{hours of critical component uptime}}{\text{hours that critical components have the physical potential to be operational}}$$

Operational Resiliency Under Emergency Conditions

- Power resiliency: Period of time (hours or days) for which backup power is available for critical operations
- Chemical resiliency: Period of time (hours or days) for which minimum daily demand can be met with water treated to meet SDWA standards
- Treatment operations resiliency: Percent of minimum daily demand met with primary production or treatment plant offline for 24, 48, and 72 hours
- Average number of response-capable backup staff available for critical operation and maintenance positions

Example Practices for Operational Resiliency at Rural and Small Systems

The practices listed below are drawn from the [Rural and Small Systems Guidebook](#) and the [Moving Toward Sustainability Roadmap](#) document. They are examples of practices that utilities have implemented to improve their performance in the area of Operational Resiliency.

Risk assessment for high consequence assets.

Emergency roles and responsibilities identification for utility personnel and local response partners.

Basic system information documentation (e.g., system maps and drawings).

Cybersecurity measures (e.g., virus protection on all computers).

Process improvement projects (e.g., fences and barriers around facilities, chemicals stored safely).

Local and state officials identified that would be involved in recovery.

Resources

Highlighted below are several practical and free resources that provide information for utilities on how to improve Operational Resiliency. For a longer list of resources covering more information on specific areas of utility management, please see the *Rural and Small Systems Guidebook to Sustainable Utility Management: Appendix III*.

<https://www.rd.usda.gov/files/RuralandSmallSystemsGuidebook2016.pdf>

Mutual Aid Networks

This website provides information on mutual aid networks, including how to join one. A mutual aid and assistance network provides water and wastewater utilities with the means to quickly obtain help (e.g., personnel, equipment, associated services) from other utilities to restore critical operations impacted during an emergency.

<https://www.epa.gov/waterutilityresponse/mutual-aid-and-assistance-drinking-water-and-wastewater-utilities>

Natural Disaster Preparedness Guidelines for Water and Wastewater Utilities

This checklist was developed to assist water and wastewater utilities in natural disaster readiness.

<http://rcap.org/resource/natural-disaster-preparedness-guidelines-for-water-and-wastewater-utilities/>

Taking Stock of Your Water System: A Simple Asset Inventory for Very Small Drinking Water Systems

This is an EPA brochure with detailed information and sample forms on how to conduct an asset inventory. The brochure is designed for small water systems, and helps create a standardized approach to asset inventories.

<https://www.epa.gov/sites/production/files/2015-04/documents/epa816k03002.pdf>

Vulnerability Self-Assessment Tool (VSAT)

This tool helps drinking water and wastewater utilities of all sizes to enhance their security and resiliency by identifying the highest risks to mission-critical operations; and finding the most cost-effective measures to reduce those risks.

<https://www.epa.gov/waterriskassessment/conduct-drinking-water-or-wastewater-utility-risk-assessment>

Water Infrastructure and Resiliency Finance Center

The Water Infrastructure and Resiliency Finance Center is an information and assistance center, helping communities make informed decisions for drinking water, wastewater, and stormwater infrastructure to protect human health and the environment. The Center can help communities identify financing options for resilient and sustainable infrastructure projects.

<https://www.epa.gov/waterfinancecenter>

