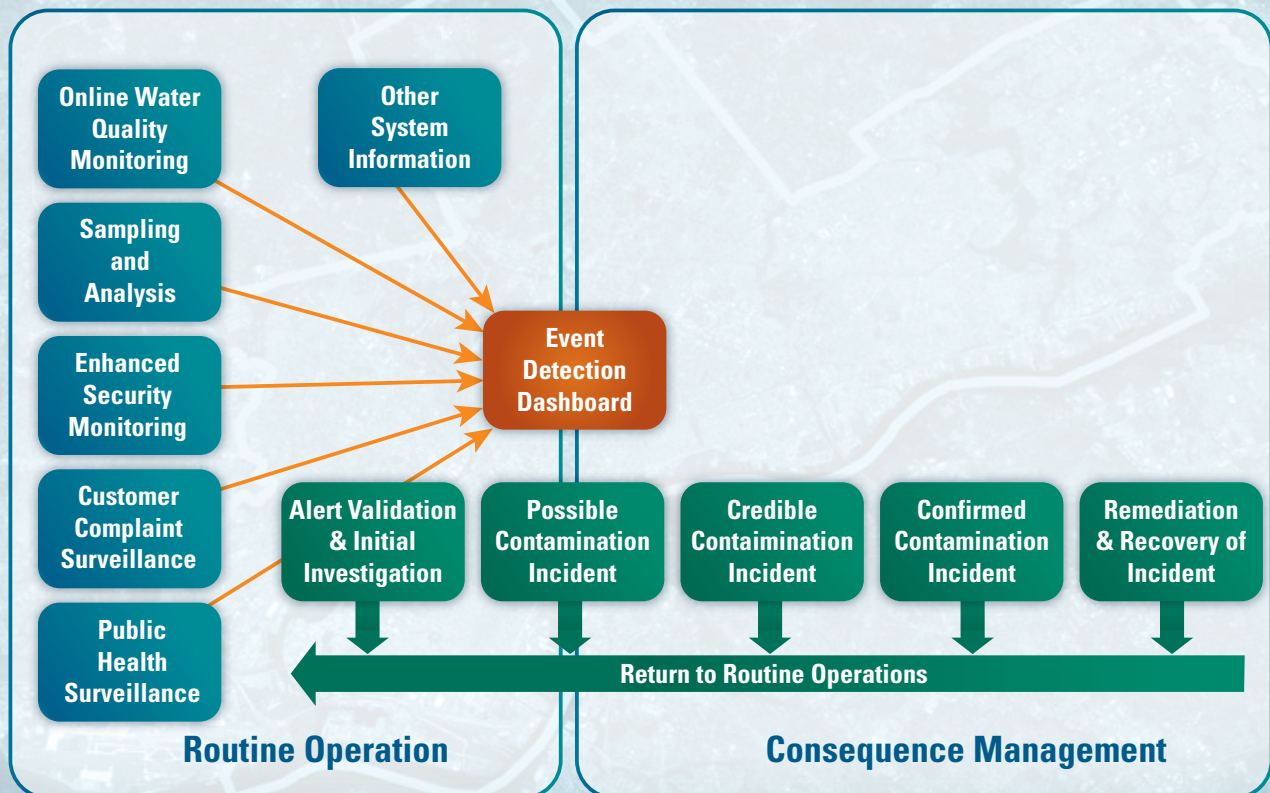


Philadelphia Water Department
 Contamination Warning System Demonstration Pilot Project:

Site Characterization and Water Sampling



EPA Disclaimer

Although the information in this document has been funded wholly or in part by the United States Environmental Protection Agency under the Water Security Initiative program, it may not necessarily reflect the views of the agency and no official endorsement should be inferred.

When referencing this white paper in another document, please use the following citation:

Philadelphia Water Department and CH2M HILL. May 2013. Philadelphia Water Department Contamination Warning System Demonstration Pilot Project: Site Characterization and Water Sampling. White Paper Submitted to EPA as part of the Water Security Initiative Grant Awarded to Philadelphia Water Department.

This paper can also be downloaded from www.ch2mhill.com/iws.

Acknowledgments

The Philadelphia Water Department would like to recognize the following individuals and organizations for their assistance and contributions in the development of this document:

EPA Water Security Division

- Steve Allgeier
- Elizabeth Hedrick, PhD

Contractor Support

- Timothy Maloney, CH2M HILL
- Christopher Wiggins, CH2M HILL
- David Hartman, CH2M HILL
- Yakir Hasit, PhD, PE, CH2M HILL

Questions concerning this document should be addressed to:

Gary Burlingame
Philadelphia Water Department
Bureau of Laboratory Services
1500 E Hunting Park Avenue
Philadelphia, PA 19124
Phone: 215-685-1402
E-mail: Gary.Burlingame@phila.gov

Yakir Hasit, PhD, PE
CH2M HILL
1717 Arch Street
Suite 4400
Philadelphia, PA 19103
Phone: 215-640-9027
E-mail: Yakir.Hasit@ch2m.com

Abstract

The Philadelphia Water Department (PWD) developed a comprehensive contamination warning system (CWS) for its drinking water system under a Water Security (WS) initiative grant from the U.S. Environmental Protection Agency (EPA). Site characterization and sampling documents were developed respectively as part of the Consequence Management (CM) and Sampling and Analysis (S&A) components of the CWS. This paper summarizes the site characterization objectives, design and related processes, site characterization sample activities, laboratory procedures, and available analytical support.

Project Background

PWD developed a comprehensive CWS for its drinking water system under a WS initiative. The WS initiative is a program developed by the EPA in partnership with drinking water utilities and other key stakeholders in response to Homeland Security Presidential Directive 9. The WS initiative involves designing, deploying, and evaluating a model CWS for drinking water security. A CWS is a systematic approach to the collection of information from various sources, including monitoring and surveillance programs, to detect contamination events in drinking water early enough to reduce public health or economic consequences. The WS initiative goal is to develop water security CWS guidance that can be applied to drinking water utilities nationwide.

The project has six major components:

1. Online water quality monitoring
2. Sampling and analysis
3. Enhanced security monitoring
4. Consumer complaint surveillance
5. Public health surveillance
6. Consequence management

One of the consequence management component activities is to conduct site characterization, an S&A component activity, in response to a water contamination incident. Site characterization involves collection of information at the site for use in supporting the evaluation of the contamination event. Site characterization involves development of a customized plan for approaching the site, characterizing the site, sample collection, and site exit. Site characterization results help to identify safety procedures, protocols, and resources to be used to protect the health and safety of field responders and laboratory personnel. S&A activities performed as part of site characterization include field safety screening tests, rapid field screening tests, and water sampling. Identification and development of guidance related to roles and responsibilities, sampling procedures, analytical methods, quality control, sample handling, laboratories, and data review process are necessary for effective site characterization.

CH2M HILL served as the project contractor and supported PWD in development of its CWS. CH2M HILL supported PWD in the design, implementation, and evaluation of the S&A component, including site characterization.

Site Characterization Background and Objectives

Site characterization is a process that is adapted to the needs and objectives of a specific incident and consists of collecting information from an investigation site to support the evaluation of a drinking water contamination threat. Site characterization activities include site evaluation, field safety screening, rapid field testing of the water, and sample collection. The site characterization results are of critical importance to the threat evaluation process.

The site characterization process consists of the following six stages (EPA 2003):

1. **Customize the Site Characterization Plan.** A site characterization plan is developed for each specific incident using a pre-established generic plan.

2. **Approach the Site.** Before entering the site, an initial assessment of site conditions and potential safety hazards is conducted at the site perimeter.
3. **Characterize the Site.** The customized site characterization plan is implemented by conducting a detailed site investigation with rapid analytical field testing of the water.
4. **Collect Samples.** Water samples are collected for laboratory confirmation analysis.
5. **Prepare Samples.** The water samples are prepared for transport to the designated laboratory.
6. **Exit the Site.** Following completion of site characterization, the site is secured, and personnel exit and undergo any necessary decontamination.

Depending on the nature of the contamination threat, other agencies and organizations may be involved or otherwise assume some responsibility during planning and implementation of site characterization activities. Various organizations that may be involved include HazMat, technical assistance providers, laboratories, local law enforcement, and federal law enforcement. Federal roles and responsibilities are dictated by the Federal Response Plan (EPA 2003).

Quality Control

A Quality Assurance Project Plan (QAPP) provides instructions on how to apply quality assurance (QA) and quality control (QC) practices to generate the type and quality of data needed to make informed incident response decisions (EPA 2002). It documents planning activities to ensure that each person is informed of and understands the requirements of the QA/QC program. The QAPP refers to various supporting documents, including laboratory quality manuals, standard operating procedures (SOPs), and sampling and analysis plans. Development of the QAPP will likely help water utilities identify needed procedures that may not have already been developed and standardized. These documents collectively form the core of a quality system.

SOPs are needed for site characterization testing. They describe the specific processes and requirements in sufficient detail for use as both operational and training tools. An initial demonstration of capability should be conducted for each analytical procedure, using the established SOP, and conducted by each analyst conducting the testing. Continuing demonstration of capability is the annual (or more frequent) version of an initial demonstration of capacity to show ongoing proficiency using the method. Each SOP contains details of initial and continuing demonstration of capability requirements.

Site Characterization Design and Processes

The site characterization process operates as part of the CWS Consequence Management component and under the National Incident Management System Incident Command System (ICS) guidelines. The ICS uses unified command, processes, communications, terminologies, and tactics that are standardized across the nation so that all responders from various locations and organizations can work together effectively.

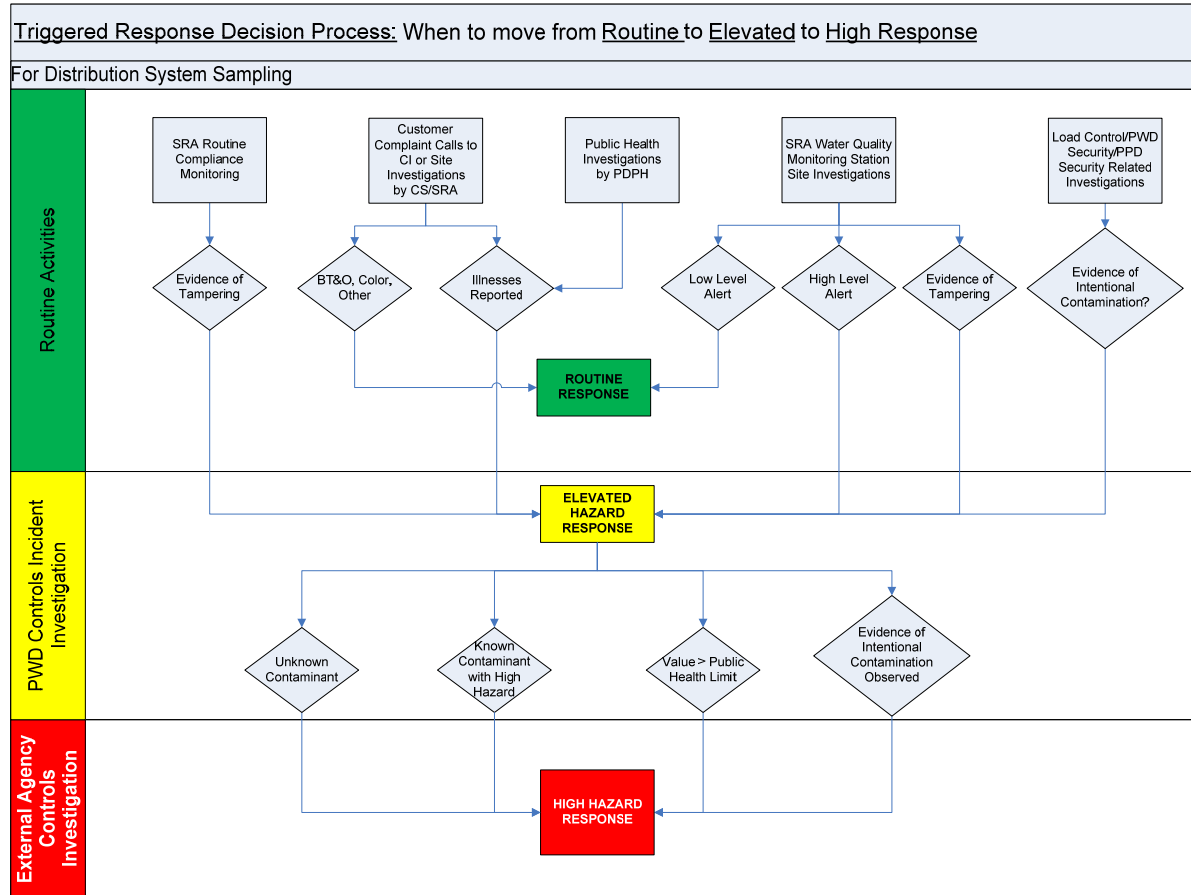
The water utility will be responsible for incident command (IC) unless another organization is designated. If IC is designated to another agency, utility staff should be included on the site characterization team or as technical advisors. As incident commander, the utility is responsible for managing the response to the threat along with planning and directing site characterization activities. The site characterization team leader must coordinate and communicate regularly with the incident commander during site characterization. The incident commander approves the site characterization team to proceed with its activities at key decision points in the process (e.g., whether to enter the site following the approach) (EPA 2003).

Site characterization results help to identify the safety procedures, protocols, and resources to be used in protecting the health and safety of field responders and laboratory personnel. To be effective, safety practices must be established before an incident. For example, hazardous materials awareness training is available through various state and federal agencies and is recommended for staff members who may encounter hazardous materials. In most cases, the investigation site or suspected contamination site will not present a significant hazard to the site characterization team, and basic equipment and training will be sufficient to conduct site characterization activities safely.

Site characterization results are critically important to the threat evaluation process. The threat evaluation process considers all the available and relevant information to determine if the threat is “possible,” “credible,” or “confirmed.” Figure 1 presents PWD’s threat response decision tree.

FIGURE 1

PWD’s Threat Response Decision Tree



Customize the Site Characterization Plan

The threat evaluation information supports the development of a customized *site characterization plan*. The site characterization plan is adapted from a generic site characterization plan, which should be developed as part of a utility’s planning and preparation for responding to a water quality incident. The plan has four key objectives:

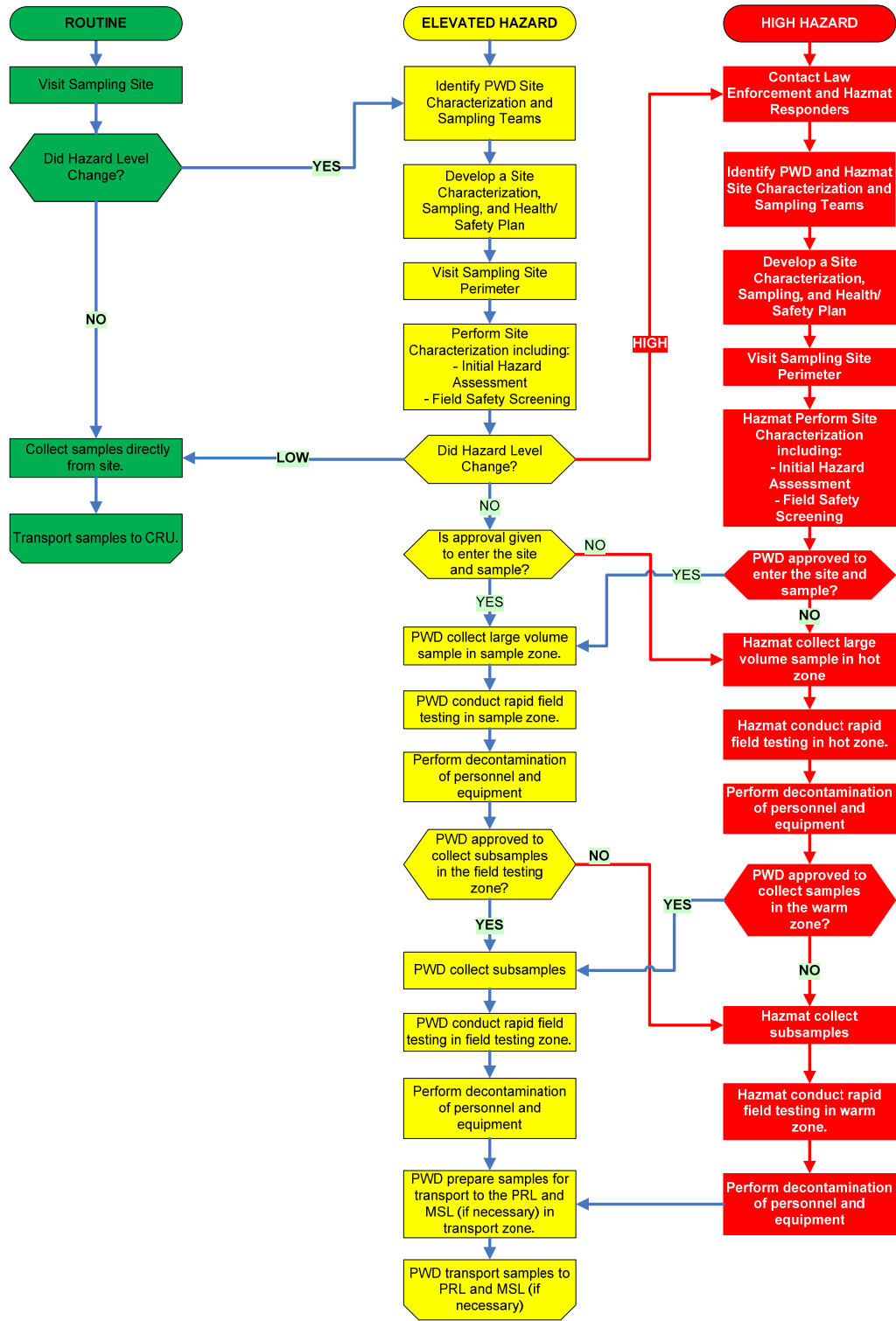
1. **Minimize Response Time** – The process is streamlined to decrease the time needed for site characterization activities. Rapid threat evaluation will reduce the harm caused by an actual contamination or water quality incident.
2. **Broad Contaminant Coverage** – Maximize the number of contaminants or contaminant classes screened to the extent practical.
3. **Safety** – Design for personnel safety while maintaining rapid assessment and response.
4. **Coordination with External Organizations** – Streamline communication and coordination between PWD and external response units. Clearly establish roles and responsibilities.

PWD’s site characterization plan is appended to the end of this paper.

The site characterization team uses the customized plan as the basis for its activities at the investigation site. As the plan is implemented, the observations and results from site characterization feed into the threat evaluation process. In turn, the revised threat evaluation may indicate that the threat is “credible” or “not credible,” or that the site characterization plan needs to be revised in the field to collect more information in order to make this

determination. Because threat evaluation and site characterization are interdependent, the incident commander must be in constant communication with the site characterization team while it is performing its tasks (EPA 2003). Figure 2 presents an example site characterization and sampling decision tree for different hazard levels.

FIGURE 2
PWD's Site Characterization Decision Tree



Select and Notify the Site Characterization Teams

The PWD site characterization team includes managers, a safety officer, a quality assurance officer, an incident scribe, a team leader, team members representing a mix of field and laboratory staff, runners, and staff to manage supplies. The site characterization team leader is responsible for selecting and notifying the team, implementing the site characterization plan in the field, and supervising site characterization personnel.

Site Characterization Field Methods and Procedures

The site characterization and sampling must follow accepted procedures that are documented in an SOP. The personnel performing the sampling must have been trained before or be under the direct supervision of a trained staff member while collecting samples. Sampling procedures and training of individuals in those procedures must be documented. All appropriate QC samples must be collected at the time of collecting samples. These may include equipment, trip, and ambient blanks, duplicate samples, samples for matrix spike and matrix spike duplicate analyses, and background samples.

PWD keeps site characterization field equipment and supplies at the ready in a dedicated “emergency response closet.” PWD’s Bureau of Laboratory Services (BLS) prepared the following six emergency response kits for site characterization that are stored in the emergency response closet:

1. **BLS Sample Coolers**—Coolers that contain the individual sample bottles with the appropriate preservation chemicals for each analytical test conducted at BLS and two 5-gallon (20-liter) collapsible cubitainers to collect a bulk sample. Two coolers are provided for each sample collected.
2. **Contract Laboratory Sample Coolers**—Coolers that contain the individual sample bottles with the appropriate preservation chemicals for each analytical test conducted by the contract laboratory and two 5-gallon (20-liter) collapsible cubitainers to collect a bulk sample. Two coolers are provided for each sample collected.
3. **Meters and Reagents Kit**—A kit containing field equipment and the reagents needed for site characterization activities.
4. **Personal Protective Equipment Kit**—A kit containing the personal protective equipment for site characterization activities.
5. **Site Characterization Supplies Kit**—A kit containing *site characterization* supplies such as a flashlight, camera, radio, clipboard, etc.
6. **Decontamination Kit**—A kit that contains the supplies and materials needed to decontaminate field crews, equipment, and sample bottles.

PWD maintains the Emergency Response Closet and kits through monthly inspections, checklists, and meetings.

BLS has also created a site characterization binder that contains pertinent information for the site characterization team to reference during site characterization field work. The binder contents include the following:

- Field supply checklists
- SOPs and bullet instructions for field meters
- Contract laboratory chain-of-custody forms and contact information
- Site characterization plan and report (see forms appended to this paper)
- Emergency contacts
- Field safety form
- Emergency response lab contacts
- Incident command at BLS
- Team members
- Philadelphia Fire Department Hazmat information

The site characterization process begins with an observation of site conditions for signs of hazards and field safety screening at the perimeter to identify potential environmental hazards that might pose a risk to the site characterization team. Field safety screening tests could be considered for use during site characterization (Table 1).

The PWD CWS project demonstrated the importance of developing a baseline profile for the various field safety screening tests. For example, the Ludlum method showed a wide range of background radiation levels at various urban locations.

The next site characterization activity is to evaluate the water using rapid field screening tests to help:

- Obtain information to support the threat evaluation process
- Tentatively identify contaminants
- Determine hazards that require special handling precautions

Table 2 lists rapid field screening tests that could be considered for use during site characterization. PWD demonstrated the importance of developing a baseline profile for the various rapid field screening tests.

Field screening samples are collected at locations determined by IC in collaboration with the site characterization team leader and utility experts in areas such as distribution and pumping.

To ensure the samples and the analytical data can be used as reliable scientific evidence, sample custody must be maintained and documented in the field, during transport, and in the laboratory. A standard chain-of-custody form may suffice.

Site characterization information is reported to IC at the following decision points or whenever unusual observations or hazardous conditions are encountered:

- Provide the incident-specific site characterization plan to IC, and request approval to approach the site.
- Report perimeter safety screen and hazard assessment to IC, and obtain approval to enter the site.
- Report site hazard assessment/safety screen to IC, and obtain approval for rapid field testing.
- Report rapid field testing data to IC, and obtain approval to collect samples.

The site characterization information will likely be used to support several follow-on activities (EPA 2003):

- Hazard assessment of the site
- Threat evaluation
- Implementation of precautionary actions to protect public health
- Estimation of the spread of a contaminant
- Development of an analytical plan (including the decision regarding whether to analyze samples)

TABLE 1
Field Safety Screening Tests

Parameter	Method	Data Qualifier
Radioactivity	Ludlum	Screening
Volatile organic compounds, carbon monoxide, hydrogen sulfide, oxygen, lower explosive limit, upper explosive limit	MultiRAE	Screening
Arsenic, hydrogen sulfide, fluorine, chlorine, oxidizers, acids/caustics, nerve, cyanide	HazMat Smart-Strip™	Indicator
Chemicals/agents	ChemRAE	Screening
Photoionization detection of volatile organic compounds in air	HAPSITE	Screening

TABLE 2
Rapid Field Screening Tests

Parameter	Method	Data Qualifier
Visual inspection	NA	Indicator
pH	Field meter	Indicator
Free cyanide	Field meter	Screening
Specific conductance	Field meter	Indicator
Turbidity	Field meter	Indicator
Total chlorine	DPD (phenylenediamine)	Indicator
Acute toxicity	ECLOX	Indicator
VOC	Portable gas chromatograph/ mass spectrometer	Screening

After completing site characterization activities, the site characterization team should decontaminate the equipment and personnel and secure the site before exiting (e.g., lock doors, hatches, gates, and install scene tape) to preserve criminal evidence and protect public safety.

Utility Laboratory Processes and Analytical Methods

One objective of site characterization is the collection and analysis of samples. Analytical results play a key role in providing information for responding to a water contamination incident. It is imperative that the samples be collected properly and analyzed in a timely manner to support incident response. To achieve this, notification procedures, roles and responsibilities, hazardous material training, sample collection and analysis, chain-of-custody procedures, and protocols for maintaining criminal evidence must be developed and in place for use when responding to an incident.

Notification Procedures, Roles, and Responsibilities

An analytical services requestor (ASR) is part of the CWS team. The ASR provides the team with field and laboratory experience that in combination helps to define a detailed analytical approach. The ASR works directly with the support labs to define the scope of testing, data quality objectives, compensation, and reporting requirements.

Special Laboratory Training

Hazardous materials awareness training is available through various state and federal agencies and is recommended for any staff that may encounter hazardous materials. PWD developed in-house guidance for handling samples that enter the laboratory and provided training to staff.

Sample Receipt at the Laboratory

If an incident involves potentially hazardous materials, outside specialty services are required to process analytical work. At the time of publication, only two facilities in the country are recognized by EPA to handle high-hazard samples. Access to these testing facilities is through the utility's EPA regional drinking water coordinator.

CWS samples received by the laboratory are handled under a laboratory fume hood and undergo laboratory safety screening to help ensure the safety of lab personnel. The safety screening process is defined by the laboratory supervisor and management team with consideration of site characterization field information. Safety screening can include radiological screening of surfaces, screening for volatile organic compounds (VOCs) with a field instrument, and screening for industrial chemicals and agents.

Chain-of-Custody Process

The chain of custody is a process, not merely a document. To ensure that the chain of custody allows for the admissibility of sample collection, and the conclusions derived from analytical results, it must document the complete history of the sample from the moment sampling was conducted to the moment it is disposed of, and all steps in between. The chain of custody must show that the sample was secure at all times and that occasions for tampering were negated through appropriate security.

Sample Analysis

The water quality response kit includes a 5-gallon (20-liter) collapsible cubitainer to collect a bulk sample for toxin and pathogen testing and multiple sample containers with preservatives required by each laboratory method. The laboratory methods to be used will be specified by the ASR. PWD developed in-house guidance for the analysis of unknowns and provided training to staff.

Maintaining Samples as Criminal Evidence

As part of the sampling plan and SOPs, samples must be safeguarded from tampering by securing sample containers with custody seals that allow detection of tampering. Before shipping, samples must be maintained according to the appropriate standard procedures to ensure the validity of the sample analyses. These procedures may include sample preservation and storage on ice and in the dark, and they must ensure that the samples are secure. Should the

samples need to be shipped, they must be shipped in appropriate containers to ensure the safety and security of the samples in a manner that will allow sample receipt to be traceable. The tracking number provided for sample shipments should be recorded on the chain of custody, and shipping containers must be controlled with tamper-proof custody seals.

Support Laboratory Processes and Analytical Methods

Support laboratory processes and identification of analytical methods play a significant role in site characterization sample analysis. They guide the decision-making process by defining roles and responsibilities, detailing appropriate analytical methods, identifying available laboratories, and defining data review, validation, and storage procedures. The use of the laboratory processes and analytical methods in responding to a contamination incident helps to ensure that the response is timely and that the actions taken are appropriate.

Notification Procedures, Roles, and Responsibilities

The first laboratory that agrees to manage the samples or testing data from a contamination incident is the primary responding laboratory. This laboratory reports data to the ASR. The ASR reports data to IC along with any qualifications needed to make informed response decisions.

Contract Support Labs

Most utilities maintain contact with other utility and commercial laboratories to supplement in-house capabilities and ensure the availability of comprehensive analytical services. Laboratory resources can be accessed through the EPA's Compendium of Environmental Testing Laboratories (<https://cfext.epa.gov/cetl>), which provides access to the Environmental Resource Laboratory Network, the Water Laboratory Alliance, and contact information for multiple laboratories.

Regional and national agency support laboratories may be able to provide specialty testing support. These laboratories can be accessed through the utility's EPA regional drinking water coordinator. An agreement should be made with the regional coordinator as part of the planning process before the resources are needed.

External Laboratory Processes

When water utilities are able to safely collect samples, external laboratories are available to provide a broad range of rapid analyses for most categories of contaminants. Clear communication with the external laboratories must be considered in advance to prevent problems later.

Samples should be transferred to the support laboratory under chain of custody with the following key information:

- Analysis requested with method indicator
- Turnaround time requested
- Verbal results to ASR with follow-up electronic data using the EPA level III data package
- Reporting information: name, phone number, e-mail, address
- Basic ordering agreement or purchase order reference
- Billing address

It is important for the laboratory to analyze samples using established methods and QA/QC procedures that are accredited by an organization such as National Environmental Laboratory Accreditation Program, EPA, Department of Defense, or other agency recognized by the industry. Alternative rapid turnaround methods may be used if results are reported as screening data, the approach is approved by the ASR, and simultaneous testing is conducted using an approved method. An agreement should be made with the laboratory as part of the planning process before the resources are needed.

Sample results are confidential and are reported, after QA/QC review by laboratory supervisory staff, to the ASR only. The ASR reports results directly to IC. Appropriate QA/QC results are reported with the test results.

Data Analysis and Management

The first line of data review and validation is conducted by the analyst as data are generated to ensure the data quality objectives and data quality indicators have been satisfied. These results are then reviewed by the field team or lab supervisor before reporting results to IC. Field results are reported to both the incident commander and the ASR. Laboratory results are reported to the ASR, who reports to IC. Results are confidential until they are evaluated, put into the overall response context, and released by the incident commander.

Data Review and Validation

Data verification is the process of evaluating the completeness, correctness, and conformance of a specific data set against the method, procedural, or contractual specifications.

All laboratory data generated for the S&A component follow a review process to ensure that the reported data are free of transcription and calculation errors. Data completeness, technical acceptance, and verification of method requirements are reviewed by each analyst as they complete a test procedure. Data completeness, project data quality needs, and other requirements are then reviewed by the laboratory supervisor or other authorized personnel. Data calculations and formulas for each test method are presented in their respective SOPs.

Once the data have been verified, they go through a data validation process to determine if the data quality goals established in the quality plans have been achieved. Data validation is an analyte-specific and sample-specific process that extends the evaluation of data beyond method, procedural, or contractual compliance (data verification) to determine the analytical quality of a specific data set.

To the extent possible, data are reported only if all QC measures are acceptable. Data that meet the data quality objectives, data quality indicators, and method-specific QA requirements are considered acceptable for project use if signed off by a laboratory supervisor. If validation results do not meet the requirements of the project, an exceptions notice and a judgment for limitations of data use are included in the site characterization report.

Sample results are confidential and are reported, after QA/QC review by laboratory management staff, to the ASR only. The ASR will report the results, with an interpretation of the data if appropriate, directly to Incident Command.

Data Storage, Security, and Archives

The site characterization report forms, notes, chain-of-custody documents, transport documents, and laboratory deliverables are archived in original hard copy form at the laboratory for at least 3 years. The analytical data are also be stored electronically on the laboratory information management system and archived for at least 3 years.

Recommendations and Conclusions

Enhanced field and laboratory capabilities to support the site characterization process gave PWD an effective tool for responding to a water quality incident. Site characterization proved to be a useful tool for evaluating threats, determining the extent of contamination, validating remediation efforts, and restoring consumer confidence in the water source.

PWD's BLS has substantial laboratory and field resources to support the site characterization process. Using its resources for site characterization, where possible, minimized the effort and expense required to enhance the program. Developing relationships, networks, and agreements with mutual support labs and agencies provided robust incident response capabilities without the high expense of developing advanced and specialty analytical capabilities internally.

A utility that serves a smaller population and does not have significant resources can custom fit its site characterization program. Smaller utilities can gain substantial site characterization capabilities by developing mutual support relationships and terms of agreement with other utilities, consultants, contract laboratories, and local, state, and federal agencies.

Abbreviations and Acronyms

ASR	Analytical services requestor
CM	Consequence Management
CWS	Contamination Warning System
BLS	Bureau of Laboratory Services
EPA	United States Environmental Protection Agency
ICS	Incident Command System
PWD	Philadelphia Water Department
QA	Quality assurance
QAPP	Quality Assurance Project Plan
QC	Quality control
S&A	Sampling and Analysis
SOP	Standard <i>operating procedure</i>
VOC	Volatile organic compound

References

- EPA. 2002. *EPA Guidance for Quality Assurance Project Plans (QA/G-5)*, EPA/240/R-2/009. December.
- EPA. 2003. "Response Protocol Toolbox: Planning for and Responding to Drinking Water Contamination Threats and Incidents—Interim Final. Module 3: Site Characterization and Sampling Guide." http://water.epa.gov/infrastructure/watersecurity/upload/2004_11_24_rptb_response_guidelines.pdf (January 2013)

Bibliography

Additional information on PWD's S&A design and implementation can be found at the following sources:

- Aspa, C., G. Burlingame, E. Hedrick, R. Miller, T. Maloney, and C. Sanchez. 2011. "Sampling and Analysis for Contamination Warning Systems—A Comparison of Effective and Sustainable Designs by WSi Pilots." 2011 AWWA Water Security Congress. Nashville, TN.
- Burlingame, G. 2010. "A Water Utility's Response to Possible Water Contamination." Sampling and Site Characterization (CD-ROM)
- Burlingame, G., T. Maloney, and C. Wiggins. 2011. "Development of a Hydrant Sampling Program for Triggered Sampling." 2011 AWWA WQTC. Phoenix, AZ.
- Burlingame, G., C. Ogino, and C. Wiggins. 2012. "Responding to Contamination: Where Do I Sample?" *Opflow*, 38(3):10-13. March.
- Consolvo, J. and T. Maloney. 2011. "Using Fire Hydrant Samples for Contaminant Detection, Tracking, and Remediation." 2011 AWWA Water Security Congress. Nashville, TN.
- Consolvo, J., A. Turner, and C. Wiggins. 2012. "Using Baseline Water Quality Data to Establish Control Limits to Identify Water Contamination." 2012 AWWA WQTC. Toronto, ON.
- Eyring, A. 2012. "Using a Portable UV-Vis Probe for Detecting Contamination Events." 2012 AWWA Water Security Congress, St. Louis, MO.
- Wiggins, C, A. Turner, and J. Consolvo. 2012. "Using Baseline Water Quality Data to Establish Control Limits to Identify Water Contamination." 2012 AWWA Water Quality Technology Conference. Toronto, ON.

DISCLAIMER

This white paper was prepared under an EPA Water Security initiative grant awarded to Philadelphia Water Department. Neither Philadelphia Water Department nor CH2M HILL makes any warranty, expressed or implied, or assumes any legal liability or responsibility for any third party's use, or the results of such use, or any information, apparatus, product, or process disclosed in this publication, or represents that its use by such third party would not infringe privately owned rights.

WATER QUALITY INCIDENT SITE CHARACTERIZATION REPORT



Site Description: _____

Date/Time: _____

Sample Location: _____

Initial Responder Name: _____

Team Members: _____

If non-routine task suggests suspicious activity (e.g. unidentified or abandoned vehicle, person loitering near waterway facilities or locked gates, person dumping materials, climbing on fences or water tanks, etc.) immediately contact 911 and move away to safe area.

INITIAL OBSERVATION AND ASSESSMENT OF IMMEDIATE HAZARDS

- Unauthorized individuals present at the site
- Fire or other obvious hazard
- Signs of a potential explosive hazard (e.g. devices with exposed wires)
- Signs of potential chemical hazard (e.g. dead animals, unusual fogs, and unusual odors)
- Unusual and unexplained equipment at the site
- Field safety screening indicates unsafe condition (radiological or chemical)
- Other signs of immediate hazard _____

Was IWU called for confined space entry testing? YES NO

Approval to Proceed with Site Characterization? YES NO **Authorization from:** _____ **Date/Time:** _____

SITE CHARACTERIZATION

Weather Conditions at Site: _____

Upon arrival at the site do you observe any of the following conditions? Please check all that apply. If any conditions observed are not listed please write additional observations in the comment section.

Type of Facility

- River/creek
- Raw Water Basin
- Treatment Plant
- Clear Well
- Storage Tank
- Covered Storage Reservoir
- Pump Station
- Distribution Main
- Hydrant
- Customer Premise
- Service Connection
- Other _____

Signs of Hazards

- NONE
- Unexplained dead or stressed vegetation
- Unexplained liquids
- Unexplained dead animals
- Unexplained clouds or vapors
- Other _____

Unexplained or Unusual Odors

- NONE
- Sulfur
- Sweet/Fruity
- Pungent
- Skunky
- New mown hay
- Irritating
- Bitter Almond
- Other _____ Describe unusual odor _____

Unusual Vehicles Found at Site

- NONE
 - Car/sedan
 - SUV
 - Pickup Truck
 - Flatbed Truck
 - Construction Vehicle
 - Van
 - Other _____
- Describe vehicle (including make/model/year/color, license plate# and logos or markings) _____

Signs of Tampering

- NONE
- Open/Damaged gates, doors, or window
- Cut locks/fences
- Missing/damaged equipment
- Open/damaged access hatches
- Facility in disarray
- Other _____

Signs of sequential intrusion (e.g., locks removed from a gate and hatch) Yes No

Describe signs of tampering _____

Unusual Containers

- NONE
- Drum/Barrel
- Bottle/Jar
- Pressurized cylinder
- Bulk Container
- Box/Bin
- Plastic Bag
- Test Tube
- Other _____

Condition of container: Opened Unopened New Old Damaged/leaking Intact/Dry

Describe labeling on container: _____

Describe visible contents of container _____

Other Observations

What other Units are on Site? _____

Were SmartStrips worn? Yes No

Was Any Safety Screen Alarmed on Site? Yes No

Report all findings of site investigation to supervisor.

Approval to proceed with sample collection? YES NO **Authorization from:** _____ **Date/Time:** _____

WATER QUALITY INCIDENT SITE CHARACTERIZATION REPORT



Site Description: _____

Date/Time: _____

Sample Location: _____

Initial Responder Name: _____

Team Members: _____

RAPID WATER QUALITY TESTING RESULTS

Parameter	Units	Meter/Kit	Meter/Kit ID	Time	Results	Trigger
pH	units	YSI 556				<6.5 or >7.8
Conductivity	µS/cm	YSI 556				>600
Temperature	°C	YSI 556				>/< baseline
Dissolved oxygen	mg/L	YSI 556				>4
Turbidity	NTU					> baseline
Total chlorine residual	mg/L	HACH DR890				< baseline
Ammonia-N	mg/L	HACH DR890				>0.5
Cyanide	mg/L	HACH DR 890				detected
Iron	mg/L	HACH DR890				> 0.1
Manganese	mg/L	HACH DR890				> baseline
Nitrite	mg/L	HACH DR890				>0.5
Nitrate	mg/L	HACH DR890				>5
Sulfates	mg/L	HACH DR890				>100

Comments

Response Team Leader:

Phone number:

PRINT NAME

EMPLOYEE #

WATER QUALITY INCIDENT SITE CHARACTERIZATION PLAN



INITIAL INFORMATION CONCERNING INVESTIGATION SITE

Site Name: _____

Date/Time: _____

Site Location: _____

Initial Observer: _____

Type of Facility

- | | | | | |
|--|--|--|--|---------------------------------------|
| <input type="checkbox"/> River/creek | <input type="checkbox"/> Raw Water Basin | <input type="checkbox"/> Treatment Plant | <input type="checkbox"/> Clear Well | <input type="checkbox"/> Storage Tank |
| <input type="checkbox"/> Pump Station | <input type="checkbox"/> Distribution Main | <input type="checkbox"/> Hydrant | <input type="checkbox"/> Covered Storage Reservoir | |
| <input type="checkbox"/> Service Connection <input type="checkbox"/> Other (Please specify): _____ | | | | |

Type of Contamination Event

- Customer Complaint Backflow Event Fish Kill Spill in Watershed
 Other: _____

INCIDENT RESPONSE PERSONNEL

PWD Incident Commander

Name: _____

Phone #: _____

Site Characterization Team

Team Leader: _____ Phone# _____

Water Quality Specialist: _____ Phone# _____

BLS Supervisor/Manager

Name: _____

Phone #: _____

Water Quality Specialist: _____ Phone# _____

Other Members:

Name: _____ Phone #: _____ Affiliation: _____

Name: _____ Phone #: _____ Affiliation: _____

INITIAL HAZARD ASSESSMENT

Are there any indicators of an explosive hazard? Yes No

If "Yes" notify law enforcement and do not send a team to the site.

Initial Hazard Characterization

- Routine Chemical hazard Biological hazard Radiological hazard (use Ludlum)
 Confined Space (Call IWU-Industrial Waste Unit)

If the initial hazard assessment indicates a chemical, radiological or biological hazard, only teams with appropriate response training should be sent to the site.

Standard Response Supplies Checklist

Mgmt ✓	Sample Team ✓	Type
		BLS Sample Bottle Kit
		LL Sample Bottle Kit
		Site Characterization Binder
		General Supplies Kit
		Decon Kit
		PPE Kit (see PPE Checklist)
		Meters and Reagents
		Digital or disposable camera
		Cell phone and charger
		Ice in separate bags
		Maps

Personal Protective Equipment (PPE) Checklist

Mgmt ✓	Sample Team ✓	PPE	Type	Quantity
		Safety Glasses		
		Goggles		
		Face Shield		
		Gloves		
		Waders		
		Boots		
		Hard hat		
		HazMat Smart Strips		

WATER QUALITY INCIDENT SITE CHARACTERIZATION PLAN



Rapid Field Testing Checklist

Mgmt ✓	Sample Team ✓	Parameter	Meter/Kit
		Visual Inspection	NA
		pH	YSI 556
		Conductivity	YSI 556
		Temperature	YSI 556
		Dissolved oxygen	YSI 556
		Turbidity	HACH 2
		Total chlorine residual	HACH DR890
		Ammonia-N	HACH DR890
		Cyanide	HACH DR890
		Iron	HACH DR890
		Manganese	HACH DR890
		Nitrite	HACH DR890
		Nitrate	HACH DR890
		Sulfate	HACH DR890
		UV-254	s::can
		VOCs	Hapsite ER

Sample Collection Checklist

Mgmt ✓	Sample Team ✓	Analyte Group	No. of Samples or Locations	No. of Coolers per location	Total Coolers
		LL Sample Bottle Kit		2/Sample Loc	
		BLS Sample Bottle Kit		1/Sample Loc	
		BLS Empty Cooler (for bulk sample)		1/Sample Loc	
		Contract Lab Sample Bottle Kit		1/Sample Loc	

Contract Lab Sample Handling Instructions

Name of Lab/Recipient: _____

Phone #: _____ Fax #: _____

Address: _____

Special storage & security precautions or instructions: _____

Sign-off:

BLS Supervisor/Manager: _____ Initial: _____ Date: _____

Site Characterization Team Leader: _____ Initial: _____ Date: _____