

Checklist for Laboratories Providing Analytical Support for Water Contamination Incidents

This checklist outlines actions laboratories can take to be prepared to provide cradle-to-grave analytical support to drinking water utilities responding to water contamination incidents. The checklist is limited to the roles and responsibilities within the laboratory and does not address roles and responsibilities within the Incident Command System (ICS) that may be activated during a water contamination incident. This checklist can be used by utility, commercial, municipal, tribal, state, and federal laboratories – during events where contamination in a drinking water system or source water is suspected.

Analytical Support during Water Contamination Incidents

Laboratory support plays a crucial role during water contamination incidents. Timely and accurate analytical support is critical to identify and characterize the contamination and determine if treatment and/or decontamination processes are effective. In the event of a water contamination incident, potential analytical support needs may include:

- Analyses to identify contaminants and determine concentrations.
- Analyses of large numbers of samples with a short turnaround time.
- Consult on appropriate methods; quality assurance (QA) and quality control (QC) requirements; sample collection, handling, and transport; analytical results; and safety precautions.
- Supply/reagent exchange and sample brokerage.
- Data review, reporting, transmission, and exchange.
- Identifying and accessing laboratories with specialized capabilities (e.g., radiochemical analyses).
- Identifying and contracting laboratories for additional capacity.

Laboratories may serve as a primary support laboratory, coordinating all laboratory activities, or as a mutual support laboratory, providing additional capacity and services.

Refer to EPA's companion [Incident Action Checklists](#) for specific information and actions regarding emergencies impacting water systems, including floods, wildfires, and both source water and distribution system contamination.

Figure 1. Water Contamination Response Process¹



¹For additional information refer to [EPA's Guidance for Responding to Drinking Water Contamination Incidents](#).

Actions to Prepare for a Water Contamination Incident



This section includes actions to plan for disruptions to essential laboratory operations and for providing analytical services for known contaminants (targeted) and unknown contaminants (screening for a broad range of contaminants) to a water utility that is responding to a contamination incident.

Laboratory Operations & Readiness

Develop plans to manage the impact of emergencies and maintain essential operations. Laboratories and their staff who support drinking water utilities during an emergency may also be impacted by the incident (e.g., flooding, power outage). To maintain critical support to the water utility, laboratories should consider the following actions:

- Conduct a risk assessment to identify potential threats and their impact on laboratory operations. This includes identifying essential laboratory functions, determining risks that could disrupt operations (e.g., power outages, instrument failure, staffing shortages), and recognizing potential hazards (e.g., chemical, physical, environmental) to create emergency plans.
- Develop and routinely update the laboratory's Emergency Response Plan (ERP) to handle emergency situations effectively. This includes updating 24-hour emergency contact details, updating basic laboratory details (e.g., chemicals stored onsite, inventory of hazardous materials) for first responders, creating an emergency evacuation process, ensuring the protection of sensitive equipment, etc.
- Develop or update a [Continuity of Operation Plan](#) (COOP) to establish necessary policies, procedures, and arrangements to be used in the event of laboratory disruptions.
- Discuss and establish agreements with other support laboratories, should they be needed.

Ensure there is a contingency plan for maintaining the facility's essential systems (e.g., gas, vacuum, ventilation, water purification/deionized water), such as regular maintenance and monitoring, backup power sources, and redundant systems.

Ensure the laboratory remains certified to analyze public drinking water under either EPA or state certification programs. See 40 CFR 142.10(b)(3) and your state's certification program for requirements.

Maintain and update standard operating procedures (SOPs) on a regular basis (e.g., annually).

Develop a cross-training and certification plan for laboratory staff (e.g., analysts, technicians) to perform multiple critical tasks.

Develop and maintain a contact list of all vendors and service providers.

Planning

Develop a structured plan for operations (e.g., receiving, storing, processing, and analyzing samples) outside of normal business hours to handle time-sensitive emergency samples that require immediate analysis.

- Identify shifts and personnel to provide support outside of normal business hours.
- Identify procedures, including notifications, for internal shift and personnel changes.

Establish a system for tracking staff hours, supply costs, instrumentation costs, sample transport costs, and other incident support-related costs using incident-specific accounting codes to help facilitate the reimbursement process.

Identify strategies to mitigate the impact if the Laboratory Information Management System is down,

Actions to Prepare for a Water Contamination Incident *continued*



such as proactively creating unique ID labels for samples and batch sheets that could be used while the system is down.

Establish or review strategies for maintaining (e.g., ordering, receiving, tracking) inventory of laboratory supplies, reagents, and personal protective equipment (PPE) required for sample receiving, processing (e.g., extraction), and analysis.

Maintain purchase orders, contracts, or other agreements with vendors to quickly access supplies or services during a contamination emergency.

Maintain contracts with service providers for on-call equipment repair and routine maintenance.

Identify alternate vendors/manufacturers for critical supplies to address shortages/back orders.

Confirm the services available from regular sample couriers to support an emergency and arrange for back-up services to supplement capacity or a disruption to regular services.

Create a data reporting template, such as an electronic spreadsheet (Excel or suitable format), to submit data according to reporting requirements.

Coordination and Communication

Develop a list of critical information to provide or discuss with the utility or designated incident point of contact (Incident POC). This information may include:

- Detailed contact information.
- Background information on the incident, such as site characterization information, field data, associated hazards, collected samples, etc.
- Requested analytical support including target analytes, matrix, preferred analytical methods, number of samples, procurement of sampling supplies, reporting limits, availability of preliminary results, turnaround time, QA/QC requirements, etc.
- Chain-of-custody (COC) requirements; sample transport and security requirements; sample preservation, retention, and disposal procedures; and data reporting and records retention requirements.
- Level of reporting requested for evidentiary samples.
- Criteria for rejecting samples that do not meet requirements.

Develop a communication log and instructions for documenting all communication related to the incident.

Identify key laboratory roles during an incident response and identify personnel that could fill these key roles, recognizing that multiple roles may be held by the same person. Roles may include:

- Primary and backup laboratory POC – for coordinating with response staff on incident-related matters, including sample collection, handling, distribution, results reporting, coordination with sampling teams, etc.
- Sample Receiver(s) – for receiving and properly storing samples, recording delivery and receipt information, sample source, sample ID, collection date/time, transmission method, condition upon receipt, custody changes, disposal date/time, etc.
- Analysts – for processing and analyzing incident-specific samples.
- QA Officer – for ensuring that laboratory operations and results meet established quality standards.
- Safety Officer – for reviewing safety protocols from sample receipt to sample disposal.

Actions to Prepare for a Water Contamination Incident *continued*



Develop a plan to facilitate communication to include:

- A designated phone number and email that will be continuously staffed.
- Process for staff to route external inquiries to the laboratory POC.
- A method of keeping all personnel up to date on relevant response information.
- Secure method (e.g., email) for posting and transferring data and other incident-related information.

Establish a list of contacts for other municipal, state, and/or EPA regional laboratories that can provide support and establish mutual aid agreements to:

- Share or obtain supplies, reagents, or materials.
- Perform analyses when the primary laboratory is overloaded with samples or laboratory operations are disrupted.

Determine what support the laboratory can provide to other laboratories or utilities during an emergency:

- Join the [Environmental Response Laboratory Network \(ERLN\)](#), EPA's national network of laboratories that can support large scale environmental responses.
- Consider participating in or joining your state's [Water and Wastewater Agency Response Network \(WARN\)](#) or other local mutual aid network.

Sampling Protocols

Maintain onsite emergency response water sampling supplies, field analysis kits, and coolers that can be quickly sent to the field. These kits could include:

- Supplies/equipment – general and site-specific sampling supplies, labeled sample bottles, preservatives, dechlorinating agents, water quality testing supplies, field screening tools, ice packs, thermometers, PPE, first aid kit, etc.
- Documentation/misc. – an inventory sheet of supplies, COCs, sample collection protocols, shipment/delivery instructions, field notebook, packaging materials, etc.

Develop a COC form and instructions to share with sampling teams to ensure consistent and accurate sample collection documentation.

- The COC should include the site name, analytical request number, sampler's name/signature, sample ID, method, collection date/time, type, description, number of containers, preservation method, tag/label numbers, sample receipt date/time, receiver's name/signature, etc.
- Develop a digital version of the COC. While paper forms are generally required to accompany the samples, digital forms can facilitate laboratory operations, improve efficiency, and enable electronic sharing of data.
- Develop a process for resolving issues with COCs that arrive with missing information.

Develop a form (or spreadsheet) for field-testing results. It may include the following information: field test method, meter/kit identifier used, testing location, testing time, tester's name, initial results, and comparison of results with reference values, if available.

Develop and update criteria for rejecting samples that do not meet shipping, temperature, holding time, or preservation requirements, and the procedure for notifying sample originators.

Have a system for incorporating relevant documentation, such as the COC and any other field-testing records obtained during sampling, in an incident specific data package/record.



Sample Receiving Capacity

Develop procedures for receiving and screening samples.

- Review [All Hazards Receipt Facility \(AHRF\) Screening Protocol](#), which provides guidance on in-process screening of samples of unknown chemical, explosive, and radiological hazards.
- Designate an area for receiving and screening potentially hazardous/unknown samples prior to entering the laboratory.
- Identify and obtain screening equipment, if needed.

Provide appropriate storage conditions for contaminants that may pose a safety hazard, ensuring that incompatible samples are not stored together.

Ensure equipment is available to implement security measures to restrict access to samples (e.g., locked refrigerators) and maintain evidentiary COC, if necessary.

Develop an internal COC or other method for tracking sample movement within the laboratory.

Laboratory Capacity

Develop an inventory of instrumentation and analytical capabilities that could be used to support a contamination incident including methods, standards, reagents, and other supplies.

Maintain a list of staff who are trained and proficient with methods and instrumentation.

Determine laboratory capacity based on staffing levels, instrumentation, and analytical capability that accounts for sample processing, analytical methods, method run times, instrument configurations (e.g., columns), supplies, data review and validation processes, and sample storage.

Evaluate the laboratory's capability to implement new regulatory and non-regulatory methods for contaminants of emerging concern.

Evaluate the laboratory's capability to perform analytical screening methods for unknown contaminants (e.g., non-target analysis). Develop procedure(s), as appropriate.

Ensure mission critical equipment has backup power sources (e.g., uninterruptible power supply) or are plugged into emergency electrical outlets. Verify facility backup power sources on a routine basis or consider establishing a first-priority agreement with a rental agency that could quickly provide generators during emergencies.

Ensure reagents and samples are stored in refrigerators or freezers plugged into emergency electrical outlets.

Determine and maintain inventory of laboratory supplies, reagents, and PPE to support routine analyses and sample processing and analysis during the initial stage of an emergency, until supply orders can be placed and received.

Determine laboratory storage capacity for large numbers of samples, analytical supplies, and PPE, and identify alternative storage options.

Actions to Prepare for a Water Contamination Incident *continued*



Training

Ensure staff are trained in good safety practices and appropriate use of PPE.

Identify and train multiple staff to handle key positions and perform critical analyses to ensure redundancy.

If conducting field-sampling activities:

- Train sample collectors on proper collection techniques for all types of samples and COC procedures. Training should include requirements for sample container, labeling, volume, preservation, holding time, shipping, and temperature.
- Train staff on site characterization procedures.

Conduct regular internal briefings, training, and exercises to keep staff informed about all incident response support procedures and improve execution.

Conduct and participate in available exercises that include external partners.

- Check EPA and state resources for available training or coordinate with utility(ies) or other laboratories to organize training. See [Plan a Laboratory Full-Scale Exercise](#) for more information on how to plan and conduct an exercise.

Familiarize yourself with [Water Contamination Response Resources](#), [Environmental Sampling and Analytical Methods \(ESAM\) program](#), [Clean Water Act Analytical Methods](#), and others in the resources section below.

Train staff that may be involved in an incident response on the basics of ICS, such as the ICS 100 and 200 courses.

Notes:

Actions to Respond to a Water Contamination Incident



This section includes actions for providing analytical services to a water utility that is responding to a contamination incident.

Safety First

Coordinate with Incident POC to discuss potential hazards associated with the contaminants and determine appropriate PPE and special handling requirements for samples.

Ensure an adequate supply of PPE is available, and brief staff on safety precautions prior to handling samples.

If performing field activities (e.g., sampling, screening):

- Follow the incident-specific Health and Safety Plan (HASP). Precautions taken will be based on the actual contaminants, if known.
- Constantly assess the scene, know your surroundings, and move to safe spots if necessary.
- Pay attention to all emergency alerts, instructions, and evacuate immediately if told by authorities.

Follow established, or update as appropriate, laboratory safety procedures based on the contaminants, method, or other known hazards.

Determine appropriate screening methods based on the hazards identified and subject samples to the screening procedure prior to bringing samples into the laboratory, if possible.

Limit access to samples to only the staff responsible for processing and analyzing them and implement necessary security and safety measures.

Fatigue during extended periods of emergency work is common and dangerous. Ensure staff get plenty of rest and stay alert. Leverage cross-trained staff to rotate personnel, if necessary.

Determine sample handling and transport requirements for disposal.

Identify shipping and transport requirements should samples be split or sent to another laboratory.

Coordination and Communication

Coordinate with the Incident POC to discuss required support and critical information about the incident:

- Detailed contact information.
- Background information on the incident such as site characterization information, field data, associated hazards, collected samples, etc.
- Requested analytical support including target analytes, matrix, preferred analytical methods, number of samples, reporting limits, availability of preliminary results, turnaround time, QA/QC requirements, etc.
- COC requirements; sample transport and security requirements; sampler preservation, retention, and disposal procedures; data review and reporting; and record retention requirements.
- Level of reporting requested for evidentiary samples.
- Criteria for rejecting samples that do not meet requirements.
- Discuss laboratory communications including the process for communicating with staff collecting samples in the field and external entities.
 - Determine communication or reporting requirements for the drinking water regulatory agency.

Actions to Respond to a Water Contamination Incident *continued*



Document all communication related to the incident in a communication log, including implementing a strategy to facilitate internal communication.

Evaluate current laboratory and sampling needs to maintain normal operations and regulatory requirements, and the need for additional support.

Update the contingency plan for internal shift and personnel changes, as well as the method for notifying staff of shift changes, to address incident-specific requirements throughout the response, as necessary.

Meet with laboratory staff to brief them on the water contamination incident including incident details, anticipated level of support, safety issues/precautions, designated roles and responsibilities, and chain of command. Additional topics depending on the availability of information could include:

- Analytical methods and associated QA/QC requirements.
- Data management, review, and validation.

Designate laboratory staff supporting the incident including:

- Laboratory POC and backup POC for internal and external incident-specific communications.
- Sample receiver(s).
- Analysts.
- QA officer.
- Safety officer.

Coordinate with vendors to assess the availability of supplies, reagents, and PPE. Identify alternate vendors/manufacturers to address shortages/back orders and update contact lists.

Leverage relationships and mutual aid agreements with laboratories to obtain reagents and supplies to allow for the continuation of analytical work until orders can be received from vendors.

Participate in scheduled status meetings with Incident POC and response personnel and provide updates, as necessary.

Sample Receiving

Ensure laboratory personnel receiving samples are trained and following established procedures for receiving and screening samples.

For each set of samples received, confirm digital/paper COC has been received, notify Incident POC that samples have been received, and follow up to obtain any missing information or report issues that would normally require the laboratory to reject samples.

Log samples into the internal COC or other tracking method for the laboratory.

Store incident samples in a separate area to avoid cross contamination of routine/compliance samples, if possible.

Analyses and Data Reporting

Inventory reagent and supplies daily during an incident and replenish as quickly as possible.

Ensure staff have reviewed the methods/SOPs, are qualified to conduct the analyses, and understand

Actions to Respond to a Water Contamination Incident *continued*



analytical goals (e.g., screening for presumptive identification vs. targeted quantitative confirmatory analyses) and associated QC analyses.

Prepare for and perform requested analyses following the selected methods/SOPs including:

- Performing sample preparation/processing procedures.
- Calibrating instrumentation using appropriate surrogates and calibration standards.
- Preventing cross contamination and maintaining sample integrity.
- Completing required analyses within the agreed upon turnaround time.
- Adhering to incident-specific sample retention requirements.

Contact the Incident POC with any issues with the analysis or if the turnaround time cannot be met.

Data reporting

- Provide preliminary data deliverables as agreed upon with the Incident POC. Due to time sensitivity in addressing an event, the Incident POC may ask for data that has not undergone complete internal review/verification/validation. Preliminary results should be flagged/identified in a manner such as “preliminary data pending confirmation,” and note that QA/QC issues will be addressed later in the final data deliverable(s).
- Review and validate data in accordance with the agreed upon incident-specific requirements prior to submitting final data deliverable(s) to the Incident POC.
- Ensure staff understand regulatory requirements that require the laboratory to verify results and to provide prompt notice to the water system and Incident POC if results trigger a reporting threshold. Report data as required by regulatory requirements.
- Submit data in accordance with agreed upon data reporting requirements. Ensure the data reporting template includes all required data fields to meet the response needs.
- Request confirmation of the receipt of data submitted electronically to the Incident POC and record in communication log.

Perform a final review of all results and data deliverables provided to the Incident POC to ensure all results were delivered, including confirming final results were provided for any preliminary data.

Provide final delivery of all incident data and confirm with the Incident POC that the data was received and that nothing was missing from the deliverables.

Confirm data storage requirements.

Follow sample retention and disposal procedures for the unused portion of the samples.

Documentation

Record and compile all documents related to the response including COCs, communication log, confirmation of sample receipt, any issues related to sample(s), data package submission, confirmation of data receipt, etc.

Work with the Incident POC to ensure records are retained and archived in accordance with policy.

Document all the equipment used, purchases made, staff hours worked, and contractors used during the response to assist in requesting reimbursement or invoicing.

- Track compensation (e.g., overtime) for personnel and ensure analyst hours do not exceed laboratory policies.

Actions to Resume the Laboratory's Normal Operations



This section includes actions for after analytical services have been provided to a water utility.

Discuss any long-term monitoring analyses needs (e.g., frequency, duration, number of samples per sampling event, analytes, QC samples, turnaround times, and sample retention) with the utility.

Review and perform an inventory of supplies and reagents and place orders as necessary with vendors to replenish.

Perform any deferred routine or preventative maintenance on sample processing and analytical instrumentation.

Ensure no cross-contamination or sample carryover by cleaning sample processing and analytical instrumentation and discarding necessary consumables.

Dispose of unprocessed samples, sample residuals, or processed sample extracts following retention requirements or after the Incident POC confirms that they are no longer required.

Develop a lessons-learned document based on the laboratory's response activities.

- Participate in an after-action discussion with utility/response personnel and other relevant response partners to identify portions of the response that went well and areas for improvement to facilitate development of the incident-specific after-action report (AAR).
- Conduct a discussion with internal staff for feedback on internal practices and communication during the incident.
- Review emergency procurement procedures to acquire supplies and services and evaluate response.
- Determine if additional staff need to be cross-trained.

Update/revise support processes, ERP, and COOP based on findings from incident lessons-learned.

Update and continue ongoing training.

Compile cost documentation into a single report to facilitate reimbursement or invoicing for services provided.

- Explore funding opportunities and resources to assist with reimbursement. Note that each state has its own rules for reimbursement. Resources available to assist include:
 - [Fed FUNDS](#)
 - [Reimbursement Tips for Water Sector Emergency Response and Recovery](#)
 - [Reimbursement Tips for Emergency Water Laboratory Support](#).

Contacts and Resources



CONTACT NAME	UTILITY/ORGANIZATION NAME	PHONE NUMBER

Resources

Operations Planning

- [Continuity of Operations Plan \(COOP\) for Water Laboratories](#) [EPA]
- [Continuity of Operations Plan Improvement Tool for Public Health Laboratories](#) [APHL]
- [Emergency Response Plan \(ERP\) Template and Instructions \(for Utilities\)](#) [EPA]
- [Laboratory System Improvement Program](#) for Public Health Labs [APHL]

Laboratory Coordination & Response

- [Water/Wastewater Agency Response Network \(WARN\)](#) [EPA]
- [EPA Water Laboratory Alliance Response Plan](#) [EPA]
- [Laboratory Notification Form for Drinking Water Results](#) [Pennsylvania DEP]
- [Compendium of Environmental Testing Laboratories \(Laboratory Compendium\)](#) Note: registration is required for access. [EPA]
- [Reimbursement Tips for Emergency Laboratory Support](#) [EPA]
- [Reimbursement Tips for Water Sector Emergency Response and Recovery \(for Utilities\)](#) [EPA]
- [Incident Action Checklists for Water Utilities](#) [EPA]
- [Federal Funding for Water and Wastewater Utilities in National Disasters \(Fed FUNDS\)](#) [EPA]



Analytical Resources

- [Approved Drinking Water Analytical Methods](#) [EPA]
 - [Drinking Water Regulations and Contaminants](#) maximum contaminant levels (MCLs) for drinking water [EPA]
- [Contact Information for Certification Programs and Certified Laboratories for Drinking Water](#) [EPA]
- [Clean Water Act Analytical Methods](#) for wastewater and surface waters [EPA]
 - [Water Quality Standards: Regulations and Resources](#) – for water bodies [EPA]
- [Environmental Response Laboratory Network](#) [EPA]
- [Protocol for Collection of Water Samples for Detection of Pathogens and Biothreat Agents](#) [EPA]
- [Environmental Sampling and Analytical Methods \(ESAM\) Program](#) [EPA]
 - [Selected Analytical Methods for Environmental Remediation and Recovery \(SAM\)](#) [EPA]
 - [Sample Collection Information Document \(SCID\)](#) [EPA]
- [Water Contamination Incident Remediation Plan \(WaterCIRP\)](#) [EPA]
- [Technical Support Products and Services List](#) [EPA]
- [The Integrated Consortium of Laboratory Networks](#)

Resource for Unknowns

- [All Hazards Receipt Facility \(AHRF\) Screening Protocol](#) [EPA]
- [Sampling Guidance for Unknown Contaminants in Drinking Water](#) [EPA]
- [Non-Targeted Analysis Research](#) [EPA]
- [Agency for Toxic Substances and Disease Registry \(ATSDR\)](#)

Training

- [Plan a Laboratory Full-Scale Exercise](#) [EPA]
- [WLA Analytical Preparedness Self-Assessment](#) [EPA]
- Chain of Custody (COC) Training [Part 1](#) & [Part 2](#) [EPA]
- [ICS Resource Center](#) [FEMA]

Safety

- [PubChem](#) [NIH]