

Incident Action Checklist – Distribution System Contamination

For on-the-go convenience, the actions in this checklist are divided into three “rip & run” sections and are examples of activities that ground water and surface water utilities can take to prepare for, respond to, and recover from an incident that impacts the distribution system. You can also populate the “My Contacts” section with critical information that your utility may need during a distribution system contamination incident. Disclaimer: Each incident is unique and may involve specific response actions that are not outlined in this checklist. Please consult with your drinking water regulatory agency and emergency management on all actions.

Distribution System Contamination Incidents and Water Utilities

Distribution system contamination, whether by a chemical, biological (including toxins), or radiological agent, can occur due to natural, accidental, or intentional causes. For example, contaminants can enter the distribution system by passing through treatment, via cross-connections, through leaking pipes, through vents or hatches at water storage facilities, and during repair or construction activities. Regardless of the cause, contamination incidents require a measured and appropriate response to protect public health, critical infrastructure, and the environment.

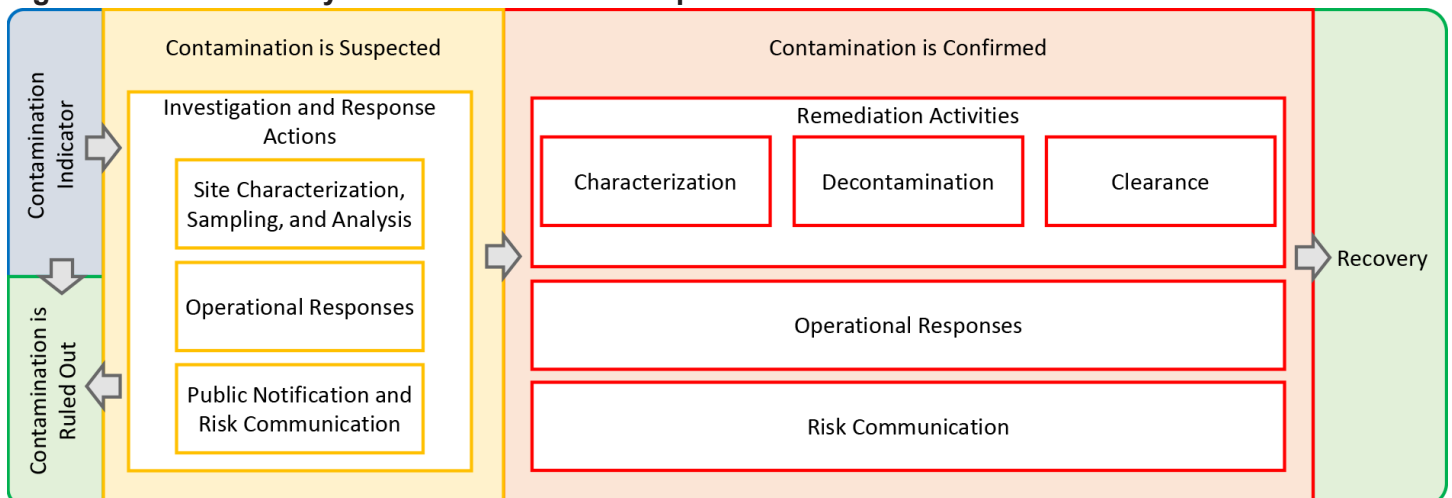
Contaminants in the distribution system could lead to:

- Taste and odor issues and complaints.
- Boil water advisories or other use restrictions.
- Significant volumes of water requiring removal or treatment.
- Loss of customer confidence in the drinking water and the utility.
- Prolonged drinking water outages that can impact both human health and a community’s economy.

Refer to EPA’s companion [incident action checklists](#) for specific information and actions regarding other incidents, including harmful algal blooms and wildfires, that can affect distribution system water quality. Distribution system water quality may also be impacted by source water incidents. Refer to EPA’s companion incident action checklist for source water contamination for more information.

The overall framework for responding to a distribution system contamination incident is shown below in Figure 1 and will be described throughout the checklist. The timeframe for each process will be determined on an incident-specific and site-specific basis. The time to complete the entire process can vary from a few hours or days to months or years if infrastructure replacement is required. Incident- and utility-specific constraints will guide the decision-making process that is unique for each contamination incident. Utilities should determine which activities they have the capability to perform internally and which activities they will rely on relationships with response partners, mutual-aid agreements, or utility contracts.

Figure 1. Distribution System Contamination Response Framework



Actions to Prepare for a Distribution System Contamination Incident



This section includes actions to plan for a contamination incident that could impact your distribution system.

Plans and Procedures

- ☐ Conduct or update a [risk and resilience assessment](#) (RRA), as described by Safe Drinking Water Act (SDWA) Section 1433, to identify threats to your distribution system. EPA recommends that all systems conduct an RRA, even if not required. Some factors to consider include:
 - Vulnerable utility locations where contaminants may be introduced.
 - Vulnerabilities to other disasters that may introduce contamination.
 - Number and location of check valves or other backflow prevention devices.
 - Number and location of cross connections.
- ☐ Develop or update your [emergency response plan](#) (ERP), as described by SDWA 1433 or state regulations, based on the results of your RRA. EPA recommends that all systems have an updated ERP.
 - Utilizing the National Incident Management System (NIMS) principles, be sure to incorporate your response structure, using the Incident Command System (ICS), into your ERP.
 - Ensure all 24-hour emergency contacts are updated.
 - Include plans for actions in case of supply chain interruptions to critical components and chemicals.
 - Develop a [Distribution System Contamination Response Procedure](#) (DSCRPP). A DSCRPP is an appendix in a utility's overall ERP that focuses specifically on activities to perform during a distribution system contamination incident such as investigating and confirming potential contamination, identifying response actions (e.g., isolating storage tanks), and preparing for remediation and recovery. It should include the following:
 - Site Characterization and Sampling Plan (SC&SP) template, a brief checklist-style plan that will be completed during the initial investigation phase to help guide field teams in looking for what may be occurring. A template SC&SP is available as Appendix D within the [Guidance for Building Field Capabilities to Response to Drinking water Contamination](#) document.
 - Sampling and Analysis Plan (SAP) template, a detailed plan that will be completed during the remediation phase to collect the samples needed to characterize the contaminant and determine the extent of contamination. EPA created an [SAP Template Tool for Pathogens](#) that you can review as an example of what an SAP template could look like.
 - [Water Contamination Incident Remediation Plan](#) template that will be completed during the remediation phase that details the remedial objectives and water decontamination and disposal actions that will be implemented, monitored, and evaluated for effectiveness.
 - A general pre-incident [Waste Management Plan](#) (WMP) that includes consideration of waste staging, sampling, characterization, packaging, transportation, reuse, recycling, treatment, and disposal. For more information, go to "[Managing Materials and Wastes for Homeland Security Incidents](#)."
- ☐ Update or develop an [emergency drinking water supply plan](#) that specifies the following:
 - Current back-up water sources (interconnections, emergency well, temporary intake, etc.) that may be utilized if portions of distribution can be isolated.
 - Regularly test and exercise back-up sources.

Actions to Prepare for a Distribution System Contamination Incident



- Develop procedures to account for differences in water quality.
- The quantity of water needed to meet daily demand.
- Who is responsible for obtaining and distributing emergency drinking water supplies, including logistical and security considerations.

☐ Develop a [Risk Communication Plan](#) (RCP), as deemed appropriate by the utility or per drinking water regulatory agency requirements, as part of your ERP to communicate potential hazards and unknown factors to employees, first responders, the public, and other stakeholders.

- Identify the required communication steps and appropriate actions that may be taken to inform customers and the general public if contaminants are detected in the distribution system.
- Develop template statements and public notices to provide rapid communications at the beginning of an incident.
- Document roles and responsibilities of utility personnel and response partners (i.e., local officials, regulatory agency, local and state emergency management, public health officials, etc.) regarding the communication of public information, if necessary, during a contamination incident.
- Identify appropriate communication mechanisms such as reverse 911 and/or wireless emergency alerts.

☐ Ensure your utility has a Health and Safety Plan (HASP) template that can be modified for different field and laboratory activities associated with a distribution system contamination event.

☐ Identify a lead and team of individuals who can prepare for and perform critical duties (e.g., isolate portions of the system, issue water use restrictions) during a distribution system contamination incident.

☐ Work to [build field capabilities](#) to investigate potential drinking water contamination, such as performing hazard and safety assessments, water quality testing, rapid field testing, and sampling for laboratory analysis.

- Prepare field sampling kits and identify personnel capable of conducting emergency response field sampling and analysis.

☐ Work to [build laboratory capabilities](#) to enable identification and characterization of the contaminant(s) during a distribution system contamination incident, including identifying and maintaining a list of laboratories that can provide support. EPA's [Drinking Water and Wastewater Laboratory Network](#) page has information on how to access laboratory support.

- Develop a Quality Assurance Project Plan (QAPP) template for sampling and analysis that can be completed with incident-specific information to ensure results from these activities are of sufficient quality to support decision-making during the response.

☐ Develop an information management strategy to collect, document, and manage the large amount of information that may be generated during a contamination incident, including field reports, sampling and analysis results, personnel time records, invoices, and response partner information.

- Establish a protocol for staff to communicate results and issues to ensure they are quickly and accurately conveyed to decision-makers.
- Coordinate the information management strategy with the RCP. Information management contributes to an effective communication strategy to ensure the public, partners, and all personnel stay informed.

☐ Identify possible staging areas for response partners or mutual aid crews if needed in a response, and the availability of local facilities to house crews. If staging or housing is not possible, be sure to inform external responders when requesting their assistance.

Actions to Prepare for a Distribution System Contamination Incident



- ☐ Utilities are encouraged to develop and implement a routine distribution system monitoring plan that lists sampling frequency, locations, parameters, analytical screening, criteria for identifying results outside expected ranges, and procedures for investigating atypical results for common errors (e.g., instrument malfunction) and for deciding when to activate the utility ERP. Monitoring can detect any water quality changes that could serve as an indicator for a potential issue.
 - As a best practice to detect a potential issue as soon as possible, implement a [Water Quality Surveillance and Response System](#) (SRS). An SRS is comprised of components that enhance your utility's ability to quickly detect (surveillance) and respond (response) to water quality issues.
 - The surveillance components provide real-time data on conditions throughout the distribution system.
 - The response components provide a framework for making response decisions.
- Confirm all response partner emergency contacts and keep their contact information updated yearly.
- ☐ Review public information protocols with your local emergency management agency (EMA) and public health/regulatory agencies.
 - Consider developing water advisory messages and procedures for distributing them to customers using appropriate mechanisms such as reverse 911.
- ☐ Develop agreements and support processes with laboratories that can support sample analysis during a contamination incident.
- ☐ Develop/maintain a list of (and coordinate notification processes with) critical customers that need a continuous source of potable drinking water (e.g., hospitals, nursing homes, dialysis clinics, manufacturers).
- ☐ Coordinate the process and responsibility for the delivery and distribution of an emergency drinking water supply to customers (e.g., staging, bottled water, hauling water) with your local EMA and other partners.

Coordination

- ☐ Join your state's [Water and Wastewater Agency Response Network](#) (WARN) or other local mutual aid network and become familiar with procedures for requesting assistance. In addition, check to see if you are included in a statewide mutual aid law.
- ☐ Confirm all utility emergency contacts are up to date.
- ☐ Coordinate with utilities with which you have interconnections so they may take any necessary actions to prepare.
- ☐ Coordinate with your various response partner agencies (e.g., drinking water primacy agency, emergency management, public health, law enforcement) to determine ways they can aid your utility during a contamination incident.

Communication

- ☐ Establish a reporting system that is communicated to staff regularly to ensure that results and issues are quickly and accurately conveyed to decision-makers.
- ☐ Review public information protocols with your local EMA and public health/regulatory agencies.
 - Consider developing water advisory messages and procedures for distributing them to customers using appropriate mechanisms such as reverse 911.

Actions to Prepare for a Distribution System Contamination Incident



Training

- ☐ Complete [Incident Command System](#) (ICS) training.
 - Ensure multiple utility personnel are trained on Key Leadership Positions (e.g., Incident Commander, Operations Section Chief, Public Information Officer) in case people are sick or on vacation during an incident.
 - Practice and identify elements of a Unified Command with your response partners.
- ☐ Conduct training on recognizing site hazards and identifying the right partners to call for help, such as calling law enforcement for signs of tampering or vandalism.
- ☐ Conduct internal briefings, training, and exercises regularly to ensure utility staff are aware of all preparedness, response, and reporting procedures and to help improve execution of those procedures.
- ☐ Conduct or participate in external (e.g., local EMA, health department, drinking water regulatory agency) exercises regularly to understand roles and responsibilities and improve coordination and response execution.
- ☐ Identify and train multiple people that can serve in the role of Public Information Officer, whose role is to continuously notify customers and the public of updates.
- ☐ Familiarize yourself with the EPA's [Water Contamination Response Resources](#), [Containment and Disposal of Large Amounts of Contaminated Water](#), and the other resources listed in the resources section below.

Notes:

Actions to Respond to a Distribution System Contamination Incident



This section includes actions for once a contamination incident is confirmed to have impacted your distribution system.

Safety First

- ☐ Constantly assess the scene, know your surroundings, and move to a safe area if necessary.
- ☐ Pay attention to all emergency alerts, instructions, and leave the contaminated area immediately if told to do so by authorities.
- ☐ Develop an incident-specific HASP using your template. Precautions taken will be based on the actual contaminant in the system, if known. Some risk mitigation actions include the following:
 - Avoid skin contact with the water.
 - Minimize time spent at the sampling location.
 - Do not eat, drink, or smoke.
 - Wear personal protective equipment (e.g., gloves, safety glasses/goggles).
 - Fill sampling containers slowly to avoid volatilization.
 - Rinse the outside of sample bottles with laboratory grade water or decontaminate with a bleach wipe.
 - Evaluate health and safety risks of a contaminant before conducting odor tests.
- ☐ Fatigue during extended periods of emergency work is common and quite dangerous. Be sure to get plenty of rest and stay alert.
- ☐ Carry a first aid kit, and an automated external defibrillator (AED) if possible, and avoid unnecessary risk.

Preliminary Actions

- ☐ Once water contamination is suspected, notify the pre-designated water contamination lead and utility personnel.
- ☐ Gather and review any available information from internal utility resources and external response partners to assess if a known issue

or equipment malfunction may explain the initial findings. Examples include any routinely collected data or information such as customer calls, compliance sampling data, and flow and pressure data.

- ☐ Evaluate initial findings and other available information to determine if contamination can be ruled-out or if contamination is still suspected.
- ☐ If contamination is not ruled out, activate your Emergency Response Plan, Distribution System Contamination Response Procedure, and Risk Communication Plan (see planning section for development of plans).
- ☐ Begin and continue to document all events, timeframes, and any resulting impacts until the water system resumes normal operations. All information can be used to validate findings or for post-incident investigations.

Investigation and Response

The incident is investigated to determine if contamination has occurred while operational response actions are simultaneously taken to reduce potential consequences. The investigation and response is a cyclical process (as shown in Figure 2) where each new piece of information collected is evaluated until contamination can be ruled out or confirmed. All decisions and activities are conducted in coordination with your regulatory agency and response partners.

- ☐ If contamination cannot be ruled out, set up a well-defined command structure, such as the Incident Command System (ICS), as established in your ERP or contamination response procedure (if created) to organize and manage the incident.

Coordination

- ☐ Notify and coordinate with the state drinking water regulatory agency on your water system's status and continue coordination throughout the incident as response actions and treatment changes may need approval.

Actions to Respond to a Distribution System Contamination Incident



- ☐ Notify and coordinate with local emergency management and the local health department throughout the incident.
- ☐ Coordinate sampling and monitoring efforts with responding agencies and laboratories to efficiently use resources and share information.

Notifications

- ☐ Notify all staff of the situation and any plans and proposed actions.
- ☐ Notify utilities with which you have interconnections of the distribution system contamination so they can take any necessary actions and continue coordination until normal operations are resumed.
- ☐ Notify utilities with the same water source if the contamination is suspected to originate in the source water so they can take necessary steps to investigate the water quality at their intakes.

Response Actions

- ☐ Take steps to identify the contaminant and evaluate the potential consequences to your system and customers through site characterization, sampling, and analysis.
 - Complete your Site Characterization and Sampling Plan (SC&SP) template for the circumstances of the incident.
 - Deploy field teams to collect information and conduct field activities based on the completed SC&SP template.
 - Sampling should be considered at locations other than the site characterization area to provide supporting evidence to verify transport of the contaminant upstream or downstream of the site and establish portions of the distribution system that are uncontaminated.

- Communicate with laboratories early in the site characterization process to ensure they are prepared to receive and process samples quickly.
- Ensure Quality Assurance/Quality Control (QA/QC) requirements in the QAPP are included with all field and laboratory sampling and analysis.

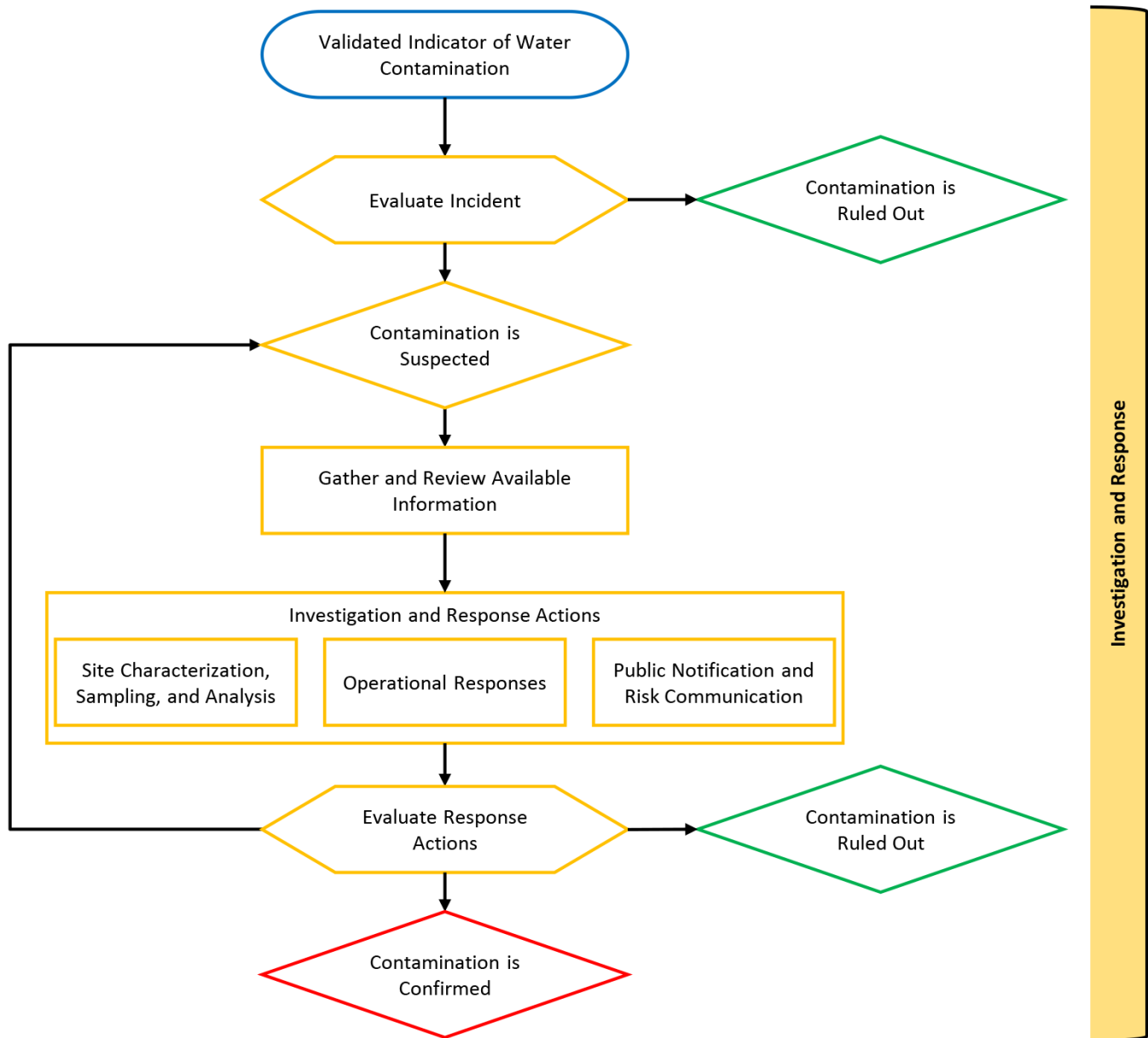
- ☐ Initiate operational responses (i.e., changes to operation of the distribution system) to limit the spread of contaminated water and prevent or reduce the impact on customers and your system. Some operational responses to consider include:
 - Isolation of the affected area.
 - Reducing or diverting flow.
 - Flushing, if viable.
- ☐ Activate the emergency drinking water supply plan, if necessary. If alternative water cannot be distributed via the customers' taps, provide information on how water is being supplied and how to access it.
- ☐ Document all incident activities (sample results, response actions, overtime hours, equipment used, invoices, receipts, photographs, etc.).

Communication with Customers

- ☐ Assign a trained Public Information Officer to provide information and updates to the public, elected officials, and the media regularly.
- ☐ Update the communication and messaging templates and protocols in your Risk Communication Plan to include incident-specific details.
- ☐ Coordinate with your regulatory agency to determine the need for public notifications and issuing use restrictions. Typical types of use restrictions include instructions to "boil water," "do not drink," and "do not use." Depending on the restriction, this notification should be closely coordinated with the provision of emergency drinking water.



Figure 2. Diagram of Investigation and Response Actions



Remediation

Once contamination is confirmed, steps need to be taken to address the contamination including characterizing the nature, source, extent, and fate of contamination, implementing additional operational response actions as more information is gathered, planning and implementing a decontamination strategy, and clearing the system for return to normal operations. The remediation process is

shown in Figure 3. Coordination with your regulatory agency and response partners is critical to each remediation action and communication with customers is vital throughout the entire remediation process.

Actions to Respond to a Distribution System Contamination Incident



☐ Keep customers updated on their water availability if any operational response disrupts service (i.e., customer is in the isolated area).

☐ Ensure updates are provided on all available platforms (e.g., social media, website, newspapers, TV, radio, etc.).

Characterization

☐ Compile information on the contaminant such as:

- The contaminant's chemical, biological, or radiological characteristics and possible interaction with infrastructure materials.
- The public health and environmental risks at the contaminant concentrations detected. Also identify any regulatory or aesthetic levels (taste/odor/color), if available.

☐ Characterize the contaminated area by determining the approximate boundaries and contaminant concentrations.

- Complete your Sampling and Analysis Plan (SAP) template that details the characterization activities:
 - Select multiple sampling locations to fully capture the spread of contamination.
 - Only select parameters that are most relevant to the identified contaminant (the contaminant, related contaminants, important water quality parameters).
 - Update QA/QC requirements in the QAPP.

☐ Identify the major components of the system in the contaminated area such as storage tanks, large diameter pipes, and pressure zones.

☐ Identify and contact critical customers that are in the contaminated area or may be impacted by response actions taken during remediation.

☐ Assess and implement additional operational responses as needed to limit the area requiring decontamination.

☐ Update/reissue risk communication and notifications as new information is gathered.

Decontamination

☐ Develop and implement a remediation strategy that is documented in a Water Contamination Incident Remediation Plan. The strategy should address removal of the contaminated water from the system, treatment and disposal of the contaminated water, and decontamination of system infrastructure (if determined to be necessary).

- Establish clearance goals (i.e., the contaminant concentration at which the system may return to normal operations) and a clearance strategy with the input of public health agencies and subject matter experts. Consider:
 - Public health and environmental risks
 - Aesthetic concerns
 - Public perception
- Develop remediation actions that detail the operations, monitoring, and performance assessment decisions and includes objectives, methods, sampling/monitoring, schedule, personnel involved, health and safety information, and required approvals.
 - Determine disposal or discharge options for the contaminated water, including determining if treatment is necessary. Be sure to coordinate with any partners or agencies responsible for receiving the water, such as a wastewater utility.
- Update your general Waste Management Plan to include incident-specific information on wastes generated during sample collection, water treatment and infrastructure decontamination, and safety.

Actions to Respond to a Distribution System Contamination Incident



- The remediation strategy should also consider premise plumbing impacts and how those impacts will be addressed after completing remediation of the water mains.

☐ Update/reissue risk communication and notifications as the remediation strategy is implemented.

☐ Continue to re-assess response actions and implement additional responses as needed as the remediation strategy is implemented.

Clearance

☐ Clear the system for normal operations per the strategy in the Water Contamination Incident Remediation Plan.

- Perform additional sampling and analysis throughout the contaminated areas to verify that clearance goals have been achieved.
 - Samples should be collected from across all portions of the contaminated area and may include large and small diameter water mains, service lines, different pressure zones, and major system components, such as storage tanks and pump facilities.
 - If sampling indicates clearance goals

have not been achieved, return to decontamination, and reassess the remediation strategy.

- Depending on the incident, different sections of the system may be cleared at different times or clearance may occur gradually by allowing different uses of the water (e.g., toilet flushing, bathing, drinking).

- Consult with your regulatory and public health agencies who play a lead role in providing final clearance.

- Once clearance is provided for the entire system, operations can return to normal.

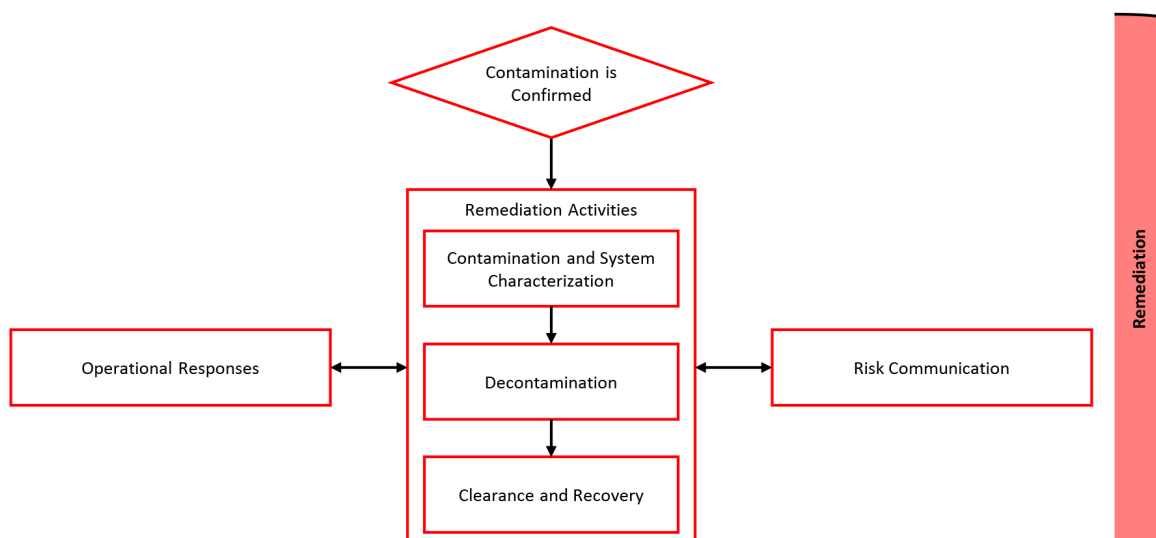
☐ As portions of the system are cleared, assess and revert any changes made to the operation of the distribution system during the response (e.g., discontinue pressure zone modifications, resume service to all parts of the distribution system).

☐ Demobilize any external resources activated for the response.

Communication with Customers

☐ Update your Risk Communication Plan as needed and have the assigned PIO continue providing information and updates to customers on progress.

Figure 3. Diagram of Remediation Actions



Actions to Recover from a Distribution System Contamination Incident



This section includes actions once a contamination incident that impacts your distribution system has ended.

- ☐ Keep critical customers in the contaminated area informed of activities that may impact them.
- ☐ Keep customers updated as use restrictions are lifted and on any follow-up activities the utility conducts after clearance goals have been met.
 - Consider a data visualization system/ interactive map for sharing results and other updates with customers.
- ☐ Work with public health officials to provide customers with instructions for managing the contamination in their premise plumbing system.
- ☐ Work with your regulatory agency to assess the need for a long-term monitoring program to demonstrate the contaminant(s) concentration remains below the clearance goal.
 - Develop and implement program if required.
- ☐ Continue to conduct public outreach regarding mitigation actions being taken and sharing sample results to support public confidence in the safety of the water supply.
- ☐ Develop an after-action report (AAR) to document and evaluate your response activities and lessons learned, including what went well and what could be improved.
- Create an improvement plan (IP) based on your AAR that lists recommendations and actions to improve preparedness and response. Some items may include:
 - Update all plans and procedures utilized during the event.
 - Identifying mitigation and long-term adaptation measures that can help prevent distribution system contamination incidents in the future and increase utility resilience when they do occur. Consider impacts related to distribution system contamination incidents when planning for system upgrades (e.g., ability to close pressure zones).
 - Share lessons learned with utilities that have interconnections with your utility, if applicable.
- ☐ Finalize and compile all incident-related documentation.
- ☐ Revise budget and asset management plans to address increased costs from response-related activities and follow-up actions.

Notes:

My Contacts and Resources



It is critical to know who to contact to assist with incident response. Engage your local and state partners and authorities throughout the decision-making process to ensure protection of public health and the environment.

The following table can be expanded and used to record contact information for key partners. Example contacts include: any wholesale or consecutive systems, systems with the same source water, local emergency responders such as police and fire, drinking water regulatory agency, local emergency management agency, local laboratory, local health department, local spill agency (if established), and WARN Chair.

CONTACT NAME	UTILITY/ORGANIZATION NAME	PHONE NUMBER

Planning

- [SDWA Section 1433 Overview](#) (EPA)
- [Develop Emergency Response Plans](#) (EPA)
- [Distribution System Contamination Response Procedure Development](#) (EPA)
- [Guidance for Responding to Drinking Water Contamination Incidents](#) (EPA)
- [Planning for an Emergency Drinking Water Supply](#) (AWWA/EPA)
- [SAP Template Tool for Pathogens](#) (EPA)
- [Guidance for Building Field Capabilities to Respond to Drinking Water Contamination](#) (EPA)
- [Emergency Response for Drinking Water and Wastewater Utilities Tools](#) (EPA)
- [Emergency Management Training for Water and Wastewater Utilities](#) (EPA)
- [FEMA Incident Command System \(ICS\) Resources Center](#) (FEMA)

- [Incident Action Checklists](#) (EPA)
- [Guidance for Building Laboratory Capabilities to Respond to Drinking Water Contamination](#) (EPA)

Detection

- [Water Quality Surveillance and Response](#) (EPA)

Coordination

- [Water/Wastewater Agency Response Network](#) (EPA)
- [Drinking Water and Wastewater Laboratory Network](#) (EPA)
- [Accessing Laboratory Support](#) (EPA)

Communication

- [Developing Risk Communication Plans for Drinking Water Contamination Incidents](#) (EPA)
- [Drinking Water Advisory Communication Toolbox](#) (CDC)
- [Need to Know: Anticipating the Public's Questions during a Water Emergency](#) (EPA)

- [Revised Public Notification Handbook](#) (EPA)
- [Effective Risk and Crisis Communication during Water Security Emergencies](#) (EPA)
- [Water Utility Communication During Emergency Response](#) (EPA)
- [NIMS Basic Guidance for Public Information Officers](#) (FEMA)

Response

- [Water Contamination Response Resources](#) (EPA)
- [Sampling Guidance for Unknown Contaminants](#) (EPA)
- [Drinking Water Treatability Database](#) (EPA)

- [Selected Analytical Methods](#) (EPA)
- [Waste Management Plan Guidelines](#) (EPA)
- [Managing Materials and Wastes for Homeland Security Incidents](#) (EPA)
- [Containment and Disposal of Large Amounts of Contaminated Water](#) (EPA)
- [Water Utility Response On-The-Go](#) (EPA)

Recovery

- [Response Protocol Toolbox: Planning for and Responding to Drinking Water Contamination Threats and Incidents. Module 6: Remediation and Recovery Guide](#) (EPA)

Notes: