Building Field Capabilities to Respond to Drinking Water Contamination

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Abbreviations

ASTM	American Society for Testing and Materials
Atm	Atmosphere
APTI	Air Pollution Training Institute
AWOP	Area Wide Optimization Program
BT	Bioterrorism Threat
°C	Celsius
CFR	Code of Federal Regulations
CFT	Calculated Flush Time
CH_4	Methane
Cl_2	Chlorine Gas
Cm	Centimeter
CO	Carbon Monoxide
COC	Chain of Custody
DO	Dissolved Oxygen
DOT	United States Department of Transportation
DPD	N, N-diethyl-p-phenylenediamine
DQO	Data Quality Objective
EPA	United States Environmental Protection Agency
ERSAK	Emergency Response Sampling and Analysis Kit
ETV	Environmental Technology Verification Program
FBI	Federal Bureau of Investigation
FPS	Flame Photometric Spectrometry
FTIR	Fourier Transform Infrared Spectroscopy
GC/MS	Gas Chromatograph/Mass Spectrometer
g/L	Grams per Liter
Gal	Gallon
Gpm	Gallons per Minute
HAA5	Haloacetic Acids
HASP	Health and Safety Plan
HCN	Hydrogen Cyanide
HazMat	Hazardous Materials Response Unit
HCl	Hydrochloric Acid
HDPE	High Density Polyethylene
HMR	Hazardous Materials Regulations
HNO_3	Nitric Acid
H_2S	Hydrogen Sulfide
H_2SO_4	Sulfuric Acid
ID	Identification
IMS	Ion Mobility Spectrometer
ISE	Ion Selective Electrode
L	Liter
LDPE	Low Density Polyethylene

LEL	Lower Explosive Limit
LRN	Laboratory Response Network
M	Molarity
mg/L	Milligrams per Liter
MHz	Megahertz
mL	Milliliter
µm	Micrometer
MOT	Materials of Trade
NaI	Sodium Iodide
NaOH	Sodium Hydroxide
Nm	Nanometer
NH_3	Ammonia
NHSRC	National Homeland Security Research Center
NO	Nitric Oxide
NO_3	Nitrate
O_2	Oxygen
ORP	Oxidation Reduction Potential
OSHA	Occupational Safety and Health Administration
OWQM	Online Water Quality Monitoring
PH_3	Phosphine
PHMSA	Pipeline and Hazardous Materials Safety Administration
PID	Photoionization Detector
PPE	Personal Protective Equipment
Ppm	Parts per Million
PTFE	Polytetrafluoroethylene
PVC	Polyvinyl Chloride
QAPP	Quality Assurance Project Plan
QC	Quality Control
Qt	Quart
r mV	Relative Millivolts
RPTB	Response Protocol Toolbox
S&A	Sampling and Analysis
SC&SP	Site Characterization and Sampling Plan
SCT	Site Characterization Team
SDWA	Safe Drinking Water Act
SO_2	Sulfur Dioxide
SOP	Standard Operating Procedure
SM	Standard Methods for the Examination of Water and Wastewater
SRS	Water Quality Surveillance and Response System
SVOC	Semi-volatile Organic Compound
TNI	The National Environmental Laboratory Accreditation Council Institute
TTHMs	Total Trihalomethanes
TOC	Total Organic Carbon
TTEP	Technology Testing & Evaluation Program
UV	Ultraviolet

UV-VIS	Ultraviolet/Visible
VOC	Volatile Organic Compound
w/v	Weight per Volume

Section 1: Introduction

When performed in response to possible or credible drinking water contamination, the goal of Sampling and Analysis (S&A) is to confirm or rule out contamination through field and laboratory testing (EPA, 2015a). It is one of the earliest utility-led activities initiated when the utility has activated its drinking water contamination response plan and continues throughout remediation and recovery if contamination is confirmed (EPA, 2015b).

In the early phases of investigation, the primary objective of S&A field activities is the collection of drinking water samples. Samples may be collected from locations throughout the distribution system to determine the extent of possible contamination, as well as the investigation site where contamination is suspected to have been introduced. **Figure 1-1** illustrates the process of field response in support of S&A, from arrival at an investigation site or sampling location until samples are packaged for shipment to a laboratory.

Basic field response activities depicted in Figure 1-1 are those activities that can be performed by utility personnel with minimal additional training. With proper planning and practice, these activities can be extremely effective in ensuring that samples are quickly and safely collected for field and laboratory testing. They include:

- Visual site hazard assessment
- Sample collection
- Water quality parameter testing
- Sample packaging and shipping

A visual site hazard assessment can detect immediate hazards and indicators of potential hazards that may require the support of an emergency response partner such as law enforcement or a Hazardous Materials Response Unit (HazMat). If no hazards are discovered, however, utility personnel can proceed with sample collection, water quality parameter testing, and sample packaging and shipping.

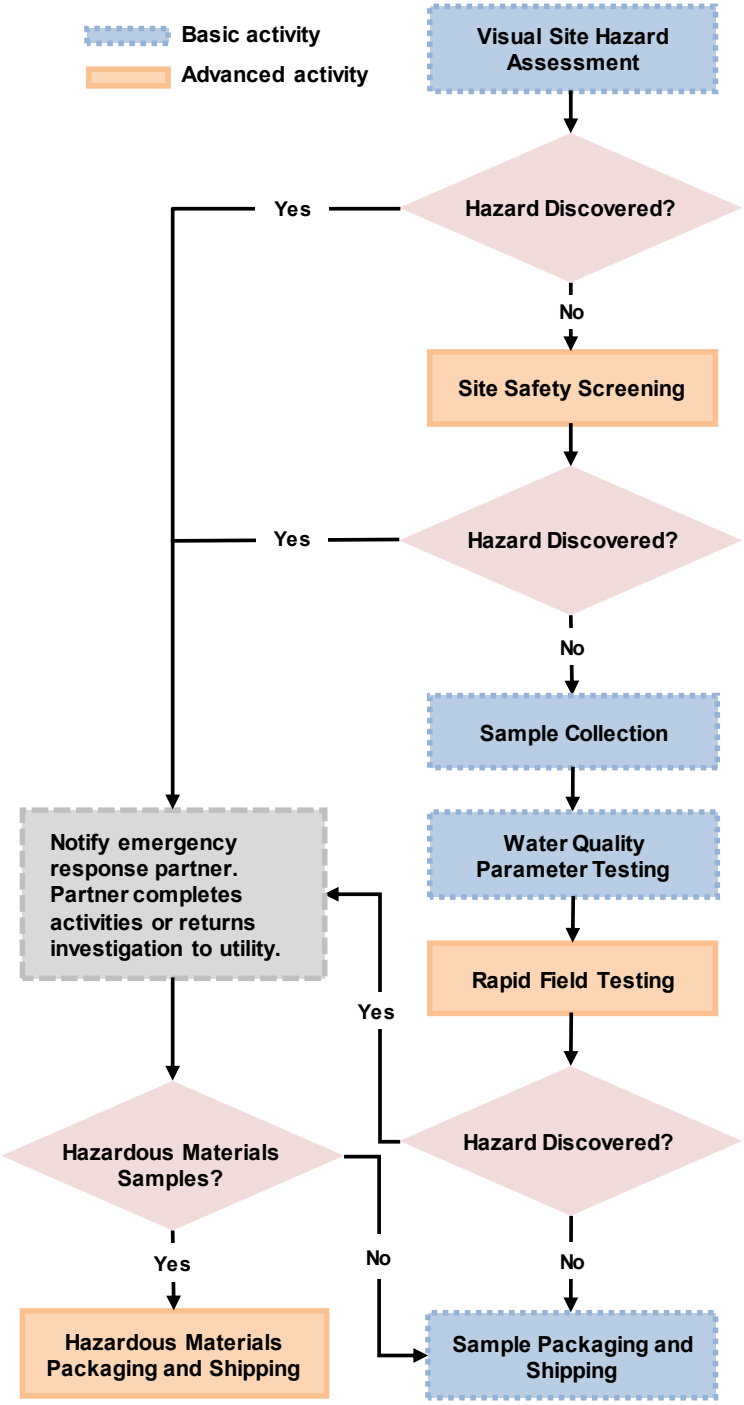


Figure 1-1. Basic and Advanced Field Response Activities

Advanced field response activities can be performed by an emergency response partner or by utility personnel with specialized training. They include:

- Site safety screening
- Rapid field testing
- Hazardous materials packaging and shipping

Site safety screening detects exposure hazards (e.g., combustible or volatile gases, radiation, chemical agents) and provides an additional means to assess site safety. Rapid field testing detects specific contaminants or contaminant classes (e.g., cyanide, arsenic, volatile organic compounds) in drinking water and can help focus the analytical investigation, determine if additional Personal Protective Equipment (PPE) is needed, or detect the presence of contaminants requiring emergency response partner support (chemical warfare agents). If contamination is confirmed through field or laboratory testing, a determination needs to be made if drinking water samples can be packaged and shipped as non-hazardous environmental samples or must be shipped as hazardous materials.

Small, medium, and large utilities can prepare for emergency response S&A by developing in-house capabilities to perform basic field response activities, and adding in-house capabilities to perform advanced activities if they are sustainable. This approach reflects lessons learned by drinking water utilities that participated in the Environmental Protection Agency's (EPA) Water Security Initiative Contamination Warning System Pilot Program (EPA, 2014 and EPA, 2015c). During this program, all of the pilot utilities built capabilities to perform basic field response activities in an emergency, and made new investments in capabilities to perform advanced activities if they could be sustained. Sustainability depended on maintenance costs of instrumentation and supplies, ability to maintain the proficiency of trained personnel, and finding multiple uses of instrumentation beyond emergency response. Regardless of their ability to perform advanced activities, all the pilot utilities planned with emergency response partners and conducted regular drills and exercises to practice emergency response procedures.

This document, *Guidance for Building Field Capabilities to Respond to Drinking Water Contamination*, provides utilities with planning and implementation guidance, templates, customizable report forms, and other documentation for the activities depicted in Figure 1-1.

The guidance is organized into the following sections:

- **Section 2: Basic Field Response Activities**. Describes planning and documentation for visual site hazard assessment, sample collection, and sample packaging and shipping.
- **Section 3: Advanced Field Response Activities**. Describes planning and documentation for site safety screening, rapid field testing, and hazardous materials packaging and shipping.
- **Section 4: Staffing**. Describes utility staffing to perform basic and advanced field response activities.
- **Section 5: Health and Safety**. Discusses field response health and safety considerations.
- **Section 6: Quality Assurance**. Discusses development of a quality assurance project plan and quality control for field methods.
- **Section 7: Procedures**. Describes emergency response procedures necessary for effective field response from pre-deployment activities to submission of samples for laboratory analyses.
- **Section 8: Emergency Response Sampling and Analysis Kits**. Discusses considerations for preparation, placement, and contents of emergency response sampling and analysis kits.
- **Section 9: Resources**. Lists EPA and non-EPA resources helpful for field response planning.
- **Section 10: References**. Lists references cited in the document.

Section 2: Basic Field Response Activities

Basic field response activities include visual site hazard assessment, sample collection, water quality parameter testing, and sample packaging and shipping. Field samplers, water quality technicians, and chemists can perform these activities unless information from the initial threat notification indicates safety concerns that would prohibit utility personnel from performing these tasks. Additional support personnel such as distribution system operators or security personnel may be needed at some locations.

2.1 Visual Site Hazard Assessment

The purpose of visual site hazard assessment is to visually inspect an investigation site or sampling location for immediate hazards and indicators of suspicious or criminal activity. Information from a visual site hazard assessment is used to make an initial determination of site safety and to determine if an emergency response partner (law enforcement, HazMat) is needed.

Personnel should be trained in advance to perform a visual site hazard assessment, report findings in real time, and document results. If a visual site hazard assessment is performed at a utility facility, personnel should be aware of any chemicals, equipment, personnel, or vehicles that are typically at the site.

The investigation site and sampling location should be approached cautiously while visually scanning the surroundings for immediate hazards or the presence of unusual equipment, containers, odors, dead animals, unauthorized vehicles, or people at utility-owned sites, or signs of intrusion or tampering. Cell phones or radios should be used for real-time communication between utility personnel in the field and utility management (a utility manager, the Incident Commander, or other designated individual). If an immediate hazard or indicator of suspicious or criminal activity is discovered, utility personnel should stop, withdraw to a safe distance, and notify utility management. After an evaluation of the situation, utility personnel may be given permission to continue their investigation or instructed to wait for assistance.

APPROACHING SITES

Approach sites where contamination is suspected to have been introduced from upwind, using binoculars to survey the area from a distance.

A *Visual Site Hazard Assessment Form* with instructions is provided in **Appendix A-1**. This form can be customized with utility-specific information and instructions. A template can be opened in Word by clicking the icon in the callout box.

This template can be used to develop a Visual Site Hazard Assessment Form.

2.2 Sample Collection

Utility personnel needed to perform sample collection include field samplers and, in some cases, support personnel to perform specific tasks related to sample collection or documentation. For example, a distribution system operator may be required to open fire hydrants or security personnel needed to access secure facilities. A sample custodian may be needed to complete the Chain of Custody (COC) form and package samples.

Planning for sample collection requires laboratory planning. An in-depth discussion of laboratory planning is beyond the scope of this guidance; however, there are a number of resources to assist utilities. EPA's *Water Security Initiative: Guidance for Building Laboratory Capabilities to Respond to Drinking Water Contamination* is available to help utilities identify specific contaminants of concern from intentional threats, analytical methods, and laboratories. EPA's *Response Protocol Toolbox (RPTB) - Module 3: Site Characterization and Sampling Guide*, and *Module 4: Analytical Guide*, and derivative

guidance, *Sampling Guidance for Unknown Contaminants in Drinking Water* present a framework for sampling and analysis of "unknown" contaminants in drinking water. For information on requesting laboratory support in an emergency, refer to EPA's *Water Laboratory Alliance - Response Plan*.

The following sections discuss the preparation of sample bottles; general and site-specific supplies; and sampling from taps, dedicated sampling stations, fire hydrants, storage tanks, and Online Water Quality Monitoring (OWQM) stations.

2.2.1 Sample Bottles

Sample bottles should be available for planned laboratory analyses. As a starting point, utilities should document their current in-house and partner laboratory capabilities and maintain a stock of sample bottles for emergency response. **Appendix A-2**, *Example Laboratory Capabilities*, presents the laboratory capabilities of an example utility and illustrates the types of information needed to prepare sample bottles. This document can be customized according to a utility's laboratory capabilities. A template can be opened in Word by clicking the icon in the callout box. Document the following for each laboratory method:

This template can be used to document laboratory capabilities.

- Contaminant or contaminant class
- Method title/Identification (ID)
- Laboratory to perform analyses in an emergency (name, shipping address, phone number)
- Emergency point-of-contact at the laboratory (name and phone number)

For methods that do not describe sample collection within the method itself, the laboratory performing the analyses should provide sample collection procedures that indicate sample bottle type and size, cleaning requirements if needed, dechlorinating agents, preservatives, and any special packaging or shipping instructions. Use the laboratory information to prepare a sample bottle supply list that includes the following information for each method:

- Method title/ID
- Sample bottle type and size
- Number of bottles required for sample analysis and quality control
- Method preservatives and dechlorinating agents as appropriate

An *Example Sample Bottle Supply List* is presented in **Appendix A-3** using the example laboratory capabilities contained in Appendix A-2. This list can be customized based on individual utility capabilities. A template can be opened in Word by clicking the icon in the callout box.

This template can be used to develop a Sample Bottle Supply List.

2.2.2 General Supplies

Table 2-1 lists general supplies for sample collection and packaging. PPE and safety supplies are listed in Table 5-1.

Table 2-1. General Supplies

Item	Notes
Supplies	
Tubing and clamp	May be needed for tap sampling
Clean, large volume sample container with dispensing spout or spigot (20-L HDPE or glass container, or 20-L collapsible LDPE container)	For large volume sampling
Miscellaneous labware	Beakers, graduated cylinders, spatulas, etc.
Stopwatch and graduated cylinder or plastic measuring cup	For measuring flow rate
Thermometer	For measuring water temperature
pH paper in ranges from 0 - 4 and 10 - 14 (sensitive to 0.5 pH units)	For measuring pH of samples preserved with acid or base
Paper towels	For wiping wet containers and spill clean-up
Labels or custody tags	For labeling bottles in the field if they are not pre-labeled
Custody seals	For sample bottles and coolers
Ice packs	For chilling samples
Coolers	For sample storage and shipping
Sealable/zippered freezer bags (1-qt, 1-gal)	For double bagging ice or sample bottles
Packing tape	For sealing coolers
Water proof pen and marker	For labeling
Bleach wipes or 10% bleach solution	For decontaminating coolers and sample bottles
Squirt bottles	For rinsing equipment and supplies with laboratory grade water
Reagents	
Laboratory grade water	For rinsing equipment and supplies; ASTM Type II or better
Sodium thiosulfate crystals	For water sample dechlorination
Ascorbic acid	For water sample dechlorination
Sodium sulfite crystals	For water sample dechlorination

HDPE = High Density Polyethylene, LDPE = Low Density Polyethylene

A 20-L sample container is recommended in Table 2-1 for large volume sample collection and sub-sampling for field and laboratory testing. Large volume sample collection is beneficial in many scenarios. It can reduce the time spent by utility personnel in a confined space, increase the likelihood of capturing transient contamination by reducing sampling time, and ensures that field testing results reflect the water quality of sub-samples for laboratory analyses. It should be noted, however, that not all contaminants or contaminant classes may be amenable to sub-sampling. For example, volatile organic compound samples should be collected directly into headspace-free bottles to avoid losses, and microbiological samples should be collected directly into

Figure 2-1. Sub-sampling from a Large Volume Container

sterile bottles using sterile reagents and technique. Additional quality control may be necessary to determine if sub-sampling introduces bias, contamination, or interferences. Utilities should consult with their primacy agency before using large volume sample collection and sub-sampling for any method results submitted for compliance monitoring.

2.2.3 Site-Specific Sampling and Supplies

Sampling from taps, fire hydrants, storage tanks, and OWQM stations are discussed below followed by a list of site-specific supplies.

Sampling from Taps

Taps are the most common location type to sample from in a drinking water emergency. The ability of field samplers to access tap sampling locations should be considered before they are dispatched, as it may be necessary to obtain the permission of the resident or business owner, or have security personnel unlock a facility.

The objective of tap sampling may be to collect samples representative of water quality in the distribution main, the service line, or in the premise plumbing. The objectives of tap sampling should be clearly conveyed to field samplers since different objectives require different purge rates and times. If distribution system contamination is suspected or confirmed, characterizing water quality in the distribution main in the proximity of the sample location is especially important. Under-flushing a tap may result in sampling from the service line and over-flushing may result in sampling from another part of the system. EPA's Area Wide Optimization Program (AWOP) has developed the following procedure for collecting water samples representative of the distribution system main.

TAP SAMPLING REPRESENTATIVE OF THE DISTRIBUTION MAIN

Supplies: 2 gallons per minute (gpm) flow control valve (or a large measuring cup and stopwatch) and a timer.

1. Determine the total length of premise and service line piping from the tap to the distribution main, recording the internal diameter of each segment of pipe. Use 3/8 inch for all pipes ≤ 3/8 inch.
2. Using **Table 2-2**, determine the calculated flush time (CFT), in minutes, for **each** segment of pipe. For pipe lengths in between values in the table, round to the nearest pipe length that is in the table.
3. Add the CFTs for each segment of pipe to determine the Total CFT and multiply by 2. Flushing for **2 X Total CFT** will empty the existing water from the line and replace it with water from the distribution main.
4. If applicable, remove the aerator from the faucet.
5. Attach the 2 gpm flow control valve.
6. To flush using the 2 gpm flow control valve, fully open the cold water tap and start a timer. Flush for **2 X Total CFT**.
7. If manually adjusting the flow rate to 2 gpm using a measuring cup and stopwatch, start the timer when the flow rate is 2 gpm. Flush for **2 X Total CFT**.
8. Collect samples after the line has been flushed for **2 X Total CFT**.
9. Record the temperature of the flowing water after all samples have been collected.

Table 2-2. Calculated Flush Times in Minutes for a Flow Rate of 2 gpm

Length of Pipe (feet)	Internal Diameter of Pipe (inches)								
	3/8	1/2	3/4	1	1 1/2	2	2 1/2	3	4
1	0.00	0.01	0.01	0.02	0.05	0.1	0.1	0.2	0.3
10	0.03	0.05	0.1	0.2	0.5	0.8	1.3	1.8	3.3
20	0.1	0.1	0.2	0.4	0.9	1.6	2.6	3.7	6.5
30	0.1	0.2	0.3	0.6	1.4	2.4	3.8	5.5	9.8
40	0.1	0.2	0.5	0.8	1.8	3.3	5.1	7.3	13.1
50	0.1	0.3	0.6	1.0	2.3	4.1	6.4	9.2	16.3
60	0.2	0.3	0.7	1.2	2.8	4.9	7.7	11.0	19.6
70	0.2	0.4	0.8	1.4	3.2	5.7	8.9	12.9	22.8
80	0.2	0.4	0.9	1.6	3.7	6.5	10.2	14.7	26.1
90	0.3	0.5	1.0	1.8	4.1	7.3	11.5	16.5	29.4
100	0.3	0.5	1.1	2.0	4.6	8.2	12.8	18.4	32.6

Notes

1. To minimize flush times consider an alternate location for long or large diameter service lines.
2. For internal pipe diameters less than 3/8 inch, use the CFTs for 3/8 inch.
3. Diameters are approximate as the actual inner diameter may vary depending on pipe material and degree of corrosion inside the pipe.

Table 2-2 can be used for flow rates other than 2 gpm and for pipe lengths greater than 100 feet. The following is an example of how to use Table 2-2 for a flow rate other than 2 gpm, and for pipe lengths greater than 100 feet. ***Example:*** The service line is 150 feet of 2 inch diameter pipe and 50 feet of ½ inch diameter pipe, and the actual flow rate is 5 gpm (the flow rate will *not* be adjusted to 2 gpm).

1. Determine the CFT based on a flow rate of 2 gpm using Table 2-2.

	$CFT_{Table\ 2\text{-}2}$
100 feet, 2 inch diameter:	8.2 minutes
50 feet of 2 inch diameter:	4.1 minutes
50 feet of ½ inch diameter:	0.3 minutes
Total $CFT_{Table\ 2\text{-}2}$ =	12.6 minutes

2. Determine the CFT for an actual flow rate of 5 gpm.

$$CFT_{actual\ flowrate} = Total\ CFT_{Table\ 2-2}\ \frac{2\ gpm}{actual\ flowrate, gpm}$$

$$CFT_{5\ gpm} = 12.6\ minutes\ x\ \frac{2\ gpm}{5\ gpm} = 5.04\ minutes$$

3. Flush the tap for 2 X CFT *actual flow rate*: 2 X 5.04 = 10.08 minutes.
4. Collect samples after the line has been flushed for 2 X CFT *actual flow rate*.
5. Record the water temperature of the flowing water after all samples have been collected.

Sampling from Dedicated Sampling Stations

Dedicated sampling stations are water taps enclosed in protective boxes that are designed to allow for collection of samples representative of water quality in the distribution main. Since dedicated sampling stations are typically plumbed to require a low volume of flush water, they may be impractical for collecting large volume samples. If, however, large volume samples must be collected from dedicated sampling stations, a length of tubing can be used to facilitate filling large volume containers while they are on the ground to avoid the need to hold a heavy container during the potentially lengthy sample collection process.

Sampling from Fire Hydrants

Sampling from fire hydrants may not be ideal under normal circumstances, however, it may be necessary in an emergency if there are no easily accessible tap sampling locations in the vicinity of suspected contamination. Additional quality control may be necessary to determine if dirt or rust from hydrant sampling has an adverse impact on method performance.

Figure 2-2. Hydrant Sampler

A distribution system operator should accompany field samplers when sampling from a fire hydrant. Dry barrel hydrants, the most common type of hydrant, are designed to be operated with their valves fully opened, however, filling sample bottles from a fully opened hydrant can be challenging. EPA's *AWOP Hydrant Sampler Procedure* describes the assembly and use of a hydrant sampler that allows for a fire hydrant to be fully opened while providing a side-stream sample tap to fill bottles in a controlled, safe manner. **Figure 2-2** shows a fully assembled hydrant sampler.

Sampling from Storage Tanks

Security personnel and a distribution system operator may be required to help field samplers access sampling locations at storage tanks. Some tanks have separate inlet/outlet access points and taps, so consideration should be given to the selection of an access point based on the sampling objectives. Sampling from the outlet will provide an indication of water quality leaving the tank whereas sampling from the inlet will provide an indication of water entering the tank. Tanks with a common inlet/outlet only provide a sample of tank contents during drain cycles if the tank is well mixed. Samples from tanks may not be representative of current water quality in the distribution system since water age in storage tanks can be significantly older than the water in the distribution mains leading to the tanks.

Advance planning and training are necessary to perform depth sampling of tanks. Temperature-induced stratification, tank baffling, and dead-spaces with poor mixing may be unique to individual tanks and should be understood if depth sampling is performed. A Kemmerer sampler, Van Dorn sampler, or submersible pump can be used for depth sampling of storage tanks. Refer to the American Society for Testing and Materials (ASTM) 6759, *Standard Practice for Sampling Liquids Using Grab and Discrete Depth Samplers*, for more information on depth sampling.

Sampling from Online Water Quality Monitoring Stations

OWQM stations are used to monitor water quality in real time at strategic locations in a distribution system (EPA, 2015d). The data generated at these stations is continuously analyzed to support system operation and to detect water quality anomalies that may be an indication of contamination. Some OWQM stations include a 20-L glass or HDPE sample collection container that can be remotely triggered to fill when a water quality anomaly is detected. The remotely filled sample container can then be sub-sampled for field and laboratory testing. If the remotely filled sample container is sealed, as shown in **Figure 2-3**, care should be taken to slowly release any residual pressure that may remain in the filled sample container. If an OWQM station does not include remote sample collection capabilities, sampling from the station can be performed by manual sample collection onsite. Field samplers should be trained in advance on procedures for collecting samples from OWQM stations.

Figure 2-3. OWQM Station with Sample Collection Containers

Site-Specific Sampling Supplies

Table 2-3 summarizes typical supplies for site-specific sampling . Additional supplies may be identified by the utility.

Table 2-3. Site-specific Sampling Supplies

Type of Site	Supplies
Tap	Flow control valve (2 gpm)
	Tubing and clamp
	Thermometer
Dedicated sampling station	Thermometer
	Tubing and clamp
Hydrant[1]	Hydrant Sampler

Type of Site	Supplies
Storage tank	Kemmerer or Van Dorn bottle for depth sampling
	Tubing and clamp
OWQM station	20-L volume glass or HDPE bottle with screw cap
	Bubble wrap® (to wrap glass bottle for transport)
	Large plastic bag to contain bottle
	Bungee cords or other means to secure 20-L bottle in transport vehicle
	Tubing and clamp

[1]Refer to EPA's *Hydrant Sampler Procedure* for a parts list and assembly instructions.

2.3 Water Quality Parameter Testing

Water quality parameter changes can indicate a source water change, water treatment or distribution system operational issues, or contamination. Previous research has demonstrated that many types of contaminants can change at least one water quality parameter (EPA, 2009). Laboratories can use the results from water quality parameter testing to determine possible matrix effects.

Field samplers or water quality technicians can perform water quality parameter tests. Potentially useful water quality parameter tests and methods are listed in **Table 2-4**. Disinfectant residual, pH, and temperature must be measured in the field. Other water quality parameters can be measured in the field or in a laboratory as soon as possible after sample collection.

Table 2-4. Water Quality Parameters and Example Methods

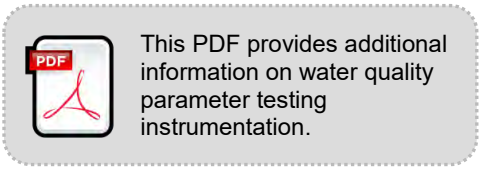
Parameter	Method
pH[1]	SM 4500-H+B
Disinfectant residual[1] (e.g., total and free chlorine)	SM 4500-Cl G
Specific conductance	SM 2510 B
Turbidity	SM 2130 B
Temperature[1]	SM 2550
Total organic carbon	SM 5310 B
UV-VIS absorption	SM 5910 B
Oxidation reduction potential	SM 2580 B
Apparent color	SM 2120 B
Dissolved oxygen	SM 4500-O G
Ammonia	SM 4500-NH3

[1] Must be measured in the field at the time of sample collection for compliance monitoring.
UV-VIS = Ultraviolet/Visible

Initial calibration of the instruments used for water quality parameter testing should be conducted in a controlled environment (e.g., laboratory or staging area at the sampling location) although calibration checks and other point-of-use QC can be performed in the field. Point-of-use QC is any QC performed in the field at the time of sample analysis.

A *Water Quality Parameter Report Form* for documenting water quality parameter results from a single sampling location is provided in **Appendix A-4**. A template can be opened by clicking the icon in the callout box. Each Water Quality Parameter Report Form should receive a unique ID number that can be recorded on the COC form for respective samples.

This template can be used to develop a Water Quality Parameter Report Form.



Additional information on water quality parameters, field instrumentation, and purchase and maintenance costs can be found in *Supplemental Information: Water Quality Parameter Testing Instrumentation*. The PDF can be opened by clicking the icon in the callout box.

2.4 Sample Packaging and Shipping

Packaging and shipping of drinking water samples should be completed in a manner that protects the safety of the individuals transporting the samples, ensures that samples arrive at their final destination intact and at the proper temperature, and maintains COC. Field samplers, water quality technicians, or specially designated sample custodians can prepare the COC form and package and ship samples.

The following are general guidelines for sample packaging:

- Rinse the outside of each bottle with laboratory grade water or disinfect with a bleach wipe
- Inspect individual sample bottles and caps to ensure that they are free of defects or cracks
- Affix a sample bottle label that includes a unique ID number
- Place each sample bottle in a sealable plastic bag and apply a custody seal
- Protect individual sample bottles with a padded layer (such as Bubble Wrap®)
- Use a sturdy shipping container such as a chest cooler with the drain spout sealed shut
- Line the shipping container with a large plastic garbage bag
- Double bag individual ice packs by filling a sealable plastic bag with ice and then sealing this bag in another bag
- Place individual sample bottles in the cooler with sufficient space to allow the bottles to be surrounded by the ice packs

The following guidelines are applicable for transporting and shipping preserved drinking water samples and for transporting common preservatives in utility-owned vehicles:

- Commercial shipment of preserved water samples are not regulated as hazardous materials if the amount of preservative does not exceed the following levels as excerpted from 40 Code of Federal Regulations (CFR) 136.3, Table II, Footnote 3:
  - *Hydrochloric acid (HCl) in water solutions at concentrations of 0.04% by weight or less (pH about 1.96 or greater)*
  - *Nitric acid (HNO_3) in water solutions at concentrations of 0.15% by weight or less (pH about 1.62 or greater)*
  - *Sulfuric acid (H_2SO_4) in water solutions at concentrations of 0.35% by weight or less (pH about 1.15 or greater)*
  - *Sodium hydroxide (NaOH) in water solutions at concentrations of 0.080% by weight or less (pH about 12.30 or less)*
- The transportation of samples or hazardous materials by a federal, state, or local government employee in a government vehicle for government business are not subject to these requirements in accordance with 49 CFR 171.1(d)(5).
- Motor transport of hazardous materials used to preserve or dechlorinate water samples by utility personnel may meet the Materials of Trade (MOT) exceptions contained in 49 CFR 173.6 if they do not exceed reportable quantities, are properly packaged and labeled, and if personnel are trained to safely handle and use the materials. It is the responsibility of the utility to determine if sample preservatives meet the MOT exceptions.

2.4.1 Chain of Custody

COC documents the integrity of samples from preparation of reagents and supplies to sample collection, transport, transfer, laboratory analysis, data management, and final disposal of samples. A sample is in someone's custody if:

- It is in one's actual physical possession
- It is in one's view, after being in one's physical possession
- It is one's physical possession and then locked up so that no one can tamper with it
- It is kept in a secured area that is restricted to authorized personnel only

The following COC guidelines are recommended to ensure the integrity of samples, especially if they could be used as evidence in civil or criminal investigations. These guidelines only cover COC from the time a sample is collected in the field until it is transferred to a laboratory for analysis.

- Each cooler should have a COC form for its contents (i.e., do not prepare a single COC form for multiple coolers)
- If the samples will be shipped by a commercial courier, the COC form should be placed inside a sealable plastic bag and taped to the inside of the cooler lid
- Seal the cooler with tape to ensure it does not open during transport or shipping
- Apply a custody seal to the cooler and write the COC Form ID and initials of the packager on the seal
- If the samples will be delivered by utility personnel to the laboratory, the COC form may be hand delivered and custody seals are optional

Evidentiary COC requirements in a drinking water emergency may exceed what the utility normally practices during routine sampling. Utilities should develop an evidentiary COC procedure for samples that could be used as evidence in a civil or criminal investigation. Utility personnel involved in sample collection, packaging and shipping should be trained in evidentiary COC procedures and should maintain proficiency through regular drills and exercises if evidentiary COC is not used for routine sampling. EPA's *Water Laboratory Alliance Training Center* in conjunction with EPA's Air Pollution Training Institute (APTI) offer online COC training titled *Handling Criminal Investigation Samples: Maintaining Chain of Custody* that can assist utilities.

Appendix A-5 is an *Emergency Response Chain of Custody Form* for documenting evidentiary COC and relevant field information for recipient laboratories. The form can be customized in Word with utility-specific information. A template can be opened by clicking the icon in the callout box. Note that the COC form contains fields to enter the field testing report form ID numbers so that samples can be linked to water quality parameters and rapid field testing results. Recipient laboratories may request this information prior to sample analysis.

This template can be used to develop an Emergency Response Chain of Custody Form.

Multipage carbon or carbonless copy capabilities allow each agency that generated, relinquished, or received samples to retain a copy of the COC form for their records. If a COC form is used during field response that does not include a multipage carbon copy, the utility should consider how it will manage the need to retain originals and provide copies of the COC form when samples are transferred between individuals or agencies.

Section 3: Advanced Field Response Activities

Advanced field response activities include site safety screening, rapid field testing, and hazardous materials packaging and shipping. Advanced activities can be performed by utility personnel with specialized training or by an emergency response partner.

3.1 Emergency Response Partner Planning

In a drinking water contamination emergency, emergency response partners may be needed to perform advanced activities or to assist the utility in performing basic activities. Emergency response partners include local HazMat, law enforcement, Civil Support Teams, EPA Emergency Response Teams, and others. Planning in advance with emergency response partners provides an opportunity to share information about the utility with the partner and to learn about each other's capabilities (EPA, 2012).

Figure 3-1. HazMat Responders During a Water Utility Drill

Field personnel should participate in utility planning discussions with emergency response partners so that they understand the technical capabilities of emergency response partners to perform advanced activities, and their roles and responsibilities when working with these partners in the field.

A *HazMat Interview Form* is provided in **Appendix B-1** to help utilities gather information pertaining to an emergency response partner's capabilities to perform advanced activities. A template can be opened in Word by clicking the icon in the callout box. The Interview Form was developed for a HazMat partner, but can be customized for use with other emergency response partners.

This interview form can be used to assess capabilities of emergency response partners relevant to field response.

The following is a summary of some of the topics that should be discussed with emergency response partners:

- Conditions and scenarios that the partners respond to
- Site safety screening instrumentation
- Rapid field testing capabilities for drinking water samples
- Familiarity of the partner with utility facilities
- Ability of the partner to collect drinking water samples
- Ability of the partner to package and ship hazardous materials

TRAIN WITH PARTNERS

Invite emergency response partners to tour utility facilities and become familiar with utility procedures to collect drinking water samples.

Utilities should consider the capabilities of emergency response partners before making new investments in instrumentation, test kits, and training to perform advanced field response activities. Information on site safety screening and rapid field testing is provided in the sections below for utilities interested in building in-house capabilities to perform these activities.

3.2 Site Safety Screening

Site safety screening can detect exposure hazards (e.g., radiation, inhalation hazards) that could pose a risk to utility personnel performing field response activities. Site safety screening is typically conducted in permitted confined space entry or if exposure hazards are suspected. Instrumentation should provide continuous monitoring and perform well in a variety of environmental conditions (e.g., adverse weather, low light). Continuous read instrumentation can usually be programmed to alarm if an unsafe level of contaminant is detected.

Site safety screening should be performed continuously from site approach to site exit. Site safety screening instruments and test kits commonly used by HazMat are presented in **Table 3-1**. The instruments and test kits listed in Table 3-1 are easy to use but require initial training and periodic use to maintain proficiency. Instrumentation should be evaluated for sensitivity, accuracy, and false positive and false negative rates. Maintenance or calibration checks are usually required every three months.

Table 3-1. Site Safety Screening Instruments

Parameter	Matrix	Contaminants	Instrument/Test Kit
Radioactivity	Air and surfaces	Alpha, beta, gamma emitters	Meter and Probes Self-Contained Meter Personal Monitor
Gases	Air	CO, O_2, H_2S, LEL, unsaturated volatile organic compounds	Multi-gas monitor with PID
Gases	Air	H_2S, CO, O_2, NH_3, Cl_2, ClO_2, HCN, NO, NO_2, PH_3, SO_2	Personal monitor
Chemical Agents	Air and surfaces	Toxic industrial chemicals and chemical warfare agents	IMS or FPS FTIR[1] Badges Test Kits[1]

[1]These tests require manual operation and do not provide continuous monitoring.
LEL = Lower Explosive Limit, IMS = Ion Mobility Spectrometer, FPS = Flame Photometric Spectrometry, FTIR = Fourier Transform Infrared Spectroscopy, PID = Photoionization Detector

Appendix B-2 is a *Site Safety Screening Report Form* for documenting the results of site safety screening at a single investigation site. The form includes fields to record instrument checks that are performed before use to test that the instrument is functioning properly. This form can be modified, as needed, based on the equipment used and checks performed. A template can be opened in Word by clicking the icon in the callout box. For non-alarming instrumentation, the Site Safety Screening Report Form includes a field to enter an "action level," which is the threshold for a site safety screening parameter that would indicate an exposure hazard. If a contaminant is detected at or above an "action level," field responders should withdraw from the site and contact utility management for further instructions. If an exposure hazard is detected, it may be necessary to establish site control and security so that other utility personnel or the public do not enter the area.

This template can be used to develop a Site Safety Screening Report Form.

Supplemental information on operation, vendors, and costs of site safety screening instrumentation is provided in *Supplemental Information: Site Safety Screening Instrumentation and Test Kits*. The PDF can be opened by clicking the icon in the callout box.

This PDF provides additional information on site safety screening instruments and test kits.

3.3 Rapid Field Testing

Rapid field testing is performed in the field to identify or screen for specific contaminants or contaminant classes in water. Results can help determine if additional PPE is necessary or if an emergency response partner is required. Emergency response partners may not have rapid field tests that are sensitive to dilute contaminants in a water matrix in which case utility investment in rapid field testing instrumentation and test kits can fill a gap.

Rapid field tests should be evaluated for sensitivity, accuracy, and false positive and false negative rates. Response actions and laboratory confirmation should be planned in advance for all rapid field tests a utility would perform. For example, if the utility elects to perform rapid field testing for arsenic, a laboratory should be identified in advance to confirm a positive result.

Figure 3-2. Rapid Field Testing

Rapid field testing should be performed in the field but away from the source of potential contamination. Since weather or other environmental conditions can have an adverse impact on method performance, conduct rapid field testing inside buildings, or under other suitable shelter. Tents and tables, a van, trailer, or mobile laboratory are all options that can provide a suitable work space.

Table 3-2 lists common rapid field tests for water analysis.

Table 3-2. Rapid Field Testing Instruments and Test Kits

Contaminant	Instrumentation/Test Kit
Free cyanide	Colorimetric ISE Test strips
Arsenic	Colorimetric Test strips
Solvents, toxic industrial chemicals, chemical agents, fuel	Portable GC/MS Multi-gas with PID handheld meter using headspace method
Acute toxicity	Portable test kits based on bioluminescence Portable test kits based on chemiluminescence
Chemical Warfare Agents: G-series, blister and blood agents, toxic industrial chemicals	Colorimetric test kits

ISE = Ion Selective Electrode, GC/MS = Gas Chromatograph/Mass Spectrometer

Many rapid field test kits include reagents that have expiration dates and specific storage requirements. The expiration dates will need to be tracked and new reagents acquired to ensure the test kits are always available for emergency use. For utilities considering storage of rapid field tests at remote locations or in a utility-owned vehicle, storage requirements should be evaluated to ensure proper storage and access requirements are both met.

A *Rapid Field Testing Report Form* is provided in **Appendix B-3** to document the results of rapid field testing. This form can be customized by the utility to include rapid field tests they or an emergency response partner can perform. A template can be opened in Word by clicking the icon in the callout box. A unique

This template can be used to develop a Rapid Field Testing Report Form.

ID number should be assigned to this form for each sampling location and recorded on the COC form for respective samples.

This PDF provides additional information on rapid field testing instruments and test kits.

Supplemental information on operation, vendors, and costs of rapid field testing instrumentation and test kits is provided in *Supplemental Information: Rapid Field Testing Instrumentation and Test Kits*. The PDF can be opened by clicking the icon in the callout box.

3.4 Hazardous Materials Packaging and Shipping

The Hazardous Materials Regulations (HMR; 49 CFR Parts 100-185), issued by the Department of Transportation's (DOT's) Pipeline and Hazardous Materials Safety Administration (PHMSA), establish requirements governing the transportation of hazardous materials by highway, rail, vessel, and air. Under the HMR, hazardous materials are assigned hazard classes and packing groups based on the risks they present during transportation. The HMR specify appropriate packaging and handling requirements for hazardous materials, and require a shipper to communicate the material's hazards through use of shipping papers, and package marking and labeling. The HMR also require shippers to provide emergency response information applicable to the specific hazard or hazards of the material being transported.

The HMR mandates training for personnel who prepare hazardous materials for shipment or who transport hazardous materials. Trained personnel must be able to identify hazardous materials, understand HMR requirements applicable to the functions he or she performs, and be knowledgeable of emergency response, self-protection measures, and accident prevention methods. Any employee who participates in any function (paperwork, packaging, loading, labeling) involved in the shipment of samples that are classified as a hazardous material must be trained and certified by their employer. Training is available from a number of vendors and through self-paced online training available on the DOT website titled *Hazardous Materials Transportation Training Modules*.

The utility should plan to package and ship preserved drinking water samples using routine procedures when they are collected in response to possible or credible contamination. If the drinking water sample is determined to be a hazardous material through field or laboratory testing, however, trained and certified hazardous materials personnel must package and ship samples according to the HMR.

Section 4: Staffing

Routine field samplers, water quality technicians, and other support personnel with minimal additional training can perform basic field response activities (visual site hazard assessment, sample collection, water quality parameter testing, and sample packaging and shipping). Advanced activities (site safety screening, rapid field testing, and hazardous materials packaging and shipping) can be performed by utility personnel but require specialized training and in some cases certification. A utility staffing plan should consider all field response activities the utility plans to perform in a drinking water contamination emergency and ensure that utility personnel are trained and qualified to perform them.

CROSS-TRAINING PERSONNEL

Cross-train personnel to provide redundancy in skill sets for key field response activities.

Site characterization is the process of collecting information from an investigation site or sampling location to evaluate the presence of exposure hazards and contaminants in drinking water. A Site Characterization Team (SCT) is a team of employees who have trained together to perform site safety screening and/or rapid field testing in addition to basic field response activities. A SCT may not be required for all investigation sites or sampling locations and in some scenarios may not be needed at all, especially if the primary objective of field response is to collect water samples from routine sampling locations. Field samplers, water quality technicians, chemists, and support personnel can comprise a SCT if they also have been trained to perform site safety screening or rapid field testing.

Table 4-1 lists typical utility personnel and responsibilities for basic and advanced field response activities.

Table 4-1. Staffing for Basic and Advanced Field Response

Personnel	Responsibilities
Basic and Advanced Activities	
Health and Safety Officer	• Ensures that a job hazard analysis is performed for each planned field response activity • Reviews Health and Safety Plan at initiation of field response and modifies, if needed, for specific sites • Reviews field response procedures for health and safety concerns
Quality Assurance Officer	• Reviews the Quality Assurance Project Plan for field measurements • Reviews field method QC results
Basic Activities	
Field sampler	• Prepares field sampling supplies • Performs a visual site hazard assessment, documents and communicates results to utility management or other designated individual • Collects drinking water samples, packages samples, completes COC form, ships or delivers samples to laboratory
Water Quality Technician	• Calibrates instruments • Performs a visual site hazard assessment, documents and communicates results to utility management or other designated individual • Performs water quality parameter testing, documents and communicates results to utility management or other designated individual
Support Personnel	• Security officer, distribution system operator, city plumbing inspector, chemist, sample custodian, and others as needed for site specific investigations or sampling
Advanced Activities	
Site Characterization Team[1]	• Calibrates instruments • Performs visual site hazard assessment • Performs site safety screening • Performs rapid field testing • Documents results and reports to Site Characterization Team Leader • Collects drinking water samples, packages samples, completes COC form, ships or delivers samples to laboratory
Site Characterization Team Leader	• Reports results to utility management or other designated individual • Initiates site control if hazards are discovered

[1]Site Characterization Teams can be the same personnel as used for basic field response activities if they have been trained to perform site safety screening and/or rapid field testing.

Appendix C is a *Staffing Plan Template* that can be used to document personnel who have been trained to perform basic and advanced field response activities. A template can be opened in Word by clicking the icon in the callout box. A Staffing Plan should include responsibilities, names of primary and back-up personnel, contact information, and business and non-business hours of availability. An "on-call" duty program can be implemented for non-business hours to ensure that the appropriate personnel are available 24/7, 365 days a year to support field response. A rotation schedule for assigning "on-call" duty can be developed and appended to the staffing plan. Pager notifications or other means of communication can be used to notify employees when they need to report for duty during non-business hours.

Section 5: Health and Safety

A job hazard analysis should be performed for all basic and advanced field response activities the utility plans to perform in a drinking water contamination emergency. Potential locations of field response activities that are identified during planning should be assessed for routine workplace hazards and site-specific Health and Safety Plans (HASPs) developed if necessary. At a minimum, the HASP for field response activities should include the elements listed in **Table 5-1**.

Table 5-1. Elements of a Health and Safety Plan for Field Response

- Roles and responsibilities
- Approvals and field personnel concurrence (signature page)
- Description of field activities
- Job hazard analysis for each field activity
- General physical hazards and controls
- Chemical hazards and controls
- Biological hazards and controls
- PPE
- Decontamination of personnel and equipment
- Site-specific entry procedures
- Site control plan
- Waste management
- Employee training
- Medical surveillance (if required)
- Records and reporting
- Accident notification
- Contact information and location of the nearest medical facility

The HASP for field response and any necessary site-specific HASP should be reviewed with the field personnel before they deploy to the field. At least two people should be deployed to perform field response activities so that a "buddy system" can be implemented, as shown in **Figure 5-1**. The "buddy system" relies on two people working within sight of each other to monitor each other's safety and provide or seek assistance in the event of an accident or other emergency.

Figure 5-1. Site Safety Screening Using the Buddy System

To minimize the risk of exposure to unknown contaminants, field samplers and water quality technicians should:

- Minimize time spent at the sampling location
- Implement the "buddy system"
- Not eat, drink, or smoke
- Not taste or smell samples
- Wear PPE
- Avoid skin contact with the water and avoid inhalation exposure by working in well ventilated areas
- Fill sampling containers slowly to avoid volatilization
- Rinse the outside of sample bottles with laboratory grade water or decontaminate with a bleach wipe

Field samplers, water quality technicians, and others who could come in contact with potentially contaminated water should wear a minimum level of PPE as described in Occupational Safety and Health Administration (OSHA) 29 CFR 1910.120 Appendix B. PPE should be reviewed for appropriateness and revised if necessary based on available information at the time a field team is deployed.

Table 5-2 lists 29 CFR 1910.120 Appendix B Level D PPE and recommended safety supplies for field activities.

Table 5-2. Level D PPE and Safety Supplies

Level D PPE	
Item	**Notes**
Coveralls	One per individual
Gloves[1]	Optional. Chemical resistant, various sizes and multiple pairs
Boots/shoes, chemical-resistant steel toe and shank	One pair per individual
Boots, outer, chemical-resistant (disposable)	Optional. One pair per individual
Safety glasses or chemical splash goggles[1]	Optional. One per individual
Hard hat	Optional. One per individual
Escape mask	Optional. One per individual
Face shield	Optional. One per individual
Safety Supplies	
Item	**Notes**
Heavy duty plastic trash bags	For disposal of coveralls, gloves, etc.
Antiseptic or bleach wipes	For cleaning hands
Squirt bottle	For use with rinse water
First aid kit	For general first aid
Flashlight/headlamp	For working at night or in dark locations
Binoculars	For performing a visual site hazard assessment at a safe distance
Cell phone or 800 MHz radio[2]	For communication with utility management

[1]Personnel should wear gloves and chemical splash goggles during sample collection activities.
[2]Use of public safety channels in the designated public safety spectrum of 800 MHz radios requires permission of the regional public safety planning committee; however, other channels can be used by the utility for internal communications.

Section 6: Quality Assurance

The utility should have a quality management program that addresses instruction, training, and procedures for field methods. It is beyond the scope of this guidance to provide a comprehensive discussion of quality management programs or development of Quality Assurance Project Plans (QAPPs). Additional information regarding quality assurance for field activities is available from *EPA's Drinking Water Laboratory Certification Program* and *The National Environmental Laboratory Accreditation Council Institute* (TNI). Certification or accreditation is not required for field methods unless the results will be used for compliance reporting. Data Quality Objectives (DQOs) should be established to ensure that selected field methods can produce results of sufficient quality for their intended use. Data quality indicators, acceptance criteria, and data quality assessment should be described in the QAPP for each field method. At a minimum, the utility's QAPP for field response should include the elements listed in **Table 6-1**.

Table 6-1. Elements of a Quality Assurance Project Plan for Field Response

- Roles and responsibilities
- Document control
- Employee training
- Standard operating procedures
- Initial demonstration of capability
- Continuing demonstration of capability (proficiency testing)
- Equipment maintenance logs
- Periodic manufacturer calibration (if required) of equipment
- Quality control for field methods
- Documentation of field results
- Maintenance of emergency response sampling and analysis kits
- Traceability of standards and reagents
- Sample handling and COC
- Data review and validation
- Data management

Quality Control (QC) evaluates the performance of field testing. QC and acceptance criteria should be described in the QAPP and respective procedures. QC instructions included with most field kits and instruments should be followed. Additional QC may be warranted depending on DQOs. **Table 6-2** lists QC for field methods, although not all are relevant to every method.

Table 6-2. Quality Control for Field Methods

Quality Control	Description
Instrument checks	Performed for continuous read instruments to ensure instrument is operating within manufacturer's specifications prior to use.
Blank sample	Analyzed at each sampling location to evaluate background levels of contamination or to demonstrate a non-detected baseline value for the method.
Initial instrument calibration	If method requires daily calibration, it is recommended that calibration be performed in a controlled environment (e.g., laboratory or staging area) when possible.
Continuing calibration check	Performed daily prior to analyzing samples to ensure that the instrument calibration is acceptable. Calibration verification standards should bracket the expected ranges of sample concentrations or be at, or just below, the midpoint of the instruments calibrated range.
End meter check	Calibration check performed at the end of use.
QC sample	A reference sample from a different source than the calibration standards used to measure the accuracy of the analysis method.
Field duplicates	Analysis samples to demonstrate precision.
Point-of-use QC	QC parameters that are measured in the field at the time of analysis of samples. Examples of point-of-use QC include continuing calibration check, QC sample, field duplicates, blank samples, and end meter checks.
Repeat testing	Conducted whenever an unusual result is determined for a specific sample location. Repeat testing should include at a minimum the testing of a second aliquot of sample and may include analysis of point-of-use QC.

Section 7: Procedures

Emergency response procedures are simple step-by-step instructions necessary to complete an activity. Communication protocols, checklists, flowcharts, and forms with instructions are acceptable formats for emergency response procedures. Emergency response procedures should be clearly written and easily understood by a variety of personnel. Large fonts and plastic page sleeves or lamination can make procedures more rugged for field work and easier to use.

The most qualified personnel to write emergency response procedures are those individuals who have experience performing the activity. Additional guidance on preparing procedures can be found in *Guidance for Preparing Standard Operating Procedures*. Procedures and documentation can be tested for completeness and clarity by having multiple field response personnel use and evaluate the procedures. Periodic drills and exercises are the most effective means to test and refine procedures, especially for field activities that require interfacing with other utility departments or external parties such as field response partners and laboratories. EPA's *Water Quality Surveillance and Response System (SRS) Exercise Development Toolbox* is software that can be used to help utilities and their response partners design, develop, conduct, and evaluate discussions and operations-based exercises.

UTILITY EXPERIENCE

After just four drills, one utility reduced their time to complete all planned field response activities by 50%.

A Site Characterization and Sampling Plan (SC&SP) is an incident-specific set of instructions prepared by utility management to guide field response activities. The SC&SP specifies the location of the investigation site or sampling location; if samples should be collected from a distribution main, service line, or premise; possible health and safety concerns; field tests to be performed; and the types of samples to collect for laboratory analysis. If multiple locations will be investigated, a separate site-specific SC&SP is required for each location. As new information becomes available, the SC&SP may be revised. **Appendix D** is an example of an *SC&SP*. A template can be opened in Word by clicking the icon in the callout box. A customized SC&SP can be pre-populated with capabilities the utility has to perform basic and advanced field response activities. The SC&SP is usually developed in conjunction with the utility's contamination response plan (EPA, 2008).

This template can be used to develop a Site Characterization and Sampling Plan.

The SC&SP helps utility personnel mobilize for field response and guides what activities to perform at each investigation site or sampling location. Starting with initial notification of a drinking water contamination emergency, **Table 7-1** lists steps, procedures, and documentation for the activities described in Figure 1-1 of this guidance.

Table 7-1. Field Response Procedures and Documentation

Step	Procedures	Documentation
Pre-deployment • Field team is notified of the investigation • Health and safety officer reviews HASP • Field team receives the SC&SP • Field teams prepare supplies and instrumentation • Field team deploys to the investigation site	• Notification protocol for field team(s) to mobilize for field response • Checklist of supplies needed to perform activities described in SC&SP • Procedures for initial calibration of instruments	• SC&SP (Appendix D)
Arrival at site	• Communication check between field team and designated utility contact	• Visual Site Hazard Assessment Form (Appendix A-1)
Visual site hazard assessment	• Visual site hazard assessment instructions	• Visual Site Hazard Assessment Form (Appendix A-1) • Photographs
Site safety screening	• Site safety screening instrumentation procedure(s) • Site control procedure to implement if a hazard is detected	• Site Safety Screening Results Form (Appendix B-2)
Sample collection	• PPE procedure • Sample collection procedures • Site-specific sampling procedures • Decontamination of sample bottles and supplies procedure • COC procedure	• Field notebook • COC Form (Appendix A-5)
Water quality parameter testing	• Water quality parameter testing procedures	• Water Quality Parameter Results Form (Appendix A-4)
Rapid field testing	• Rapid field testing procedures	• Rapid Field Testing Results Form (Appendix B-3)
Sample packaging and shipping	• Notification protocol to alert laboratories that samples are in transit • Protocol for submitting water quality parameter and rapid field testing results forms to laboratories • Sample packaging procedure • Sample shipping procedure	• Water Quality Parameter Results Form (Appendix A-4) • Rapid Field Testing Results Form (Appendix B-3) • COC Form (Appendix A-5) • Field notebook

The steps, procedures, and documentation contained in Table 7-1 conclude with sample packaging and shipping, however, there are post-deployment activities not described in this table that should be performed by field responders when they return. Procedures should be developed for the post-deployment activities of:

- Decontamination of personnel, equipment, and supplies
- Disposal of waste
- Data transfer and management
- Filing and retention of paper records and photographs
- Transfer of responsibilities to subsequent field response teams

Section 8: Emergency Response Sampling and Analysis Kits

Emergency Response Sampling and Analysis Kits (ERSAKs) are pre-planned sample bottle and supply kits stored at the utility or staged at strategic locations in the distribution system. They are most often prepared to expedite S&A that the utility would perform during the initial phases of response to possible or credible contamination.

Sample Bottle Kit

An ERSAK Sample Bottle Kit should be prepared for each laboratory receiving samples. For example, there should be a sample bottle kit for analyses that the utility will perform in their laboratories and another kit for analyses that a partner laboratory will perform. Laboratory-specific coolers that are labeled and ready to be shipped eliminate the need to re-pack samples at the utility for shipment to multiple laboratories. Sample bottles for analyses that will be performed by a commercial laboratory can often be purchased from the laboratory if they are contracted to perform the analyses.

Listed below are typical contents of an ERSAK sample bottle kit:

- Inventory sheet of contents
- Pre-labeled sample bottles
- Preservatives and dechlorinating agents
- Sample collection procedures
- Packaging materials
- A pre-filled COC form
- Instructions for delivery and shipment of samples to laboratories

Figure 8-1. ERSAK Sample Bottle Kit

Reagents need to be tracked and replaced when they expire, and instruments calibrated and maintained whether ERSAKs are stored at the utility's laboratory or staged at secure locations in the distribution system. As such, maintenance of ERSAKs should be included in the utility's QAPP for field response.

Supply Kit

A separate kit can be prepared for supplies, instrumentation, and test kits. Tables 2-1 and 2-3 can be referenced to prepare an ERSAK supply kit appropriate for the planned S&A activities at a specific location. A supply kit typically contains:

- Inventory sheet
- General sampling supplies
- First aid supplies
- PPE
- Site specific sampling supplies
- Water quality parameter testing supplies
- Rapid field testing supplies
- Field results forms (i.e., Water Quality Parameter Report Form, Site Safety Screening Report Form, Rapid Field Testing Report Form)
- Extra COC forms
- Procedures (may be compiled in a field guide)
- Field notebook

STORING ERSAKS

ERSAKs stored at the utility's laboratory may be easier to maintain and use if the laboratory is centrally located. Staging of ERSAKs in the distribution system, however, is advantageous if the utility's service area is large or field samplers are already in the field when a drinking water contamination emergency occurs.

These templates can be used to create Emergency Response Sampling and Analysis Kit Inventory Sheets.

Appendix E, *Emergency Response Sampling and Analysis Kit Inventory Sheet Templates*, is a customizable document. A template can be opened in Word by clicking the icon in the callout box.

Section 9: Resources

Basic Field Response Activities

Visual Site Hazard Assessment Form

This form can be used to record findings of a visual site hazard assessment. It can be customized with utility-specific information and instructions. December 2016.
Click this link to open the assessment form template

Water Contaminant Information Tool

The Water Contaminant Information Tool (WCIT) is a secure online database with comprehensive information about chemical, biological and radiochemical contaminants of concern for the Water Sector. This tool compiles drinking water- and wastewater-specific data in a one-stop, easy-to-use tool. WCIT's functionality and content were shaped and validated by water utility professionals, scientists, and public health experts.
https://www.epa.gov/waterlabnetwork/access-water-contaminant-information-tool

Water Security Initiative: Guidance for Building Laboratory Capabilities to Respond to Drinking Water Contamination

This document provides guidance to assist drinking water utilities with building laboratory capabilities for responding to water contamination incidents. It presents contaminant classes of concern; lists analytical methods for contaminants from those classes, and provides information on the role of national laboratory networks in responding to drinking water contamination incidents. EPA 817-R-13-001, March 2013.
https://www.epa.gov/sites/production/files/2015-06/documents/guidance_for_building_laboratory_capabilities_to_respond_to_drinking_water_contamination.pdf

Response Protocol Toolbox (RPTB): Planning for and Responding to Drinking Water Contamination Threats and Incidents, Module 3 - Site Characterization and Sampling Guide

Module 3 of the RPTB addresses site characterization and sampling in response to contamination threats and incidents. It was developed to help the water sector plan for and respond to suspected terrorist incidents. EPA 817-D-03-003, December 2003.
https://www.epa.gov/waterutilityresponse/drinking-water-and-wastewater-utility-response-protocol-toolbox

Response Protocol Toolbox (RPTB): Planning for and Responding to Drinking Water Contamination Threats and Incidents, Module 4 - Analytical Guide for Drinking Water Utilities

Module 4 of the RPTB helps drinking water utilities and laboratories understand how to develop an analytical approach to water samples that may contain an unknown contaminant. EPA 817-D-03-004, December 2003.
https://www.epa.gov/waterutilityresponse/drinking-water-and-wastewater-utility-response-protocol-toolbox

Sampling Guidance for Unknown Contaminants in Drinking Water

This document provides comprehensive guidance that integrates recommendations for pathogen, toxin, chemical, and radiochemical sample collection, preservation, and transport procedures to support multiple analytical approaches for the detection and identification of potential contaminants in drinking water. This guidance document can be used to supplement a drinking water utility's emergency response plan by providing detailed recommended sampling procedures for use by utility personnel in response to a potential contamination event. EPA-817-R-08-003, January 2017.
https://www.epa.gov/waterlabnetwork/sampling-guidance-unknown-contaminants-drinking-water

Water Laboratory Alliance – Response Plan

The Water Laboratory Alliance Response Plan provides processes and procedures for coordinated laboratory response to water contamination incidents that may require additional analytical support and a broader response than a typical laboratory can provide. This plan is designed to work within existing Incident Command System structures and procedures to facilitate emergency laboratory support to water contamination events. EPA 817-R-10-002, November 2010.
https://www.epa.gov/sites/production/files/2015-08/documents/water_laboratory_alliance_response_plan.pdf

Laboratory Capabilities

This template can be used to document a utility's laboratory capabilities and its laboratory partners' capabilities, including contaminant or contaminant classes that are analyzed, analytical methods, shipping addresses, and emergency point-of-contact information. December 2016.
Click this link to open the laboratory capabilities template

Sample Bottle Supply List

This template can be used with the Laboratory Capabilities template to document method title/ID, sample bottle type and size, number of bottles required for sample analysis and quality control, and method preservatives and dechlorinating agents. December 2016.
Click this link to open the sample bottle supply list template

AWOP Hydrant Sampler Procedure and Parts List

This resource provides a list of parts, the procedure, and a video showing the use of the Hydrant Sampler developed by the AWOP. This sampler permits samples to be collected safely from hydrants with the hydrant valve fully open.
https://www.epa.gov/dwstandardsregulations/hydrant-sampler

Standard Practice for Sampling Liquids Using Grab and Discrete Depth Sampler, ASTM D6759-09, 2009

This ASTM standard of practice describes the design and operation of commonly available sampling devices for the collection of samples from specified depths. These sampling devices and techniques may be needed when sampling from storage tanks.
https://www.astm.org/Standards/D6759.htm

Water Quality Parameter Report Form

This customizable form can be used for documenting water quality parameter results from a single sampling location. This form can be modified, as needed, based on the water quality parameter tests performed. December 2016.
Click this link to open the form template

Supplemental Information: Water Quality Parameter Testing Instrumentation

This resource contains additional information on water quality parameters, field instrumentation, and purchase and maintenance costs. December 2016.
Click this link to open the PDF

Handling Criminal Investigation Samples: Maintaining Chain of Custody

This training includes an introductory video that links to the APTI training website where APTI course number SI:303 COC can be taken online. After completing the APTI COC training, users should return to the Water Laboratory Alliance Training Center to watch a follow-up video. Credit for the training can be received by registering on the APTI website.
https://www.epa.gov/waterlabnetwork/water-laboratory-alliance-training-center

Emergency Response Chain of Custody Form

This is a customizable form for documenting evidentiary COC and relevant field information for recipient laboratories. It contains fields to enter field testing report form ID numbers so that samples can be linked to water quality parameter and rapid field testing results. Recipient laboratories may request this information prior to sample analysis. December 2016.
Click this link to open the form template

United States Geological Survey, National Field Manual for the Collection of Water-Quality Data, Techniques of Water-Resources Investigation, Book 9 Handbooks for Water-Resources Investigation Chapter A2. Selection of Equipment for Water Sampling

This document describes protocols and provides guidelines for U.S. Geological Survey (USGS) personnel who collect data used to assess the quality of the Nation's surface-water and groundwater resources. This chapter addresses the selection of the equipment commonly used by USGS personnel to collect and process water-quality samples.
http://water.usgs.gov/owq/FieldManual/

Advanced Field Response Activities

HazMat Interview Form

This form helps utilities gather information pertaining to an emergency response partner's capabilities to perform advanced activities. The form was developed for a HazMat partner but can be customized for use with other emergency response partners. December 2016.
Click this link to open the form template

Site Safety Screening Report Form

This is a customizable form for documenting the results of site safety screening at a single investigation site. The form includes fields to record instrument checks that are performed before use to test that the instrument is functioning properly. This form can be modified, as needed, based on the equipment used and checks performed. December 2016.
Click this link to open the form template

Supplemental Information: Site Safety Screening Instrumentation and Test Kits

This resource contains additional information on operation, vendors, and costs of site safety screening instrumentation. December 2016.
Click this link to open the PDF

Rapid Field Testing Report Form

This is a customizable form for documenting the results of rapid field testing. This form can be modified, as needed, based on the rapid field tests performed. December 2016.
Click this link to open the form template

Supplemental Information: Rapid Field Testing Instrumentation and Test Kits

This resource contains additional information on operation, vendors, and costs of rapid field testing instrumentation and test kits. December 2016.
Click this link to open the PDF

Pipeline and Hazardous Materials Safety Administration, U.S. Department of Transportation

The Pipeline and Hazardous Materials Safety Administration of the United States Department of Transportation (PHMSA) has developed this program to help train employees who perform functions covered under the HMR.
http://www.phmsa.dot.gov/hazmat/outreach-training/training-modules

Guidance for Radiation Accident Management, Radiation Emergency Assistance Center/Training Site

The Radiation Emergency Assistance Center/Training Site provides emergency medical consultation for incidents involving radiation anywhere in the world. The website provides a general overview of methods of radiation detection, surveying, types of exposure, and management of radiation emergencies.
https://orise.orau.gov/reacts/guide/detect.htm

A Review of Chemical Warfare Agent (CWA) Detector Technologies and Commercial-Off-The-Shelf Items

This paper provides an overview of literature and information obtained from manufacturers of technologies used in commercially available equipment currently employed for the detection of CWAs and toxic industrial chemicals.
www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA502856

National Service Center for Environmental Publications

The National Environmental Publications Internet Site (NEPIS) is a digital repository for the National Service Center for Environmental Publications (NSCEP), and includes a simple and advanced search function for users to find information about topics they may be researching. Environmental Technology Verification Program (ETV) and Technology Testing & Evaluation Program (TTEP) reports are included in this repository; utilities may use this site to access additional information on field technologies they may be interested in purchasing to support field response. Direct links to ETV and TTEP reports for some field technologies are provided in the Supplemental Information Appendices.
https://www.epa.gov/nscep

All Hazards Receipt Facility Screening Protocol

The All Hazards Receipt Facility Screening Protocol discuss the process for screening samples of unknown chemical, explosive, and radiological hazards submitted to an All Hazards Receipt Facility (AHRF). This document includes techniques and instruments for this screening. EPA/600/R-08/105, September 2008.
https://cfpub.epa.gov/si/si_public_record_report.cfm?dirEntryId=199346

Staffing

Staffing Plan Template

This is a customizable form for documenting personnel who have been trained to perform basic and advanced field response activities. A staffing plan should include responsibilities, names of primary and backup personnel, contact information, and business and non-business hours of availability. December 2016.
Click this link to open the staffing plan template

Quality Assurance

EPA's Drinking Water Laboratory Certification Program

The Drinking Water Laboratory Certification Program provides information regarding the requirements for a laboratory to be certified for drinking water analyses, including training, approved methods, and the manual for certification.
https://www.epa.gov/dwlabcert

The National Environmental Laboratory Accreditation Council Institute (TNI)

TNI is an organization that develops consensus standards used for the accreditation of environmental laboratories. They also provide training and conferences related to laboratory certification.
http://www.nelac-institute.org/

Guidance for Quality Assurance Project Plans

This document provides guidance to EPA employees and other organizations involved in developing Quality Assurance (QA) Project Plans that address the specifications listed in EPA Requirements for QA Project Plans (QA/R-5). EPA/240/R-02/009, December 2002.
https://www.epa.gov/quality/guidance-quality-assurance-project-plans-epa-qag-5

Procedures

Guidance for Preparing Standard Operating Procedures

This document provides a standard working tool that can be used to document routine quality system management and technical activities. It is one of the EPA's Quality System Series documents. These documents describe EPA policies and procedures for planning, implementing, and assessing the effectiveness of the quality system. EPA/600/B-07/001, April 2007.
https://www.epa.gov/quality/guidance-preparing-standard-operating-procedures-epa-qag-6-march-2001

SRS Exercise Development Toolbox

This tool helps utilities to design, develop, conduct, and evaluate discussion-based and operations-based exercises for an SRS. This software enables utilities and their response partners to conduct exercises that educate participants and improve procedures. March 2016.
https://www.epa.gov/waterqualitysurveillance/water-quality-surveillance-and-response-system-exercise-development-toolbox

Site Characterization and Sampling Plan (SC&SP)

An SC&SP is an incident-specific set of instructions prepared by utility management or the Incident Commander to guide field response activities. This template can be modified, as needed, prior to use during field response. December 2016.
Click this link to open the SC&SP template

Emergency Response Sampling and Analysis Kits

Emergency Response Sampling and Analysis Kit Inventory Sheet Templates

These templates include a sample bottle inventory sheet and supply kit inventory sheet which are provided as customizable documents. December 2016.
Click this link to open the inventory sheet templates

Lessons Learned from Drinking Water Utilities

Philadelphia Water Department Contamination Warning System Demonstration Pilot Project: Exercises and Lessons Learned to Improve Response Preparedness for Site Characterization and Sampling

This paper provides lessons learned from the Philadelphia Water Department Contamination Warning System Demonstration Pilot Project based on the conduct of six site characterization and sampling exercises. The lessons learned are compiled into two general categories described below: (1) Designing, Deploying, and Evaluating the S&A Component; and (2) Site Characterization and Sampling. May 2013.
http://www.ch2m.com/sites/default/files/content/article/attachments/CH2M-HILL-Improve-Response-Preparedness.pdf

Philadelphia Water Department Contamination Warning System Demonstration Pilot Project: Site Characterization and Water Sampling

This paper summarizes the site characterization objectives, design and related processes, site characterization sample activities, laboratory procedures, and available analytical support based on the Philadelphia Water Department Contamination Warning System Demonstration Pilot Project. May 2013.
http://www.ch2m.com/sites/default/files/content/article/attachments/CH2M-HILL-Site-Characterization.pdf

Philadelphia Water Department Contamination Warning System Demonstration Pilot Project: Safety Screening for Radiological Contaminants During Site Characterization

This paper provides an overview of site characterization, detailed information on site safety screening tests for radiologicals, a Radiological Fact Sheet, and safety levels support based on the Philadelphia Water Department Contamination Warning System Demonstration Pilot Project. May 2013.
http://www.ch2m.com/sites/default/files/content/article/attachments/CH2M-HILL-Safety-Screening-Radiological-Contaminants.pdf

Water Security Initiative: Evaluation of the Sampling and Analysis Component of the Cincinnati Contamination Warning System Pilot

This paper provides a summary and evaluation of the S&A component as developed for the Cincinnati Contamination Warning System pilot. Additionally, this paper contains details about the methods, coverage, operational reliability, sustainability, and timeliness of response during this pilot. EPA 817-R-14-001G, April 2014.
https://www.epa.gov/sites/production/files/2015-06/documents/wsi_evaluation_of_the_sampling_and_analysis_component_of_the_cincinnati_contamination_warning_system_pilot.pdf

Summary of Implementation Approaches and Lessons Learned from the Water Security Initiative Contamination Warning System Pilots

This report provides a summary of key findings from five water utilities that participated in a pilot program to design and demonstrate a sustainable Contamination Warning System capable of providing timely detection of and response to drinking water contamination incidents in a water distribution system. Specifically, this document provides a concise overview of implementation approaches and lessons learned from the pilots that are potentially useful to utilities interested in implementing a Water Quality Surveillance and Response System. EPA 817-R-15-002, October 2015.
http://www.epa.gov/sites/production/files/2015-12/documents/wsi_pilot_summary_report_102715.pdf

Section 10: References

EPA, 2008. *Water Security Initiative: Interim Guidance on Developing Consequence Management Plans for Drinking Water Utilities*, EPA 817-R-08-001.

EPA, 2009. *Distribution System Water Quality Monitoring: Sensor Technology Evaluation Methodology and Results*, EPA 600-R-09-076.

EPA, 2012. *Coordination of the Water and Emergency Services Sectors: An Important Step to Better Response*, EPA 817-K-12-001.

EPA, 2014. *Water Security Initiative: Evaluation of the Sampling and Analysis Component of the Cincinnati Contamination Warning System Pilot*, EPA 817-R-14-001G.

EPA, 2015a. *Sampling and Analysis Primer for Water Quality Surveillance and Response Systems*, EPA 817-B-15-002F.

EPA, 2015b. *Consequence Management Primer for Water Quality Surveillance and Response Systems*, EPA 817-B-15-002E.

EPA, 2015c. *Summary of Implementation Approaches and Lessons Learned from the Water Security Initiative Contamination Warning System Pilots*, EPA 817-R-15-002.

EPA, 2015d. *Online Water Quality Monitoring Primer for Water Quality Surveillance and Response Systems*, EPA 817-B-15-002A.

Glossary

buddy system. A system of organizing employees into work groups in such a manner that each employee of the work group is designated to be observed by at least one other employee in the work group. The purpose of the buddy system is to provide rapid assistance to employees in the event of an emergency.

calibration. The checking, adjusting, or systematic standardizing of the graduations of a quantitative measuring instrument.

compliance monitoring. EPA's and states' primary means of monitoring public water system compliance with the Safe Drinking Water Act and implementing regulations is the review and evaluation of analytical results of water samples collected by public water systems.

concentration. In solutions, the mass, volume, or number of moles of solute present in proportion to the amount of solvent or total solution. Common measures are molarity, normality, percent, and by specific gravity scales.

confirmed. Contamination is considered confirmed when the analysis of all available information provides definitive, or nearly definitive, evidence of the presence of a specific contaminant or contaminant class in a distribution system. While positive results from laboratory analysis of a sample collected from a distribution system can be a basis for confirming contamination, a preponderance of evidence, without the benefit of laboratory results, can lead to this same determination.

contamination. The introduction of microorganisms, chemicals, waste, or sewage into a drinking water distribution system that has the potential to cause harm to a utility or the community served by the utility.

credible. Contamination is considered credible if information collected during the investigation of possible contamination corroborates a validated indicator of contamination.

dechlorinating agent. A chemical additive that removes chlorine or chloramine from water.

disinfectant residual. The remaining chemical (commonly chlorine or chloramine) used to prevent regrowth of microorganisms and maintain water quality in the drinking water distribution system.

dissolved oxygen. Measure of water quality indicating free oxygen dissolved in water.

distribution system operator. Utility personnel responsible for installation, operation, and maintenance of water valves in the distribution system including fire hydrants.

hazardous material. A broad term that includes all substances that can be harmful to people or the environment; or a substance or material that could adversely affect the safety of the public, handlers, or carriers during transportation.

Hazardous Materials Response Unit (HazMat). A specially trained unit of professionals with responsibility for responding to uncontrolled releases of hazardous materials. In situations where the presence of hazardous materials is suspected or discovered, HazMat supports implementation of site characterization activities.

Health and Safety Plan (HASP). A plan for a workplace that is designed in accordance with the legislative requirements covering the roles and responsibilities of the staff, the emergency action plan, etc. A HASP is designed to serve and protect the individuals affected by the organization in all matters of health, wellbeing, and safety.

Incident Commander. A person responsible for directing and controlling resources by virtue of explicit legal, agency, or delegated authority.

investigation site. The location where site characterization activities are performed. If a suspected contamination site has been identified, it will likely be designated as a primary investigation site. Additional or secondary investigation sites may also be identified due to the potential spread of a contaminant.

job hazard analysis. A technique or process that focuses on job tasks as a way to identify hazards before they occur by analyzing the relationships between the worker, the tasks, the tools, and the work environment.

Oxidation Reduction Potential (ORP). A measure, in millivolts, of the tendency of a chemical substance to oxidize or reduce another chemical substance. The ORP of a solution is a measure of the oxidizing or reducing power of the solution.

Personal Protective Equipment (PPE). Equipment and supplies designed to protect employees from serious injuries or diseases resulting from contact with chemical, radiological, biological, or other hazards. PPE includes face shields, safety glasses, googles, laboratory coats, gloves, and respirators.

pH. A measure of the relative acidity or alkalinity of water. pH is the negative logarithm of the hydrogen ion concentration (-log10[H+]) where H+ is the hydrogen ion concentration in moles per liter. Neutral water has a pH value of 7.

possible. Contamination is considered possible if an indicator of contamination is investigated and contamination cannot be ruled out.

preservative. Refrigeration and/or reagents added at the time of sample collection (or later) to maintain the chemical or biological integrity of the sample.

quality assurance. A set of activities that ensures that development or maintenance processes are adequate in order for a system to meet its objectives.

Quality Assurance Project Plan (QAPP). A written document outlining the procedures a monitoring project will use to ensure the data it collects and analyzes meets project requirements.

quality control. A set of activities designed to evaluate the products developed for a system to meet its objectives.

rapid field testing. Testing performed in the field to identify specific contaminants or contaminant classes in water and to help determine if additional personal protective equipment or safety precautions are necessary and to focus the investigation.

response partners. A subset of external partners that assist a water utility during emergency response activities such as site characterization, laboratory analysis, public notification, and provision of alternate water supply.

sample custodian. The utility individual responsible for maintaining control of drinking water samples from collection until shipment or delivery to a laboratory for analysis. Primary responsibilities include ensuring sample bottles are properly labeled and packaged and that chain of custody is properly maintained and documented.

Semi-volatile Organic Compounds (SVOCs). Organic compounds, composed primarily of carbon and hydrogen atoms, that have boiling points greater than 200°C and volatilize slowly at standard temperature (20°C) and pressure (1 atm). Common SVOCs include phenols and phthalates.

site characterization. The process of collecting information from the site of a suspected contamination incident. Site characterization activities include the visual site hazard assessment, site safety screening, rapid field testing, sample collection, and sample packaging and shipping.

Site Characterization Team (SCT). A group of utility personnel that have trained together to perform the site characterization activities such as visual site hazard assessment, site safety screening, rapid field testing, sample collection, and sample packaging and shipping.

Site Characterization Team (SCT) Leader. The utility individual responsible for coordinating the site characterization activities in the field and ensuring that utility management or the Incident Commander remains informed as those activities progress.

site safety screening. The process of screening for environmental hazards at the site of a field investigation to help ensure worker safety. Typical site safety screening includes instrumentation for monitoring volatile organic compounds or combustible gases and radiation.

specific conductance. A measure of the ability of a solution to carry an electrical current.

staging area. Temporary location for available resources. A staging area can be any location in which personnel, supplies, and equipment can be temporarily housed or parked while awaiting operational assignment.

Standard Operating Procedure (SOP). A standardized process for accomplishing a task, operating a piece of equipment, or running a system.

Total Organic Carbon (TOC). A measurement of the amount of organic carbon in water.

turbidity. The cloudy appearance of water caused by the presence of tiny particles. High levels of turbidity may interfere with proper water treatment and monitoring.

Volatile Organic Compounds (VOCs). Organic compounds, composed primarily of carbon and hydrogen atoms, that vaporize at standard temperature (20°C) and pressure (1 atm). Common VOCs include benzene, trichloroethane, and toluene.

Appendix A
Forms and Templates for Basic Field Response Activities

Appendix A-1: Visual Site Hazard Assessment Form

General Information				
Site Name or ID:				**Date:**
Site Address:				**Time of Arrival:**
Type of Facility:	☐ Source water ☐ Ground storage tank ☐ Distribution main	☐ Treatment plant ☐ Elevated storage tank ☐ Hydrant	☐ Pump station ☐ Finished water reservoir ☐ Service connection	☐ Other: _____
Weather Conditions at Site:				
Additional Site Information:				
Designated Contact (Name, Title, and Phone Number):				
Communication Check: ☐ Phone ☐ 2-way radio ☐ Digital ☐ Other:_____ Contact Time: _____ Individual(s) Contacted:_____				

Site Approach		
Immediate Hazards:	☐ None ☐ Fire ☐ Signs of a potential explosive hazard (e.g., devices with exposed wires) ☐ Hazardous materials release ☐ Unauthorized personnel/intruder onsite ☐ Other_____	**Time of Approach to Site:**
*****If hazards are discovered* STOP *and* WITHDRAW**** *Notify Designated Contact and await further instructions*		
Signs of Chemical Hazards:	☐ None ☐ Dead or stressed vegetation ☐ Unexplained liquids ☐ Dead animals ☐ Clouds or vapors ☐ Odors ☐ None ☐ Sulfur ☐ Sweet/fruity ☐ Irritating ☐ Pungent ☐ Skunky ☐ New mown hay ☐ Bitter almond ☐ Other_____	
Unusual Vehicle Found at the Site:	☐ None ☐ Car/sedan ☐ Other_____ ☐ Flatbed truck ☐ SUV ☐ Construction vehicle ☐ Pickup truck Describe make/model/year/color, license plate #, and logos or markings:	

Site Approach (continued)			
Signs of Intrusion or Tampering:	☐ None ☐ Open/damaged gates, doors, or windows ☐ Missing/damaged equipment ☐ Cut locks/fences Describe signs of tampering:	☐ Open/damaged access hatches ☐ Facility in disarray ☐ Other: _____ _____	Signs of sequential intrusion (e.g., locks removed from a gate and hatch)? ☐ Yes ☐ No
Unusual Equipment:	☐ None ☐ Tools (e.g., wrenches, bolt cutters) ☐ Lab equipment (e.g., beakers, tubing) Describe equipment:	☐ Discarded PPE (e.g., gloves, masks) ☐ Hardware (e.g., valves, pipe) ☐ Pumping equipment	☐ Other: _____ _____
Unusual Containers:	Type of container: ☐ None ☐ Plastic bag ☐ Test tube ☐ Drum/barrel ☐ Box/bin ☐ Bulk container ☐ Bottle/jar ☐ Pressurized cylinder ☐ Other: _____ _____ Describe container size, labeling/placards, and visible contents:	Condition of container: ☐ Opened ☐ Unopened ☐ New ☐ Old ☐ Damaged/leaking ☐ Intact/dry	
****STOP and REPORT**** *Report to Designated Contact*			
Approval granted to proceed with sample collection? ☐ Yes ☐ No			**Time of Site Exit:**

Visual Site Hazard Assessment Form Instructions

General Information	
Site Name or ID	Provide the site name or ID where the visual site hazard assessment is being conducted. This form is for a single site.
Site Address	Provide the full street address of the site. If a street address is not available, the physical location of the site should be recorded in a clear manner.
Date	Enter the date that the site is being assessed.
Time of Arrival	Enter the time of arrival to the site.
Type of Facility	Select the appropriate box to indicate the type of facility being assessed. If the type of facility being assessed is not listed, select the box marked "Other" and describe the type of facility.
Weather Conditions at Site	Enter a description of the weather conditions at the site. Examples of conditions to describe include: temperature, wind speed, wind direction, and precipitation.
Additional Site Information	Enter any other information pertinent to the site not included in the "General Information" section.
Designated Contact	Enter the name, title, and phone number of the person to whom results should be reported from the field.
Communication Check	Select the method(s) used for communication, time contact established, and individual(s) contacted.
Site Approach	
Immediate Hazards	If an immediate hazard is observed during site approach, select the appropriate box to indicate the hazard. If the type of hazard observed is not listed, select the box marked "Other" and describe the hazard.
Time of Approach to Site	Enter the time of approach to the site.
Signs of Chemical Hazards	If signs of a chemical hazard are observed during the site assessment, select the appropriate box to indicate the hazard.
Unusual Vehicle Found at the Site	If an unusual vehicle is observed during the site assessment, select the appropriate box to indicate the type of vehicle. If the type of vehicle is not listed, select the box marked "Other" and describe the vehicle. Enter the make/model/year/color and license plate number of the vehicle in the space provided.
Signs of Intrusion or Tampering	If signs of intrusion or tampering are observed during the site assessment, select the appropriate box. Provide a description of the signs of intrusion or tampering.
Unusual Equipment	If unusual equipment is observed during the site assessment, select the appropriate box. Provide a description of the equipment.
Unusual Containers	If unusual containers are observed during the site assessment, select the appropriate box to indicate the type of container and condition of the container. Provide a description of the container.
Approval granted to proceed with sample collection?	Select "Yes" or "No" to indicate whether approval has been granted to proceed with sample collection.
Time of Site Exit	Enter the time of exit from the site.

Appendix A-2: Example Laboratory Capabilities

Below are example laboratory capabilities to illustrate the information needed to prepare sample bottles, supplies, and shipping information.

Contaminant or Class	Method	Laboratory and Shipping Address	Emergency Point-of-Contact	Emergency Phone Number
Total organic carbon (TOC)	SM[1] 5310 B	Utility Lab --address--	Primary: Backup:	(xxx) xxx-xxxx (xxx) xxx-xxxx
UV254	SM[1] 5910 B			
Semi-volatile organic compounds (SVOC) screen	EPA 3510 C/8270 D			
Volatile organic compounds and total trihalomethanes (TTHMs)	EPA 524.2			
Anions	EPA 300.1			
Coliforms/*E. coli*	SM[1] 9223 (Colilert-18®)			
Glyphosate	EPA 547	Environmental Laboratory A --address--	Primary: Backup:	(xxx) xxx-xxxx (xxx) xxx-xxxx
Diquat and paraquat	EPA 549.2			
Carbamate pesticides	EPA 531.2			
Diesel range organics screen	EPA 3510 C/8015 C			
Metals	EPA 200.8			
Total cyanide	EPA 335.4			
Microcystins and nodularin	EPA 544	Environmental Laboratory B --address--	Primary: Backup:	(xxx) xxx-xxxx (xxx) xxx-xxxx
Cryptosporidium/*Giardia*	EPA 1623			
Haloacetic acids (HAA5)	EPA 552.2			
Radiochemical – gross alpha and beta	EPA 900.0	State Health Laboratory --address--	Primary: Backup:	(xxx) xxx-xxxx (xxx) xxx-xxxx
Radiochemical – gross gamma	EPA 901.1			
Select pathogens and biotoxins	LRN[2] Bioterrorism Threat (BT) Agent Screening Protocol			

[1]Standard Methods for the Examination of Water and Wastewater
[2]Laboratory Response Network

Appendix A-3: Example Sample Bottle Supply List

The example sample bottle supply list below is based on the Laboratory Capabilities Example contained in Appendix A, and is for illustrative purposes only. Individual utility laboratory capabilities will vary.

Contaminant or Class	Method	Bottle Type	Bottle Size	No. of Samples[2] Required	Dechlorinating Agent	Preservative[3]
Total organic carbon (TOC)	SM[1] 5310 B	TOC certified, amber glass w/ PTFE-lined screw cap	500 mL	2	None	HCl, to pH≤2; store in dark at ≤6°C
UV254	SM[1] 5910 B	TOC certified, amber glass w/ PTFE-lined screw cap	500 mL	2	None	No
Semi-volatile organic compounds (SVOC) screen	EPA 3510 C/8270 D	Amber glass w/ PTFE-lined screw caps	1 L	4	Sodium thiosulfate (80 mg/L)	Store at ≤ 4°C; do not freeze
Volatile organic compounds (VOCs) and total trihalomethanes (TTHMs)	EPA 524.2	Glass w/ PTFE-lined septa (fill with no headspace)	40 mL	4	Ascorbic acid (25 mg/40 mL) for Cl_2 < 5 mg/L; plus 25 mg for Cl_2 > 5 mg/L	Two drops of 1:1 HCl for each 40 mL to pH < 2; store at ≤ 6°C, do not freeze
Anions	EPA 300.1	HDPE plastic	100 mL	2	None	None
Coliforms/*E. coli*	SM[1] 9223 (Colilert®-18)	IDEXX Shrink-banded, disposable vessel	120 mL	2	Bottle is pre-packaged with sodium thiosulfate	Store ≤10°C, do not freeze
Glyphosate	EPA 547	Amber glass w/ PTFE-lined septa	60 mL	2	Sodium thiosulfate (100 mg/L)	Store at ≤ 4°C
Diquat and paraquat	EPA 549.2	Amber PVC high density or silanized glass	1 L	2	Sodium thiosulfate (100 mg/L)	H_2SO_4 to pH ≤ 2; if biologically active, ≤ 4°C; do not freeze
Metals	EPA 200.8	HDPE Plastic	125 mL	2	None	Trace metal grade nitric acid to pH ≤ 2
Total cyanide	EPA 335.4	Plastic	50 mL	2	Ascorbic acid (60 mg/L) if positive for iodide-starch indicator paper	10 M sodium hydroxide to pH ≥ 12; store at ≤ 4°C
Carbamate pesticides	EPA 531.2	Amber glass w/ PTFE-lined septa	60 mL	2	Sodium thiosulfate (80-320 mg/L)	$KH_2C_6H_5O_7$ to pH ~3.8, store at ≤ 6°C; do not freeze
Diesel range organics screen	EPA 3510 C/8015 C	Amber glass w/ PTFE-lined screw caps	1 L	4	Sodium thiosulfate (80 mg/L)	Store at ≤ 4°C; do not freeze

Contaminant or Class	Method	Bottle Type	Bottle Size	No. of Samples[2] Required	Dechlorinating Agent	Preservative[3]
Microcystins and nodularin	EPA 544	Amber glass w/ PTFE-lined screw caps	500 mL	2	Ascorbic acid (100 mg/L)	Trizma - 7.75 g/L; 2-Chloroacetamide, 2 g/L; EDTA, 0.35 g/L; store at ≤6°C
Cryptosporidium/ *Giardia*	EPA 1623	LDPE Cubitainer (sterile)	10 L	2	Sterile sodium thiosulfate (0.01% final)	Store ≤10°C, do not freeze
Haloacetic acids (HAA5)	EPA 552.2	Amber glass w/ PTFE-lined septa	60 mL	2	None	Ammonium chloride (100 mg/L)
Radiochemical – gross alpha and beta	EPA 900.0	Plastic (polypropylene, polyethylene) or borosilicate glass	1 L	2	None	Nitric acid to pH $\leq$ 2
Radiochemical – gross gamma	EPA 901.1	Plastic (polypropylene, polyethylene) or borosilicate glass	1 L	2	None	Nitric acid to pH $\leq$ 2
Select pathogens and biotoxins	LRN[4] Bioterrorism Threat (BT) Agent Screening Protocol	LDPE Cubitainer (sterile)	20 L	2	10 mL of sterile 10% (w/v) sodium thiosulfate	Store ≤10°C, do not freeze

[1]Standard Methods for the Examination of Water and Wastewater
[2]Number of samples required per sampling location, not including field blanks.
[3]Unless otherwise indicated all samples will be shipped on ice and stored as specified.
[4]Laboratory Response Network

Appendix A-4: Water Quality Parameter Report Form

General Information	
Site Name or ID:	**Date:**
Site Address:	**Sample Collection Time:**
Team Members:	**Report Form ID:**
Designated Contact (Name, Title, and Phone Number):	

Meter/Kit IDs

Field Point of Use QC

Parameter	Blank or Background Result	QC Lot Number	QC True Value	QC Result	Acceptance Range

****STOP and REPORT****

If a field point-of-use QC result is outside of acceptance range, report the result to the Designated Contact before proceeding.

Sample Results

Parameter	Units	Sample Result	Duplicate Result	Expected Range

*****STOP and REPORT****

Verbally report results to Designated Contact.

Deviations from SOP(s) and Other Notes

Submitted By	
Report Submitted By (PRINT):	
Report Submitted By (Signature):	
Date:	

Water Quality Parameter Report Form Instructions

General Information	
Site Name or ID	Provide the site name or ID where water quality parameters are being measured. This form is for a single sample location.
Site Address	Provide the full street address of the site. If a street address is not available the physical location of the site should be recorded in a clear manner.
Team Members	Record the names of team members performing water quality parameter testing.
Designated Contact	Enter the name, title, and phone number of the person to whom results should be reported from the field.
Date	Enter the date that the water quality parameters are measured.
Sample Collection Time	Enter the collection time for the sample.
Report Form ID	Enter a unique ID number for the form. This number will be used to link water quality parameter results to samples on the chain of custody form.
Meter/Kit IDs	
Enter the ID for the meter or kit used to measure the water quality parameters.	
Field Point of Use QC	
Parameter	List the parameters that are being measured. Field point-of-use QC samples are analyzed in the field before analyzing collected samples.
Blank or Background Result	Enter the result(s) for blank or background sample(s), if taken.
QC Lot Number	Enter the lot number(s) for the point-of-use QC sample(s). Point-of-use QC samples may not be analyzed at every sample location.
QC True Value	Enter the true value(s) for the point-of-use QC sample(s).
QC Result	Enter the result(s) for the point-of-use QC sample(s).
Acceptance Range	Enter the acceptance range for the point-of-use QC sample(s).
Sample Results	
Units	Enter the units for the sample result(s).
Sample Result	Enter the result(s) for the sample(s).
Duplicate Result	Enter the result(s) for the duplicate measurement(s), if taken.
Expected Range	Enter the expected range for the water quality parameter(s) based on current expected values for location. The expected range should be known before water quality parameter testing.
Deviations from SOP(s) and Other Notes	
Document any deviations or changes to SOP(s) or other notes related to water quality parameter testing.	
Submitted By	
Report Submitted By (PRINT)	The printed name of the individual recording results and submitting the report to the utility manager or Incident Commander.
Report Submitted By (Signature)	The signature of the individual recording results and submitting the report to the utility manager or Incident Commander.
Date	The date the results are submitted to the utility manager or Incident Commander.

Appendix A-5: Emergency Response Chain of Custody Form

Utility Name: _____

Street Address: _____

City, State, Zip Code: _____

Point-of-Contact: _____

Point-of-Contact Phone #: _____

Recipient laboratory if different from above:

Laboratory Name: _____

Shipping Address: _____

City, State, Zip Code: _____

Point-of-Contact: _____

Point-of-Contact Phone #: _____

Analysis Request

Utility Project ID #:

COC ID #: | Page ____ of _____

Cooler ID #: | Total # Bottles in Cooler:

Field Samplers: | Requested Turnaround Time:

COC Completed by:

****Laboratory Use Only****

Laboratory Project ID #: | Samples Received Temp.:

Samples Received Date and Time: | Cooler Custody Seal Intact? Yes ☐ No ☐ None ☐

Samples Checked Against COC by: | Sample Custody Seals Intact? Yes ☐ No ☐ None ☐

↓ Enter Preservation Code[1] ↓

Sample ID	G, C, or S[2]	If Sub-sampled, Large Bottle ID	Location ID[3]	Collected: Date	Collected: Time	Check Below for Requested Analysis	Water Quality Parameter Report ID	Rapid Field Testing Report ID	Remarks

[1]**Preservation Codes**: *1*=Ice; *2*=HCl; *3*=H_2SO_4; *4*=HNO_3; *5*=NaOH; *6*=Ascorbic Acid; *7*=Sodium Sulfite; *8*=Sodium Thiosulfate; *9*=Potassium Dihydrogen Citrate. **Other Codes:**

Special Instructions:

[2]**G**=Grab, **C**=Composite, **S**=Sub-sampled

[3]**If all samples are from the same location, enter address here:**

Signature	Affiliation	Date and Time	Signature	Affiliation	Date and Time
Relinquished by:			Received by:		
Relinquished by:			Received by:		
Relinquished by:			Received by:		
Relinquished by:			Received by:		

Emergency Response Chain of Custody Form Instructions

Address Field	
Enter the utility name, address, and point-of-contact information. Enter the laboratory address and point-of-contact information, if different from the utility.	
Analysis Request	
In each column enter a specific analysis that will be requested.	
Enter Preservation Code	
Enter the preservation code if preservative is added to the sample bottle in the field, or is provided in the bottle from the laboratory. For convenience, common preservatives are footnoted below.	
COC Information	
Utility Project ID #	Enter the utility project ID number if assigned.
COC ID #	Enter the ID number for the COC.
Page _____ of _____	If multiple COCs will be grouped together, enter the number of the current COC out of the total number of COCs in the group.
Cooler ID #	Enter the ID number for the cooler associated with the COC.
Total # Bottles in Cooler	Enter the total number of bottles included in the shipping cooler.
Field Samplers	Enter the names, or IDs, of the field samplers who collected samples.
Requested Turn Around Time	If a specific turnaround time is requested, it should be entered here. Leave this field blank if it is not applicable.
COC completed by	Enter the name, or ID, of the individual who completed the COC.
******Laboratory Use Only******	
Laboratory Project ID #	Enter the laboratory project ID number if assigned.
Samples Received Temp.	Record the temperature of the samples when received at the laboratory.
Samples Received Date and Time	Enter the date and time of receipt of samples at the laboratory.
Cooler Custody Seal Intact?	Record if the custody seal was intact when received at the laboratory.
Sample Custody Seals Intact?	Record if the custody seals were intact when the samples were received at the laboratory.
Samples Checked Against COC by	Enter the name of the individual who checks the samples against the COC.
Sample Information	
Sample ID	Enter the sample ID for each bottle. Each sample bottle should be entered on a different row and have a unique ID.
G, C, or S	Enter the appropriate code for the sample: G for a grab sample, C for a composite sample, or S for a sub-sample from a large volume container.
If Sub-Sampled, Large Bottle ID	Enter the ID of the large bottle from which sample was sub-sampled.
Location ID	Provide the location ID for each sample. If all samples are from same location, enter the address below.
Collected Date/Time	Enter the date and time the sample was collected. Use 24 hour military time.
Check Below For Analysis Requested	Enter a check mark at the intersection of the “Sample ID” row and “Analysis Request” column for the analysis that is requested.
Water Quality Parameter Report ID	Enter the Water Quality Parameter Report ID for the sample. If none performed, enter “none”.
Rapid Field Testing Report ID	Enter the Rapid Field Testing Report ID for the sample. If none performed, enter “none”.
Remarks	Enter any remarks related to the sample.
Special Instructions	
Enter any special instructions that relate to all of the samples listed on the COC in this area.	
Sample Transfer Documentation	
Individuals who relinquish or receive the samples should sign the COC form, enter their affiliation, and enter the date and time of each transfer of samples. Use 24 hour military time.	

Appendix B
Forms and Templates for Advanced Field Response Activities

Appendix B-1: HazMat Interview Form

The following interview form is provided to facilitate information exchange between local HazMat and the utility.

Attendees	Organization	Phone	Email

1. What geographic area do HazMat responders in your organization serve?

2. What type of incidents do HazMat responders in your organization typically respond to?

3. Do HazMat responders in your organization have experience collecting drinking water samples using prescribed SDWA approved methods?

   ☐ Yes ☐ No

   If yes, what types of sampling locations?

   ☐ Taps ☐ Confined spaces (at a water utility)

   ☐ Fire hydrants ☐ Online water quality monitors (autosamplers)

   ☐ Water storage tanks ☐ Reservoirs

4. If the HazMat responders in your organization do not have experience with water sampling, are they willing to be trained?

   ☐ Yes ☐ No

5. Complete the tables below with information provided by HazMat for Site Safety Screening and Rapid Field Testing. HazMat responders may not have information regarding sensitivity or sensitivity for contaminants in water readily available. It may be beneficial to schedule a follow-up conversation regarding rapid field testing specifically for water samples.

Parameter	Matrix (air, liquids, powders, solids, surfaces)	Instrumentation or Test Kit	Sensitivity	Sensitivity for Dilute Contaminants in Water?
Example: Toxic industrial chemicals, explosives, narcotics	*Solid or liquid chemicals and chemical mixtures*	*FirstDefender™ RMX Handheld Chemical Identification Analyzer*	*Trace for liquid and solid chemicals*	*No*
Radiation				
Volatile organic compounds/combustible gases				
Semi-volatile organic compounds				
Toxic industrial chemicals				
Chemical warfare agents				
Toxins				
Pathogens				

6. Would the HazMat responders in your organization be willing to participate in tabletop exercises or field exercises for drinking water contamination emergencies?

   ☐ Yes ☐ No

7. Can you package and ship hazardous materials?

   ☐ Yes ☐ No

8. Are there additional HazMat capabilities that you are planning to develop in the near future? If yes, please describe.

Appendix B-2: Site Safety Screening Report Form

General Information	
Site Name or ID:	**Date:**
Site Address:	**Time of Arrival:**
Team Members:	**Report Form ID:**
Designated Contact (Name, Title, and Phone Number):	

Meter/Kit IDs

Instrument Checks					
Parameter	**Blank or Background Result**	**Instrument Checks Performed**	**Instrument Check Reference Value**	**Instrument Check Result**	**Acceptance Range**

****STOP and REPORT****

If an instrument check result is outside of acceptance range, report the result to the Designated Contact before proceeding.

Sample Results					
Parameter	**Units**	**Expected Range**	**Action Level**	**Action Level Exceeded? (Y/N)**	**Recorded Result**

****STOP and REPORT****

Verbally report results to the Designated Contact.

Deviations from SOP(s) and Other Notes

Submitted By	
Report Submitted By (PRINT):	
Report Submitted By (Signature):	
Date:	

Site Safety Screening Report Form Instructions

General Information	
Site Name or ID	Provide the site name or ID where site safety screening is being conducted. This form is for a single site.
Site Address	Provide the full street address of the site. If a street address is not available the physical location of the site should be recorded in a clear manner.
Team Members	Record the names of team members performing site safety screening.
Designated Contact	Enter the name, title, and phone number of the person to whom results should be reported from the field.
Date	Enter the date that the site safety screening is performed.
Time of Arrival	Enter the time the team arrives at the site and begins site safety screening.
Report Form ID	Enter a unique ID number for this form.
Meter/Kit IDs	
Enter the ID for the meter or kit used to measure the site safety screening parameters.	
Instrument Checks	
Parameter	List the parameters that are being measured. Instrument checks are typically conducted in the field before entering the site.
Blank or Background Result	Enter the result(s) for blank or background sample(s), if taken.
Instrument Checks Performed	Enter the instrument checks that are performed to ensure instrumentation is operational and ready for use.
Instrument Check Reference Value	Enter the reference value(s) for the instrument check(s), if applicable.
Instrument Check Result	Enter the result(s) for the instrument check(s).
Acceptance Range	Enter the acceptance range for instrument check(s).
Sample Results	
Parameter	List the parameters that are being measured.
Units	Enter the units for the parameter result(s).
Expected Range	Enter the expected range for the site safety screening parameter(s) based on baseline/historical data for the site.
Action Level	Enter the action level set by the utility for each site safety screening parameter.
Action Level Exceeded? (Y/N)	Enter Y if action level is exceeded and N if the action level is not exceeded.
Recorded Result	The highest observed result should be recorded for each parameter. If results are within the normal range, they may be recorded as “Normal.” If the action level is exceeded, this result should be recorded.
Deviations from SOP(s) and Other Notes	
Document any deviations or changes to SOP(s) or other notes related to site safety screening.	
Submitted By	
Report Submitted By (PRINT)	The printed name of the individual recording results and submitting the report to the utility manager or Incident Commander.
Report Submitted By (Signature)	The signature of the individual recording results and submitting the report to the utility manager or Incident Commander.
Date	The date the results are submitted to the utility manager or Incident Commander.

Appendix B-3: Rapid Field Testing Report Form

General Information	
Site Name or ID:	**Date:**
Site Address:	**Sample Collection Time:**
Team Members:	**Report Form ID:**
Designated Contact (Name, Title, and Phone Number):	

Meter/Kit IDs

Field QC Samples

Parameter	Blank or Background Result	QC Lot Number	QC True Value	QC Result	Acceptance Range

****STOP and REPORT****

If a field QC result is outside of acceptance range, report the result to the Designated Contact before proceeding.

Sample Results

Parameter	Units	Sample Result	Duplicate Result	Expected Range

****STOP and REPORT****

Verbally report results the Designated Contact.

Deviations from SOP(s) and Other Notes

Submitted By	
Report Submitted By (PRINT):	
Report Submitted By (Signature):	
Date:	

Rapid Field Testing Report Form Instructions

General Information	
Site Name or ID	Provide the site name or ID where rapid field testing is being conducted. This form is for a single sample location.
Site Address	Provide the full street address of the site. If a street address is not available the physical location of the site should be recorded in a clear manner.
Team Members	Record the names of team members performing rapid field testing.
Designated Contact	Enter the name, title, and phone number of the person to whom results should be reported from the field.
Date	Enter the date that the rapid field testing is performed.
Sample Collection Time	Enter the collection time for the sample.
Report Form ID	Enter a unique ID number for this form. This number will be used to link rapid field testing results to samples on the chain of custody form.
Meter/Kit IDs	
Enter the ID for the meter or kit used to measure the rapid field testing parameters.	
Field QC Samples	
Parameter	List the parameters that are being measured. Field QC samples are analyzed in the field before analyzing collected samples.
Blank or Background Result	Enter the result(s) for blank or background sample(s), if taken.
QC Lot Number	Enter the lot number(s) for the field QC sample(s). Field QC samples may not be analyzed at every sample location.
QC True Value	Enter the true value(s) for the field QC sample(s).
QC Result	Enter the result(s) for the field QC sample(s).
Acceptance Range	Enter the acceptance range for the field QC sample(s).
Sample Results	
Parameter	List the parameters that are being measured.
Units	Enter the units for the sample result(s).
Sample Result	Enter the result(s) for the sample(s).
Duplicate Result	Enter the result(s) for the duplicate measurement(s), if taken.
Expected Range	Enter the expected range for the rapid field testing parameters based on baseline/historical data.
Deviations from SOP(s) and Other Notes	
Document any deviations or changes to SOP(s) or other notes related to rapid field testing.	
Submitted By	
Report Submitted By (PRINT)	The printed name of the individual recording results and submitting the report to the utility manager or Incident Commander.
Report Submitted By (Signature)	The signature of the individual recording results and submitting the report to the utility manager or Incident Commander.
Date	The date the results are submitted to the utility manager or Incident Commander.

Appendix C: Staffing Plan Template

Responsibilities	Primary Contact	Phone	Backup Contact	Phone	Availability
					☐ Day ☐ Night
					☐ Day ☐ Night
					☐ Day ☐ Night
					☐ Day ☐ Night
					☐ Day ☐ Night
					☐ Day ☐ Night
					☐ Day ☐ Night
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					☐ Day ☐ Night
					☐ Day ☐ Night
					☐ Day ☐ Night
					☐ Day ☐ Night
					☐ Day ☐ Night

Appendix D: Site Characterization and Sampling Plan

Investigation Site			
Site Name:			**Additional Site Information:**
Site Address:			
Type of Facility:	☐ Source water ☐ Ground storage tank ☐ Tap ☐ Water quality monitoring station ☐ Other: _____	☐ Treatment plant ☐ Elevated storage tank ☐ Hydrant	☐ Pump station ☐ Finished water reservoir ☐ Service connection
Initial Information Known:	☐ Customer complaints ☐ Water quality anomaly ☐ Other: _____	☐ Reported illnesses ☐ Security alert	

Field Activities

☐ Visual site hazard assessment
☐ Site safety screening
☐ Water quality parameter testing
☐ Rapid field testing
☐ Sample collection for laboratory analysis

Site Safety Screening

✓	Parameter	✓	Parameter

Water Quality Parameters

✓	Parameter	✓	Parameter

Rapid Field Testing

✓	Parameter	✓	Parameter

Sampling Plan

☐ Distribution main
☐ Service line
☐ Premise
☐ Other: _____

☐ Composite sample
☐ Grab sample
☐ Large volume sample collection without sub-sampling
☐ Large volume sample collection with sub-sampling
☐ Contaminant or class listed below
☐ Contaminant or class described in attached plan

✓	Contaminant or Contaminant Class	✓	Contaminant or Contaminant Class

Sample Delivery:	☐ Return samples to utility	☐ Ship samples to pre-arranged laboratories	☐ Recipient listed below
Name:			
Address:			
Phone No.:			

Field Response Personnel

Utility	☐ Site Characterization Team:_____ ☐ Water quality technician:_____ ☐ Field samplers:_____ ☐ Security officer:_____ ☐ Distribution system operator:_____ ☐ Other: _____	
Participating Agencies	☐ Local law enforcement ☐ HazMat ☐ Fire department ☐ FBI ☐ Civil Support Team ☐ Primacy Agency ☐ EPA Response Team ☐ Other: _____	**Participating Agency will:** ☐ Deploy with utility personnel ☐ Meet at location site at (specify time)

Communications

Mode of Communication:	☐ Phone ☐ 2-way radio ☐ Digital ☐ Other: _____	
Reporting Events:	☐ Upon arrival at site ☐ During approach ☐ Site entry	☐ Site exit ☐ After field testing ☐ Other: _____
Report To:	**Phone No.:**	

Health and Safety

Health and Safety Plan:	☐ Reviewed ☐ Modified If modified, describe:_____

✓	**Personal Protective Equipment**	✓	**Personal Protective Equipment**

Approvals

Health and Safety Officer	Name (PRINT):	
	Signature:	Date:
Utility Manager or Incident Commander	Name (PRINT):	
	Signature:	Date:

Appendix E: Emergency Response Sampling and Analysis Kit Inventory Sheet Templates

Sample Bottle Kit Inventory Sheet [*Specify Storage Location*]				
Contaminant or Class	**Bottle Type and Volume**	**Number of Bottles**	**Dechlorinating Agent in Bottle?**	**Preservative In Bottle?**
Other included items: (i.e., Pre-filled COC form, Sampling Instructions, Delivery Instructions)				
Prepared By:			**Date:**	
Checked By:			**Date:**	
Kit Expiration Date:				

Supply Kit Inventory Sheet [*Specify Storage Location*]			
Item	**Quantity**	**Item**	**Quantity**
Prepared By:		**Date:**	
Checked By:		**Date:**	