Ohio Emergency Response and Recovery Exercise for the Water and Wastewater Sector

December 14, 2016 • Department of Public Utilities, Division of Sewerage and Drainage Headquarters • Columbus, Ohio

EPA | OHIO WARN | Ohio Environmental Protection Agency | EMA | Northeast Ohio Regional Sewer District

After-Action Report

03/13/2017

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EXECUTIVE SUMMARY

On December 14-15, 2016, representatives from drinking water and wastewater utilities, local and state departments and agencies, federal agencies, and other partners participated in the *Ohio Emergency Response and Recovery Exercise for the Water and Wastewater Sector (Ohio Exercise)*.

The purpose of the *Ohio Exercise* was to enhance the ability of all stakeholders to prepare for, manage, and respond to a major disaster that affects water or wastewater infrastructure. Additional purposes included:

- Providing an opportunity to augment drinking water and wastewater utility emergency response planning
- Developing a list of action items to refine emergency response plans related to the water sector
- Building relationships between utilities, response partners and other interdependent sectors (emergency services, energy, health care, the private sector and other large water users)

Eighty representatives attended day one of the exercise, which featured a series of background presentations followed by a tabletop exercise (TTX). The TTX explored opportunities for enhancements in emergency preparedness, response and recovery across all the participating organizations. See **Appendix A** for the full participant list and contact information. The TTX presented a severe storm and tornado outbreak scenario designed to result in substantial impacts to drinking water and wastewater utilities. Participants engaged in discussions focused on identifying the strengths and weaknesses of current plans and procedures, as well as options for improving future water sector-related response and recovery.

Key discussion themes of the exercise included:

- Activation Process and Operations
- Communication, Reporting and Information Management
- Coordination between Utilities and Response Partners
- Resource Request Process
- Recovery Planning and Funding, Documentation and Hazard Mitigation
- Resources and Programs to Improve Preparedness, Response and Recovery Capabilities

Participants identified a number of improvement options for consideration. Key areas identified included:

- Enhance planning among utilities, response partners and interdependent sectors
- Conduct training and exercises focusing on water sector emergency response and recovery
- Improve communications and relationship building between stakeholders

See the **Results from the Action-Planning Session** section for a bulleted list of the improvement options. The improvement options identified by participants are not official recommendations. Stakeholders should review the options against their own goals to determine which to implement. The sample improvement planning matrix (**Appendix B**) can help determine priorities and identify resources needed to complete an option.

INTRODUCTION

Exercise:	Ohio Emergency Response and Recovery Exercise for the Water and Wastewater Sector
Location:	Department of Public Utilities, Division of Sewerage and Drainage Headquarters in Columbus, Ohio
Type of Exercise:	Tabletop Exercise
Focus:	Water and Wastewater Sector Emergency Preparedness, Response and Recovery
Exercise Date:	December 14-15, 2016
Exercise Sponsors:	Cities of Columbus, Dayton and Ottawa, Ohio Montgomery County, Ohio Northeast Ohio Regional Sewer District (NEORSD) Ohio Water/Wastewater Agency Response Network (OHWARN) Ohio Emergency Management Agency (Ohio EMA) Ohio Environmental Protection Agency (Ohio EPA) U.S. Environmental Protection Agency (USEPA)

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Eighty representatives attended day one of the event, which featured a series of background presentations followed by a tabletop exercise (TTX). The TTX explored opportunities for enhancements in emergency preparedness, response and recovery across all the participating organizations. See **Appendix A** for the full participant list and contact information. The scenario used to drive discussion was a severe storm and tornado outbreak. The scenario was designed to result in severe impacts to drinking water and wastewater utilities. Through discussion and a facilitated Action-Planning Session following the exercise, participants identified a number of improvement options.

BACKGROUND PRESENTATIONS

Sarah Moore (City of Columbus, Department of Public Utilities), Darryl Key (NEORSD) and Kevin Tingley (USEPA, Office of Water, Water Security Division [WSD]) provided opening remarks and thanked participants for attending. Alfredo Lagos (CSRA) addressed administrative details. Kevin Tingley led an icebreaker activity in which each participant was assigned a role and asked to form teams based on categories in the American Water Works Association (AWWA) *Water and Wastewater Mutual Aid & Assistance Resource Typing Manual*. The event continued with five background presentations covering emergency response and recovery-related activities, roles and responsibilities of utilities, water sector mutual aid and assistance programs, and state and federal agencies. A summary of the presentations can be found below.

<u>Sarah Moore, Columbus Department of Public Utilities, City of Columbus</u>

Sarah Moore provided insight on the roles of drinking water and wastewater utilities during typical service and during disaster. The term "utilities" can include many services, including drinking water, wastewater, power, cable, fiber optic and telephone. Drinking water utilities provide clean drinking water and support fire protection. Wastewater utilities provide waste and storm water management. Utilities are considered emergency first responders by the fact that they are responsible to be on call 24 hours a day to respond to loss of service or other interruptions. Emergency management agencies (EMAs) should get to know the utilities in their jurisdiction to better understand their needs and how best to help them maintain and support operations during a disaster. In one example, Ms. Moore worked with a utility that needed to restore drinking water service to 3,000 residents following Superstorm Sandy. The initial reaction by officials was to deliver large amounts of bottled water to the community. After coordinating with the utility operator directly, officials realized that providing a single generator to power a disabled pump station could restore service, thereby eliminating the expense of delivering and distributing the bottled water. Responding effectively to contamination incidents or the lack of confidence in the quality of drinking water also requires regular communication between utilities and their EMAs. This includes communicating one's status in order to help all responders be aware of the situation. Communication and coordination with response partners, including other utilities, EMAs, the public, media and others, is vital to return the water sector to service during a disaster.

To be better prepared for emergencies, an option for utilities to consider is to join Ohio Water/Wastewater Agency Response Network (OHWARN), a statewide mutual aid program specifically created to serve the needs of the water sector. OHWARN is a voluntary, free program open to drinking water and wastewater utilities of all sizes, as well as non-utility members, ranging from water sector associations to local EMAs to state agencies, such as Ohio EPA and Ohio EMA. By including emergency managers as non-utility members, OHWARN can better coordinate its support to utilities with EMAs throughout the state, including at the state Emergency Operations Center (EOC), where OHWARN maintains a seat. As a member of OHWARN, a utility can tap into a network of water sector-specific expertise and resources from utilities across the state that can help restore service quickly. In past cases, members of OHWARN were able to provide solutions in as soon as 6 hours. OHWARN is one of many such networks across the country. Ms. Moore played a short video to explain how WARNs work and why they might be activated (WARNs in Action). OHWARN could also activate on a national level to request resources from other states or to provide assistance to utilities in other states.

Matt Haverkos, Butler County Emergency Management Agency and Pam Haverkos, Clermont County Office of Emergency Management

Matt Haverkos and Pam Haverkos co-presented on how local or county EMAs help facilitate activities during disasters. County EMAs ensure that resource requests are met while not being duplicated. Many county EMAs do not have the experience to support a utility during a disaster, so it is important that they work with utilities in their jurisdiction to help improve their own understanding of the resource needs of the water sector and identify goals that can help utilities better prepare to respond. For utilities, it is just as important to recognize how essential the planning process is by actively developing and regularly practicing their own emergency response plans (ERPs). County EMAs manage their Local Emergency Planning Committees (LEPCs), which work to ensure regional preparedness. LEPCs are concerned with hazardous materials and receive reports on spills, as well as storage and manufacturing within the local jurisdiction. Utilities are encouraged to join their LEPC. In one example of the benefits of collaboration, an LEPC worked closely with a utility member (Greater Cincinnati Water Works) to ensure timely communication and a coordinated response following a spill of 100,000 gallons of diesel fuel into source waters used by the utility. During disaster response, utilities are encouraged to contact local EOC coordinators and become part of the local response efforts. EOCs can help coordinate response actions during the early days of a disaster to align resource needs that may not be thought of immediately. Typically, response and recovery activities work in tandem. Local EMAs rely on damage assessments to determine how best to allocate resources during a response and track the cost of damage recovery.

Although the response phase of disasters can be small-scale in time (days to weeks), recovery, especially the reimbursement component to pay for the cost of repairs, can take months to years. Local EMAs are especially well-positioned to support utilities through this part of the recovery process.

Dave Riley, Ohio EPA
Dave Riley described the role of Ohio EPA and the support they offer utilities, including communicating with them to share and request information, as well as providing technical guidance during a response. Ohio EPA maintains contact with utilities through phone calls or by sending staff to facilities. A quick response by Ohio EPA can help utilities return to operation sooner. Communicating operational status and resource requests quickly is critical as it can influence Ohio EPA's ability to respond to those needs. Utilities can also self-report vital information using the Ohio EPA 24-hour hotline (800-282-9378). Information from the hotline is transferred to the Ohio EPA district offices, which can deploy on-scene responders to determine the status of a utility. This information is then shared with decision-makers at the state level. To encourage greater coordination between utilities and local EMAs, Ohio EPA implemented a new rule in late December 2016 requiring utilities to exercise their contingency plans with their local EMAs at least once a year.

Josh Sigmon, Ohio EMA
Josh Sigmon described the day-to-day operations of Ohio EMA, which helps utilities respond to and recover from disasters by coordinating response activities. Emergency managers take a collaborative approach by pulling people together during a disaster, while an organization like Ohio EPA focuses on gathering sector-specific resources to support them. Ohio EMA practices for and has experience with typical disasters, but it is actively working to improve how it can respond to unanticipated second and third order effects, including prolonged drinking water and wastewater service outages. To know the full range of impacts during a disaster, Ohio EMA works to establish a statewide "common operating picture" to determine which state and federal organizations are responding, where they are operating, and what action they are carrying out. Establishing a common operating picture can help reduce duplicative, wasteful effort through a coordinated response, one of the chief responsibilities of Ohio EMA.

Ohio EMA is also the custodian of the state EOC, located in Columbus. The state EOC provides a platform to support county EMAs and EOCs when activated. The state EOC activates for both large- and small-scale incidents, ranging from those affecting the entire state to remote events impacting a village of fewer than 1,000 people. Information can be reported to the state EOC through telephone (614-799-6500) or email (emawatch@dps.ohio.gov).

Finally, Mr. Sigmon emphasized the value of OHWARN by noting that it has consistently stepped up to provide the right kind of support to struggling utilities with very short notice. By taking the initiative to provide technical resources from throughout the state and coordinate the response for a utility in need, OHWARN's effort reduces the burden on Ohio EMA to find resources.

Alicia Brown, USEPA Region 5 and Kevin Tingley, USEPA Office of Water
Alicia Brown and Kevin Tingley discussed support by the federal government to the water sector. The National Response Framework (NRF) delegates emergency response authority through a number of Emergency Support Function (ESF) annexes. Each ESF annex provides a basic structure of responsibilities. ESFs are activated to provide support for evolving critical infrastructure-related incident management requirements. ESF #3 covers public works and engineering activities conducted by federal organizations during a disaster. The U.S. Army Corps of Engineering (USACE) acts as a coordinator and calls in support agencies when particular technical expertise is needed. For example, as the responsible support agency for drinking water and wastewater utilities, USEPA is typically called when state jurisdictions exhaust their resources. USACE can subtask USEPA to help a state with the following activities:

- Operational assessments of utilities to determine their status
- Identify sources of backup power
- Technical analysis and data management
- Identify supplies of bulk water

In providing support, USEPA works with the Federal Emergency Management Agency (FEMA), the Agency of Toxic Substances and Disease Registry (ASTDR) and other federal organizations. In 2016, USEPA Region 5 office (based in Chicago, Illinois) was activated for the first time in response to the water contamination incident in Flint, Michigan. Support activities included collecting and analyzing water samples to help the state restore confidence in the drinking water. As a result, the Region 5 office gained valuable experience that can be used to support other states in the future.

TABLETOP EXERCISE SUMMARY AND DISCUSSION TOPICS

Following the background presentations, Alfredo Lagos, the exercise facilitator, covered the ground rules and objectives for the TTX. By the end of the exercise, participants should have:

- Acquired greater awareness of interdependencies between the water sector and other sectors, including emergency services, energy, the private sector and public health services.
- Identified gaps in available resources needed during response and recovery of a large-scale incident and learned how incorporating resource typing into existing procedures can improve resource sharing.
- Acquired greater understanding of trigger points as well as overall processes for requesting aid and responding to requests from all levels of government.
- Acquired greater awareness of Ohio Water/Wastewater Agency Response Network (OHWARN) and how its operational plan is coordinated with response partners.

Alfredo then presented the scenario: a large storm system occurring on Mother's Day weekend produces supercells (fierce, rotating thunderstorms) with heavy, prolonged rainfall and tornados that impact southwestern Ohio, as well as the surrounding states of Illinois, Indiana and Kentucky. The severe storm outbreak results in 43 fatalities, over 700 injuries, and 70,000 displaced persons in Ohio alone. The disaster damages buildings, roads, bridges and other infrastructure and causes localized flooding, power outages and communication failures. Over 1,000 water and wastewater utilities across 20 counties are impacted affecting millions of people. The TTX presented the scenario in four distinct phases:

(1) Phase 1 explored pre-disaster activities 48 to 24 hours before the severe storm outbreak.
(2) Phase 2 explored activities during the first three days following the severe storm outbreak.
(3) Phase 3 explored four days to two weeks after the severe storm outbreak.
(4) Phase 4 explored three months following the severe storm outbreak.

During the exercise, Alfredo led a group discussion covering topics relevant to the exercise objectives and each scenario phase. Several key themes were identified, including:

- Activation Process and Operations
- Communication, Reporting and Information Management
- Coordination between Utilities and Response Partners
- Resource Request Process
- Recovery Planning and Funding, Documentation and Hazard Mitigation
- Resources and Programs to Improve Preparedness, Response and Recovery Capabilities

Activation Process and Operations

Pre-disaster Planning and Actions
Participants described utility pre-disaster preparedness activities expected in anticipation of the disaster from 48 hours up to the point of the storm system's impact, including:

- Monitoring weather
- Developing call schedules to ensure that staff are equipped with safety equipment
- Having staff report in to ensure adequate numbers
- Monitoring and informing on-duty staff of weather alerts and possible staging areas for taking shelter
- Reviewing the Emergency Response Plan (ERP) and facility Emergency Action Plans (EAPs)

with operators

- Checking emergency equipment, including backup generators and fuel levels of generators, trucks, and other equipment
- Contacting contactors to procure backup generators and fuel
- Testing all pumps
- Cycling water storage tanks in the event that treatment goes down
- Topping off storage tanks
- Contacting utility customer service representatives to make them aware of the situation

Participants noted completing these activities takes time, as much as half a day or longer, depending on available staff and the number and size of facilities. Several participants agreed that they would most likely wait to see what happens until they got more information on the impact of the storm system. Several participants would be in communication with the National Weather Service (NWS) for up to date forecasts. Others would contact their local or county EMA to ensure they are in coordination. One participant noted they would contact the Ohio Department of Transportation (ODOT) to learn of impacts to transportation routes.

Participants from local EMAs noted that their pre-disaster activities would be limited as well, mostly focused on monitoring the situation with notices from the NWS and other weather sources. Depending on the forecast, EMAs would share the information with their local safety services and others. Participants noted that their county governments would be reaching out to their local EOC call centers. While some EMAs would opt to wait to contact utilities in their jurisdiction, others stated that they would immediately initiate contact with utilities via telephone in order to determine the appropriate person to contact as a response partner under ESF #3 (Public Works and Engineering). Pre-disaster contact could also be useful to circulate information needed for effective coordination or to determine if any additional resources are needed. Some participants stressed that a big challenge and area for improvement is for local EMAs to determine who the appropriate point of contact is at private and smaller utilities within their jurisdiction. Local EMAs might rely on a county water utility association or other group to provide contact information for these utilities if they do not have it already. Reaching contacts at utilities on a weekend or holiday can also be difficult, as representatives may not be checking email.

Pre-disaster activities by Ohio EPA could include planning for support to utilities, including issuing drinking water advisories (e.g., boil water orders), determining how to notify the public of service interruptions, looking at connections to other water utilities as alternate water sources, and determining backup generator needs. Ohio EPA can send a blast email to all utilities in the probable impact area and, if needed, visit the facilities as part of pre-disaster preparation.

Disaster Impacts on the Water Sector and Activation

Once the disaster hits in the scenario narrative, participants identified a number of activities that would likely occur in response, including:

- Determining availability of staff
- Preparing available staff and equipment (e.g., chainsaws and trucks) to respond
- Clearing debris (e.g., downed trees) from transportation routes in order to access utility facilities
- Considering safety issues such as downed power lines that could impact debris clearing and repair work
- Shutting down systems to prevent major leaks
- Conducting damage assessments and documenting damages

- Providing status reports to response partners
- Prioritizing a return of service to critical customers
- Completing emergency repairs

Utility representatives noted that damage to wells, water towers, large mains or other utility infrastructure can release large amounts of water. The leaks need to be shut off quickly in order to avoid other problems. To shut off such leaks, repair teams need to get out into the field. Participants noted the importance of efficiently accessing blueprints and other data in order to locate shut off valves. Participants also noted the need for equipment, such as flashlights and spare batteries, to access valves and check points in underground facilities and after dark.

Participants discussed the extensive impact a power outage can have on water sector operations. Most equipment critical for treatment processes, such as pumps, valves, and supervisory control and data acquisition (SCADA) telemetry systems require electricity to operate. In particular, the loss of SCADA systems makes it extremely difficult for a utility to function. SCADA systems allow utilities to use a small staff to remotely monitor and control facilities distributed across a large geographic area. If power is down, backup generators can temporarily run SCADA systems. Participants shared other ideas, including installing inverters to communicate generator-related information to the central SCADA system. However, this configuration only works for SCADA systems that use fiber optic cables, but not systems relying on radio communication to transmit information. If all backup power sources fail and SCADA systems go offline, utilities would have to rely on field operators for visual inspections and manual facility status reports. This would take significantly more staff time and effort than other organizations may realize. Participants emphasized that immediately restoring SCADA systems is a critical piece in a return to normal operations and that resorting to manual operations could hinder staff response time and unnecessarily consume resources, impact other priorities and effectively result in a complete shutdown of utility operations.

Several participants emphasized the importance of working closely with electric utilities during a response to receive alerts and guidance concerning downed power lines. Equally important is active communication with electric utilities during normal operations to ensure that water sector utilities are included on their list of facilities for priority restoration. Participants pointed out that while large utilities tend to receive more attention from power providers, all utilities are critical infrastructure regardless of size and should maintain a designated point of contact with their electric utility for direct communications during a disaster. Water sector utilities should also work with power providers to minimize future impacts through mitigation activities such as creating redundancies or relocating and burying power cables. Participants also recommended working with electric utilities to clear trees that are susceptible to damage from high wind from the path of power lines that are near or lead to critical facilities.

Damage to drinking water utilities can impact water quality for many thousands of customers. Typically, water quality issues are reported directly to the utility or their respective jurisdiction. Under state regulations, utilities have 24 hours to report water quality issues to Ohio EPA and declare a boil water or other advisory for the service area. Participants noted that public health departments receive a list of the status of water quality advisories to provide to restaurants, grocery stores, hospitals and medical facilities, and other organizations that rely on safe drinking water. Public health departments can receive this information directly from utilities. Other times, they might learn about water quality issues from other sources and should contact utilities for confirmation. Ohio EPA can also declare water quality advisories and share it with response partners to then distribute to other critical interdependent organizations.

Utility Staffing
Participants noted that coordinating staff was one of the most critical aspects to the activation process and successful emergency response operations. Whether the scope of a disaster overwhelms the response capabilities of utility or personal concerns impacts staff availability (for example, not reporting to work to care for one's family or home), a utility must ensure a sufficient number of qualified personnel are available to conduct an effective emergency response. Staff may not be accessible, may be unreachable or simply unable to report to work. Participants noted this can be especially difficult for small or medium utilities which have small staffs and multiple facilities spread over a wide area. Other participants noted that staff can be spread even thinner when having to respond to non-water parts of their system, such as an onsite dam. One utility recommended maintaining a resource manual that indicates where critical infrastructure components are located throughout the utility system. A backup copy of the resources manual should be shared with the local EMA to ensure redundancy. Utilities can also access personnel support from OHWARN and its member associations such as Ohio Rural Water Association (ORWA).

Communication, Reporting and Information Management

Communications Methods
Participants agreed that communication is critical during all phases of a disaster. Most communication takes place through telephone calls and emails to and from utilities, local, county and state agencies, response partners and interdependent sectors. Social media outlets are used for public notifications, but not for communicating with utilities regarding response activities. Utility staff communicates between central offices, treatment plants and other infrastructure components spread throughout the service area. Due to the heavy reliance on landline and cellular telephones during regular operations, damage to or overload of these networks would pose a serious challenge to effective communication among utility staff and slow down response efforts. Communication with staff in the field is even more important if SCADA systems are down. Several participants noted their utilities use radios and would rely on them as a backup system. Others no longer use radios as this communication method has been phased out at their utility. Also, staff may not have access to radios if they are unable to get to work.

Reporting and Information Management
Utility representatives noted the importance of maintaining situational awareness, which is the ability to identify, process, and comprehend critical elements of information about an incident. Information sources include staff, local government agencies, listening to emergency scanners (for access to police or fire department radio communications) and gathering information from SCADA systems, if they are available. Utilities should compile a record or situational assessment as the response progresses.

Starting at the utility level, through local EMAs to state agencies and up to the federal government, the group walked through reporting and information management procedures in place in Ohio. Communication between organizations is necessary to ensure an effective response across the state in support of the water sector. **Figure 1** shows an overview of the information flow between stakeholders as discussed during the exercise.

Utilities could report information such as their operational status, ongoing activities and resource requests to several organizations, including:

- Local EMAs
- OHWARN
- Public Utilities Commission of Ohio (PUCO)
- Ohio EPA
- Potentially other state agencies

Alternatively, these organizations could contact utilities directly for the same information. Participants noted that it is rare that Ohio EPA would receive information directly from county EMAs. Additionally, some public health agency representatives noted they would not be in direct contact with utilities. Public health agency representatives also noted that hearing from EMAs is variable and depends on the circumstances of the disaster.

The organizations listed above collect information and share it with their respective response partners, including Ohio EMA through its regional field offices or directly with the state EOC. Ohio EMA records the information within WebEOC, the state's web-enabled crisis information management system. WebEOC helps track aid requests, as well as significant updates (for example, when a major water main is back online). Ohio EMA summarizes the information and shares it with the governor, local EMAs, supporting state agencies and federal partners. This helps to establish the statewide common operating picture and maintain situational awareness as activities progress. Participants noted that WebEOC is broadly used, including by county EMAs and state agencies. Several utility representatives noted they do not use it. Other utilities use WebEOC but only when their county EOC is activated. Participants noted there is not a web-enabled system in place that all utilities can use to self-report their status online. Instead, utilities use telephone or email communication to report their status to their local or county EMA and Ohio EPA.

At the federal level, sharing information through the established reporting chain with FEMA, U.S. Department of Homeland Security (DHS), USEPA and other partners helps streamline requests for federal assistance. The information helps FEMA determine what support may be needed, including a Presidential Disaster Declaration. A request for a Presidential Disaster Declaration relies on accurate and thorough information reporting from all levels. If a declaration is granted, the cost of the damages from the impacted area must reach a threshold of $16 million in order for Ohio to receive federal funding to repair water sector and other infrastructure under the FEMA Public Assistance Grant Program.

Also at the federal level, situational information helps DHS monitor the operational status of infrastructure of national significance. A drinking water or wastewater utility is classified as an infrastructure of national significance if, for example, it supports a business that manufactures equipment critical for the success of U.S. military operations. The USEPA regional office in Chicago, Illinois (Region 5) and headquarters in Washington, D.C. could be expected to ask for information updates about the impacts to the water sector in Ohio during a response. The U.S. EPA regional office may contact Ohio EPA for information regarding operational status of utilities and impacted communities. In the days following a disaster, the expectation and desire for information sharing increases at all levels of authority. Any information can help senior officials better anticipate federal resource requests and respond quicker, even if it provides an incomplete picture of the situation. If there is a federal response under ESF #3 of the National Response Framework, USEPA can disseminate information to the regional office and then to its field level teams supporting Ohio agencies. While not involved in natural disasters, Federal Bureau of Investigation (FBI) representatives noted that its unit supporting critical infrastructure also monitors response activities and can work with state and federal agencies to address security threats to utilities.

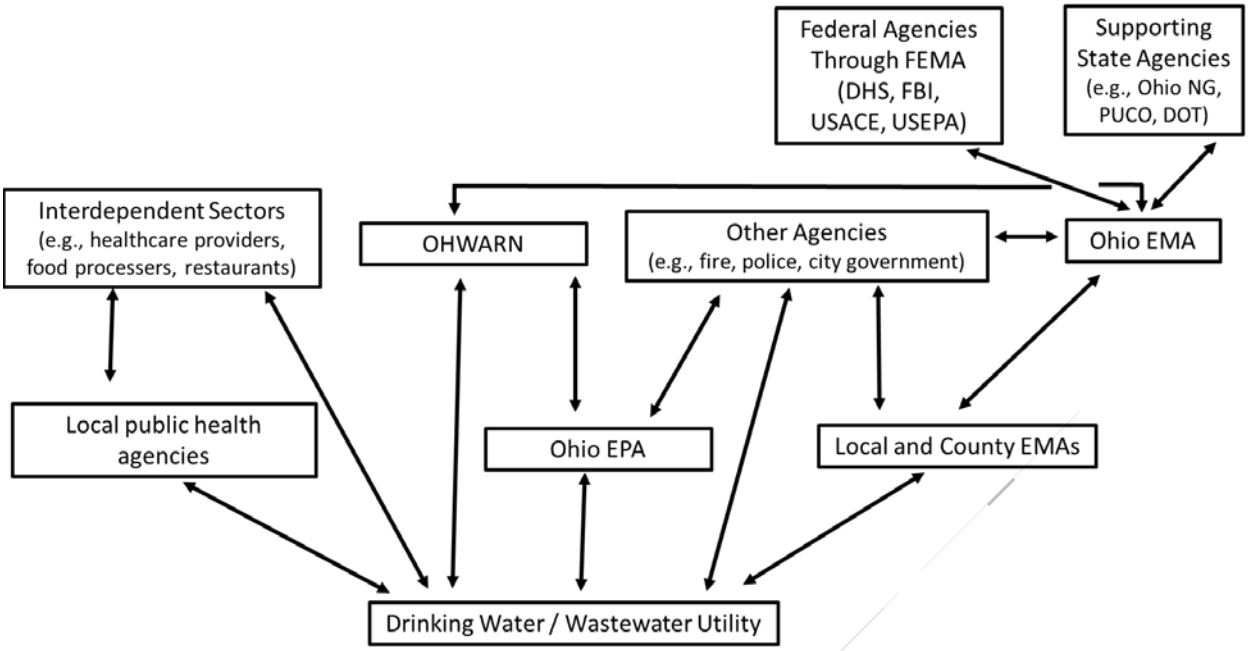

Figure 1. Information Flow between Stakeholders

Coordination between Utilities and Response Partners

Coordination between Utilities and Emergency Management

Participants emphasized the importance of maintaining dialogue among stakeholders, particularly between utility representatives and local or county emergency managers. Any one county can have 30 to 40 or more utilities within its jurisdiction. EMAs rely on utilities to provide emergency managers with information, as they are not subject matter experts on the water sector. As a result, a utility and its local emergency managers should maintain a working relationship during normal operations. Doing so can help both organizations be better informed about each other's resources, capabilities and anticipated needs before a disaster. Local or county EMAs also benefit by knowing each utility's critical customers, such as hospitals.

Utilities should have an understanding of the potential impacts to their operations if certain assets are damaged or taken off-line due to a disaster, and should share that information with local emergency managers. Participants recognized that utilities should perform a complete assessment of critical infrastructure to identify how the utility would be impacted from equipment failure, contamination or other incidents. Any information about power or service loss and potential impacts to public health should be communicated to local emergency managers to inform decision making and emergency response activities. By working together, a utility can access resources available in the county or state. Going through a single point of contact reduces the need for a utility to contact multiple organizations to ask for resources. This also helps the local emergency manager track their operational status and resource requests. By submitting damage information, especially related to power loss, a local EOC can advocate for utilities directly with power providers and facilitate providers bringing in resources from other states to expedite repairs to the electric grid. Damage assessment information provided by utilities can often push a county over the local or county threshold for a federal disaster declaration. Participants also noted that EMAs could deploy their own teams to help utilities complete damage assessments.

Local or county EMAs also prioritize the most critical facilities to be restored. In order to prioritize facilities, information from utilities needs to be reported. For example, for power outages, EMAs will want to know which facilities are out of power, how soon power needs to be restored and how soon they can get back to normal operations. Recognizing that there is a finite amount of resources, EMAs use the information reported to help prioritize and decide which facilities will receive aid and when. Information shared by the county EMA can help state executives and agencies set priorities statewide. Participants noted that while there is no clear cut formula for prioritizing a response, the information can help state leadership determine where the greatest impact in the shortest amount of time can be made. The information can help state agencies forecast what resources could be pulled in over a longer time period, from the next few days to weeks. Ohio EMA can access resources that are available across the state as well as submit a request nationwide to leverage resources from other states through the Emergency Management Assistance Compact (EMAC). EMAC offers assistance during governor-declared states of emergency through a system that allows states to send personnel, equipment, and commodities to help disaster relief efforts in other states. Ohio EMA can also request assistance from federal response partners through FEMA's disaster declaration process. In coordination with USACE, USEPA can provide sampling and other technical assistance to utilities through its regional office.

OHWARN

Participants discussed the role of OHWARN, which is managed by a steering committee of utility and non-utility members. OHWARN helps member utilities manage the impacts of emergencies in Ohio by providing information to other utilities, Ohio EPA and Ohio EMA on resource requests, any of which may be able to provide rapid assistance. OHWARN uses its website to provide contact information for all member utilities and host a forum to post requests for assistance. A blast request feature visible to all members allows utilities to handle an issue amongst themselves.

For example, a short-staffed utility might need an operator to continue operations or assist with repairs. The utility posts the resource request to the website using resource typing language from the AWWA Mutual Aid & Assistance Resource Typing Manual. Members respond indicating if they have the capability to provide assistance. The requesting utility can accept an offer and agree to the assistance under the terms of the mutual aid agreement. The requesting utility might work with one or several responding utilities to get the support it needs. If the need cannot be met by an OHWARN member, the steering committee can leverage OHWARN's seat in the state EOC to direct the request to another organization. This allows OHWARN to access resources from across the state or from other states using National WARN or EMAC. If the resource request is met, the active request is closed and the information is shared to update response partners. Closing the request helps to eliminate duplication.

Participants noted that a non-member utility also can request assistance from OHWARN, but must become a member by signing the mutual aid agreement. As a result, membership usually increases during a disaster. A representative from KYWARN shared similar experiences from Kentucky and emphasized that a written agreement must be in place to receive reimbursement from FEMA for providing mutual aid and assistance if the activities are eligible under a Presidential Disaster Declaration. Participants emphasized that for OHWARN to thrive, more utilities should join and use the network. Utilities can enroll in OHWARN by visiting http://www.ohwarn.org.

Resource Request Process

Participants noted utilities use several channels to request resources, including neighboring utilities, mutual aid and assistance networks, local or county EMAs and state agencies. It is important that utilities file their resource request with their local or county EMA regardless of the request recipient. This documents the request in an established resource request process. The process involves a finite chain in

order to help prevent political interference, erosion of tracking, duplication of requests and other issues. By following this process, local emergency managers also will know a utility's operating status and it will help when collecting information for reimbursement after the disaster.

Participants noted that it is important to address issues and resource requests at the lowest level possible. Emergency managers working with a utility begin by searching the local jurisdiction for a resource, and then, if needed, branch out to the county, state or OHWARN. Participants noted that a utility would probably not contact Ohio EMA directly. If this did happen, the state would redirect the utility to their local or county EMA to ensure they follow the established request process. As soon as an emergency manager is aware of a request, it is entered into WebEOC to track and deliver support.

Alternate Water Supplies

Access to safe drinking water is a critical need for communities. Participants emphasized that procedures for providing an alternate supply of water in case of disruption to regular services need to be established before a disaster, given the complexity of the issue. Under the Ohio Contingency Plan Rule, a drinking water utility is required to state how it would provide an alternate source of water. This could include providing bottled water or bulk water, which can be supplied by other utilities and brought in using tanker trucks. Participants acknowledged that trucking in bulk water is not a feasible response tactic for a large scale, prolonged incident. To truck in water for a large population such as Columbus to cover a single day of drinking water would require 7,500 tanker tanks. Providing bottled water to the public at pre-identified points of distribution is more practical. While this can be an effective temporary solution, participants agreed that it should be the goal of all stakeholders to quickly return utilities to service. Available resources of alternate water supplies include the Ohio Homeland Security Ohio Public Private Partnership (OP3), which can mobilize commercial entities to donate bottled water. To a very limited degree, the Ohio National Guard can provide support, including transport of bottled or bulk water and access to reverse osmosis treatment machines. Participants highlighted that the Ohio Department of Rehabilitation and Corrections is no longer involved in providing this type of support.

Recovery Planning and Funding, Documentation and Hazard Mitigation

Participants walked through recovery-related activities, noting that these activities begin while response is underway and continue long after response is complete. The recovery process can be slow and tedious, as it can involve a multi-year effort to rebuild and collect detailed documentation on the disaster to support requests for available federal aid programs, such as the FEMA Public Assistance Grant Program. If eligible for funding, FEMA will typically cover 75 percent of the cost to repair damage to public infrastructure due to the disaster. The state will typically cover 12.5 percent and the remainder (12.5 percent) is covered by local jurisdictions, although sometimes the state does not require a local cost share and covers the full 25 percent. Documenting all disaster-related activities by utilities is critical for developing a funding application for reimbursement of costs that will be acceptable to state and federal organizations. Detailed documentation can cover many aspects, including maintenance records, damages, procurements, mutual aid and assistance-related activities and repair costs.

To help a community recoup as much of the costs as it can, it is vital that a utility stay in contact with its local EMA during recovery. The local EMA ensures that all possible activities are accounted for when appealing for state or federal recovery assistance. Dedicated long-term recovery teams at the county and state level can help coordinate rebuilding and provide the resources needed until the community is returned to normal. Participants stressed, however, that recovery activities, including reimbursement requests, are a burden shared by everyone in a community. Waiting until after the disaster is over is too late and can result in a utility scrambling to collect detailed documentation before the application deadline, while simultaneously working to rebuild. The more work done to document activities as they happen, the easier to develop a detailed record for a reimbursement application.

Establishing the roles, responsibilities and procedures for collecting detailed documentation before an incident can help with all future disasters. Utilities should consider designating someone to track disaster-related activities, costs and other information. Participants also recommended that all personnel working in the field consider completing the damage assessment course offered by Ohio EMA (course EMA-OH-607). The Ohio EMA Assistance Toolbox provides guidance for documenting disaster-related activities. Additionally, USEPA's Water Security & Resiliency Highlights fact sheet and Federal Funding for Utilities – Water/Wastewater – in National Disasters (Fed FUNDS) website provide tools and resources to better understand the recovery process and help implement documentation best practices.

In the case of a Presidential Disaster Declaration, communities could also take advantage of grants specifically set aside to implement hazard mitigation improvements for critical infrastructure. Hazard mitigation improvements can be an opportunity for utilities to reduce the threat to life safety and infrastructure by moving key assets out of harm's way (for example, elevating, flood proofing or moving equipment out of a floodplain). Participants noted that pursuing funding for hazard mitigation improvements can be a long process. Others highlighted different mitigation funding programs available that are based on a scoring system. In these programs, utilities have an incentive to apply, as critical infrastructure can be very competitive and these types of projects are awarded more points. Participants also recommended USEPA's Hazard Mitigation for Natural Disasters: A Starter Guide for Water and Wastewater Utilities that outlines how utilities can work with their local mitigation planners.

Resources and Programs to Improve Preparedness, Response and Recovery Capabilities

Throughout the discussion, participants identified a number of resources for improving preparedness, response and recovery capabilities.

- AWWA Mutual Aid & Assistance Resource Typing Manual: AWWA document that provides guidance to water and wastewater utilities when they request and provide mutual aid and assistance resources during and after an emergency. The resources described in this manual are those anticipated to be needed up to the first thirty days following an incident.
- Federal Funding for Utilities – Water/Wastewater – in National Disasters (Fed FUNDS): USEPA website that assists water and wastewater utilities in identifying applicable federal funding programs.
- Hazard Mitigation for Natural Disasters: A Starter Guide for Water and Wastewater Utilities: USEPA guide on how utilities can work with their local mitigation planners.
- Ohio EMA Assistance Toolbox: Ohio EMA website that provides a comprehensive compilation of forms, guidance, fact sheets, etc. developed to assist county EMA offices, local officials and Ohio EMA staff during the recovery phase of a disaster.
- Ohio Public Private Partnership (OP3): Ohio Homeland Security website describing the initiative to provide current information and situational awareness on disaster prevention, response, and recovery efforts to state agency and business executives.
- Ohio Water/Wastewater Agency Response Network: OHWARN's website that provides an overview of the program and new member registration form.
- U.S. Army Corps of Engineers (USACE) Emergency Power Facility Assessment Tool (EPFAT): USACE web-based tool that critical public facility owners and operators or emergency response agencies can use to input, store, update and view temporary emergency power assessment data.

- Water Utility Response On-the-Go: USEPA mobile website that gives water and wastewater utilities easy access to critical response information during water-related incidents. Bookmark http://www.epa.gov/responseotg on your smart phone.
- Water Security & Resiliency Highlights: USEPA fact sheet providing direct links to specific tools and resources to improve the resilience of the water sector to all types of hazards.

RESULTS FROM THE ACTION-PLANNING SESSION

Following the exercise discussion, the facilitator led a "brainstorming" or Action-Planning Session to highlight key ideas and develop a list of improvement options drawn from participants. Each participating organization shared at least one unique idea that their respective organization, other participating organizations or the group as a whole could consider implementing based on the topics discussed during the TTX. The improvement options identified by participants are not official recommendations.

This section compiles the improvement options into the categories of planning, training and communications. Stakeholders should review the options below against their own goals to determine which, if any, to implement. The sample improvement planning matrix (**Appendix B**) can help determine priorities and identify resources needed to complete an option.

Planning, Policies, and Procedures

- Complete a thorough assessment prior to requesting aid to ensure priority and speedy recovery
- Identify mitigation measures prior to algal contamination or other disasters
- Encourage coordination between utilities and electric providers
- Improve contact information collection and outreach between utilities and local EMAs (Ohio EPA to provide contact information for drinking water and wastewater utilities to their corresponding county EMAs)
- Find out emergency contact information for backup power generation resources
- Understand secondary impacts from an event and prepare for additional recovery measures
- Share knowledge of infrastructure protection tools on the U.S. Department of Homeland Security Infrastructure Protection Gateway (IP Gateway) available to government agencies
- Devise a solution to access fuel manually (when electric pumps fail)
- Gain a better understanding on electrical connections and generator specifications and capabilities (by using, for example, the USACE Emergency Power Facility Assessment Tool [EPFAT])
- Align operational and financial staff at a utility to improve funding requests
- Optimize collection and conditioning of fuel for emergency use
- Assess resources for not only what an organization may need, but also what they can provide (by using, for example, the AWWA Water & Wastewater Resource Typing Manual)
- Ensure contingency plans are aligned with actual response priorities
- Identify ways, as a local EMA, to resolve issues and understand and meet water utility needs
- Implement redundancy in infrastructure (storage, treatment chemicals, pumps, etc.)
- Keep Standard Operating Procedures (SOPs), Emergency Response Plans (ERPs) and Material Safety Data Sheets (MSDSs) up to date and user friendly
- Encourage development of common operating picture through use of crisis information management systems such as Knowledge Center or WebEOC
- Have a family disaster plan in place so staff can report to work and respond during a disaster
- Incorporate use of Government Emergency Telecommunications Service (GETS) (for landlines; service is free) and Wireless Priority Service (WPS) (for cell phones; service is for a fee) for priority access and prioritized processing of telephone calls during an emergency; this service is open to utilities
- Incorporate resource of Silver Jackets Program (state teams across the country of multiple state,

federal, and sometimes tribal and local agencies) into local planning efforts to address risk of flooding and other natural disasters and to enhance response and recovery efforts when such events do occur

- Incorporate use of Ohio EMA State of Ohio Rain/Snow Monitoring System (STORMS) which provides real time precipitation data to local governments for flood forecasting
- Sign up for and incorporate use of National Weather Service briefing pages to track large-scale weather events
- Integrate hazard mitigation planning into utility planning efforts by using the USEPA Hazard Mitigation for Natural Disasters: A Starter Guide for Water and Wastewater Utilities

Training and Exercises

- Offer a cost documentation class for utility representatives and government agencies
- Continue inter-agency collaboration among stakeholders through exercises
- Practice internal scenarios and emergency operation plans
- Ensure entire staff is familiar with a utility's ERP
- Train rural communities on incident command and coordination
- Address responder health and safety and integrate it into plans and exercises

Communications and Relationship Building

- Ensure redundant communication systems are in place
- Bolster radio equipment and infrastructure redundancy (for example, spare batteries and other parts)
- Utilize social media as another outlet for public notification and information sharing
- Build relationships with and assist law enforcement to understand critical infrastructure to identify possible threats to national security
- Encourage professionalism and collaboration during response and recovery operations
- Coordinate with public information officers to share a consistent message with the public on water sector issues
- Foster two-way communication between utilities and their local EMAs
- Join OHWARN; if already a member, update your contacts on the website
- Improve communication between utilities and their city or village to ensure contingency plans are aligned
- Encourage EMAs and utilities to agree upon consistent, pre-scripted language to communicate messages to the public (by using, for example, USEPA Risk Communication in Action: The Tools of Message Mapping)

FOLLOW-UP MEETING SUMMARY

On December 15, exercise planning team members from the cities of Columbus and Dayton, Montgomery County, the Northeast Ohio Regional Sewer District, Ohio Rural Water Association, Ohio Rural Community Assistance Program, Ohio EPA, Ohio EMA and USEPA convened to discuss in detail the results of the TTX. The follow-up meeting also addressed a number of discussion topics identified by the exercise planning team while designing the event.

Exercise Debrief

Overall, the group thought the TTX was a success. Highlights included:

- Good turnout and a high level of interest by participants
- Networking that occurred as a result of seating neighboring communities close together
- Morning presentations allowed key organizations to provide input and define their role before starting the exercise
- Well facilitated so that everyone spoke and felt they had a role
- Exercise discussion covered recovery and mitigation in addition to the usual response-related topics
- Use of the Action-Planning Matrix tool helped participants more easily brainstorm on possible ideas for consideration
- Use of TurningPoint polling questions and remote controls benefited the exercise by gathering useful information in real time and helped engage participants

Suggestions for improvement included:

- Hand out a sheet defining roles of local, state and federal government
- Include more explanation on USEPA's role, responsibilities and activities
- Adjust layout of the Situation Manual to include the Action Planning Matrix at the end of the document to make it easier to tear out during the exercise
- Include an additional focus on technical practices and abilities (for example, cover electrical hookups and resources) as all utility participants are concerned with these activities
    - Consider incorporating elements from the past USEPA *Water and Energy Nexus in Disasters* workshop series and potentially host a similar workshop in the future for participants from a smaller geographic area
    - It was noted that materials from the workshop series were used to develop the USEPA Power Resilience Guide for Water and Wastewater Utilities.
- Include a utility speaker during the morning presentations that went through a disaster similar to what is covered by the exercise scenario in order to share with participants real-world experience and lessons learned
    - Pre-interviewing potential candidates during the exercise planning process can help ensure a good speaker
    - It was noted that the ten Incident Action Checklists for Water Utilities developed by USEPA in partnership with utility representatives incorporate real-world experience and lessons learned from the water sector for each of the featured hazard types

After-Action Report and Improvement Planning Process

Building on the results of the exercise as captured in the after-action report, USEPA will support members of the exercise planning team with improvement planning. This involves implementing short-term and long-term low cost or no cost improvements designed to enhance the ability of all stakeholders

to prepare for, manage, and respond to a major disaster that affects water sector infrastructure. USEPA can help the planning team organize its ideas using an improvement planning matrix, and also provide meeting support to take stock of its progress toward implementing its improvement plan. The group agreed to reconvene at regular intervals, potentially in three, six and nine months following the distribution of this after-action report. The group also recommended inviting representatives from county EMAs to support the improvement planning process.

Follow-Up Activities with Participants

The group noted the enthusiasm of participants and discussed the importance of building on the momentum of the exercise as well as how to sustain improvement planning activities moving forward. The group considered ideas for follow-up activities in order to capitalize on the enthusiasm of participants. Activities such as webinars, training and meetings could occur after participants receive the after-action report. The group noted that rather than develop something entirely new, they could leverage existing outlets and encourage participants to join existing organizations or to attend existing events. These outlets, organizations and events could help participants to build on what was covered during the exercise and continue networking. Activities suggested include:

- Join mutual aid and assistance networks such as OHWARN
- Explore conducting a webinar in about 3 months, open to public, to discuss at a high level what was done during this exercise and note highlights
- Include a copy of the executive summary from the after-action report in the Emergency Management Association of Ohio newsletter

Review of Results of the Action-Planning Session

Exercise planning team members reviewed the list of improvement options that participants identified during the Action-Planning Session and recommended pursuing a select number of options as action items as part of the improvement planning process. See **Appendix B** for the complete list of action items.

Other Topics of Discussion

The group stressed the importance of utilities making the effort to know their local EMAs as these organizations specialize in fulfilling resource needs. Utilities should also maintain a good working relationship with their power providers to better ensure the quick restoration of power following a disaster. Given the smaller staff size at many small and medium utilities (for example, one or two people) and potential for less interaction by private for-profit operators, the group noted that it might be up to local EMAs to take the initiative to visit these utilities and establish the working relationship. It was noted that the USEPA Collaboration between State Water Primacy Agencies and Emergency Management fact sheet provides examples of collaborative opportunities between water sector and emergency management personnel at the state and local level.

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APPENDIX B: IMPROVEMENT PLANNING MATRIX

Instructions: *Utilities, response partners and other participants are encouraged to use this matrix to create and customize their own improvement plan according to their own organization's priorities. An improvement plan identifies specific corrective actions, assigns them to responsible parties, and establishes targets for their completion.*

On the far left, list the action, task or follow-up. Next, identify who is responsible for completing it and who can provide support. Also list any needed resources and possible sources for those resources. Indicate whether the option is short-term (less than a year) or long-term (one year or more) with the anticipated duration to complete. Each individual organization can use this matrix to improve upon their capabilities and track ongoing activities and priorities.

As an example, this matrix was populated with action items selected by members of exercise planning team during the follow-up meeting. The exercise planning team plans to track these action items as part of the improvement planning process.

Action, Task or Follow-Up	Lead Individual or Agency Responsibility	Supporting Individual or Agency	Resources and Possible Sources	Timeline	
				Short-Term	Long-Term
Encourage coordination between utilities and electric providers	Utilities	Local EMAs	USEPA Power Resilience Guide for Water and Wastewater Utilities	E.g., 9 months	
Find out emergency contact information for back-up power generation resources	Utilities	Ohio EMA	USEPA Power Resilience Guide for Water and Wastewater Utilities USACE Emergency Power Facility Assessment Tool		1 year
Identify ways as a local EMA to resolve issues and understand and meet needs for utilities	Local EMAs	Ohio EPA	USEPA Fact sheet Coordination of the Water and Emergency Services Sectors: An Important Step to Better Response		1 year
Continue inter-agency collaboration among stakeholders through exercises	Local EMAs	Ohio EPA Ohio EMA	USEPA Web page Resilience Training and Exercises for Drinking Water and Wastewater Utilities		2 years

Action, Task or Follow-Up	Lead Individual or Agency Responsibility	Supporting Individual or Agency	Resources and Possible Sources	Timeline Short-Term	Timeline Long-Term
Practice internal scenarios and emergency operation plans	Utilities	Local EMAs OHWARN Ohio EPA Ohio EMA			2 years
Offer a cost documentation class for utility representatives and government agencies	Ohio EMA	Local EMAs OHWARN		9 months	
Train rural communities on incident command and coordination	OHWARN	Ohio EPA District Offices Ohio EMA Regional Field Offices	USEPA Web page Emergency Management Training for Water and Wastewater Utilities		2 year
Foster two-way communication between utilities and their local EMAs	Local EMAs	OHWARN Ohio EPA	Ohio EPA will provide a list of utilities in each county	6 months	
Improve communication between utilities and their city or village to ensure contingency plans are aligned	Utilities	Local EMAs OHWARN			1 year
Encourage EMAs and utilities to agree upon consistent, pre-scripted language to communicate messages to the public	Utilities	Local EMAs OHWARN	USEPA document Risk Communication in Action: The Tools of Message Mapping		2 years