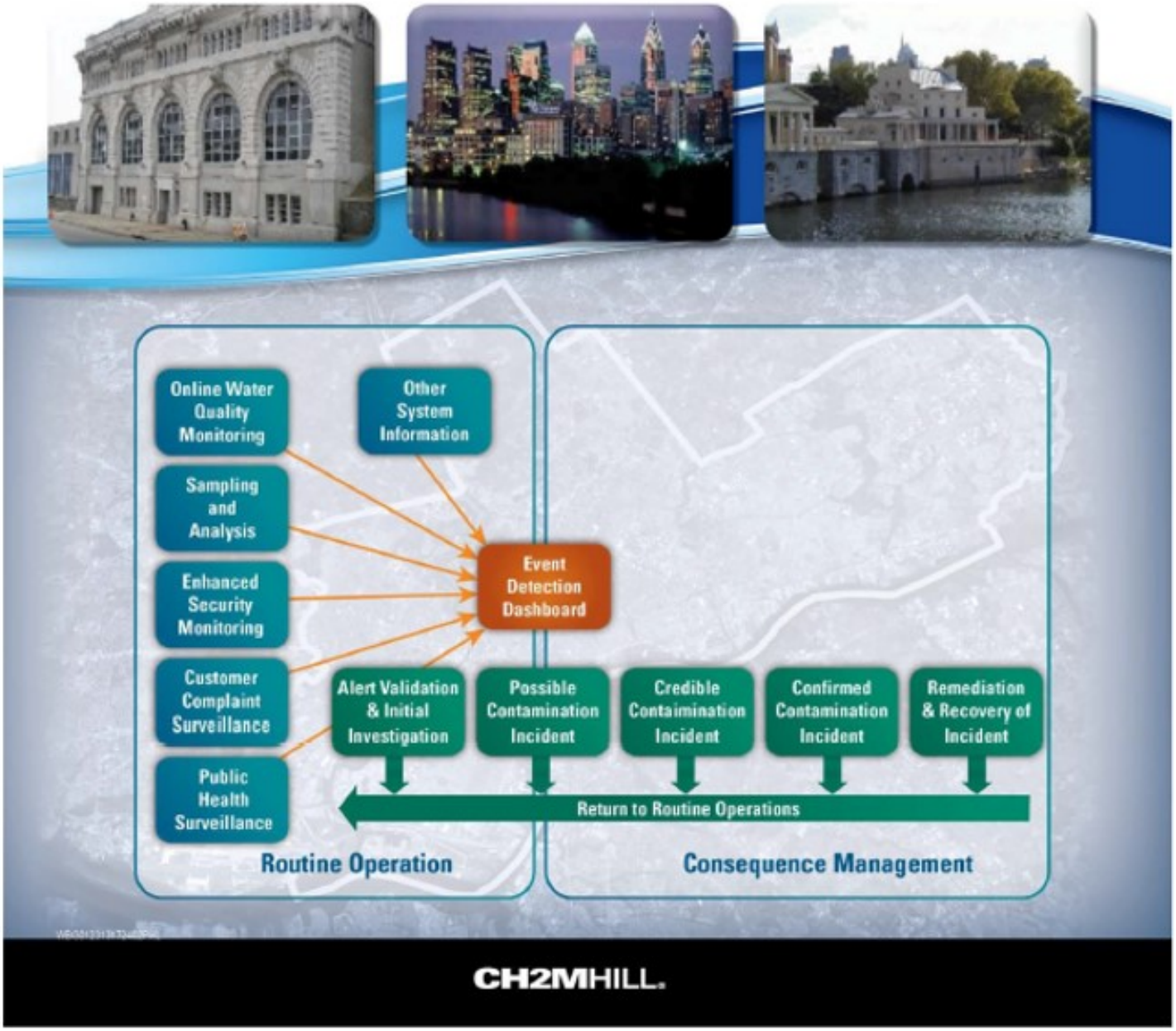
May 2013

Philadelphia Water Department
Contamination Warning System Demonstration Pilot Project:

Public Health Surveillance



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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). Public Health Surveillance (PHS) is a component of a CWS that supports the detection of contamination in the water distribution system through surveillance of public health data that may be indicative of waterborne diseases. A close partnership between the water utility and public health department is integral to the identification and investigation of public health events with possible water contamination sources in a CWS.

This paper provides general information on PWD's experience in developing public health surveillance and the integrated business partnership with the Philadelphia Department of Public Health (PDPH), including reviewing operations, defining roles and responsibilities, identifying event detection algorithms, and applying integrated analysis among the CWS components. PHS supports water utility emergency response when an alert is escalated to a possible contamination event and above.

Project Background

PWD developed a comprehensive CWS for its drinking water system under a WS initiative grant. 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 by 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

The PHS component gathers and analyzes health-related data to identify patterns or changes that might indicate unusual disease incidence. Information from these systems constitutes an important dimension of a CWS by directly enhancing contaminant signal capabilities and by involving public health experts in threat analysis, response activities, communications, and consequence management. The overall objective of the PHS component is to enhance public health signal detection capabilities and enable integration of these signals with information from other project components to increase the overall sensitivity and reliability of contaminant detection in the water system.

Implementation of the PHS component involves partnering with the local health department(s) to integrate its routine surveillance and event detection with the other contamination warning system components. As the primary agency for public health protection in the City of Philadelphia, the Philadelphia Department of Public Health (PDPH) conducts surveillance, performs investigation, and responds to issues of public health concern. PDPH was a key partner in the implementation of the PHS component and will continue to assist in its maintenance. PDPH also participated in the exercises designed to utilize the CWS and test response activities.

CH2M HILL served as the project contractor and supported PWD in development of its CWS. CH2M HILL supported PWD and PDPH in the design, implementation, and evaluation of its PHS system.

Implementation

Communications

Assessing a utility's relationship with the public health department will allow utilities to understand the existing processes and the level of effort required to implement the PHS component of a CWS. The first step in the process of implementing a PHS component is for the water utility's water quality group to reach out to its health department counterpart and to develop a communication protocol between the departments. The plan should identify the primary groups/personnel within the health department that will be involved in the PHS component, either during incident investigation or response activities. Meetings and workshops should be conducted to assess communication protocols within the health department and between the departments as a gap analysis of existing systems as they relate to the CWS.

The communication process between PWD and PDPH was already established in a Water Quality Event & Microbial Communication Plan. This Plan was developed as a guide for communicating concerns about microbiological contaminants and acute health risks associated with the drinking water. The Plan also includes a protocol for those conditions that require alerts between the two agencies and briefly discusses response protocols (such as review of past surveillance data). PWD conducted a communications and assessment workshop to complete a gap analysis and document the results. No gaps were found or major changes necessary.

Roles and Responsibilities

The CWS provides a systematic process for identifying necessary staff roles for the implementation of the component. Identifying roles and responsibilities provides the formalization of partnerships and documentation of business processes.

It is important to consider the staffing and training necessary to implement the PHS component. Multiple responsibilities can be assigned to personnel if resources are limited. In the routine operations of the local health department, many detection and reporting tasks already occur. CWS initiates the responsibilities to provide a system to integrate the existing health data with other CWS components and provide clear communication and business protocols between partner agencies. Responsibilities developed through the CWS project for the health department would include public health alert assessment and communication to the water department. The water department would be responsible for integrating the data across components and communication with the health department. Some water utilities will have to work with multiple health departments to cover all the roles and responsibilities identified. Table 1 lists the key roles defined as part of the PHS component for the CWS project.

Surveillance Systems

For effective implementation of the PHS component, the health department should have a surveillance system for collection, analysis, and interpretation of health-related data. An effective public health surveillance system should perform the following functions (World Health Organization 2013):

- Detection and notification of health events
- Collection and consolidation of pertinent data
- Investigation and confirmation (epidemiological, clinical, laboratory) of cases or outbreaks
- Routine analysis and creation of reports
- Feedback of information to those providing the data
- Feed-forward (i.e., the forwarding of data to more central levels)
- Reporting data to the next administrative level

TABLE 1
Key PHS Roles and Responsibilities

Agency	Role/Responsibility
Health Department Epidemiologists	Perform routine analysis of reportable disease surveillance stream.
Environmental Health Services/ Health Department Epidemiologists/ Water Department	Investigate abnormalities through interviews and field work.
Environmental Health Services/ Water Department	Inspect water systems within private facilities for contamination.
Environmental Health Services	Inspect food services for contamination.
Environmental Health Services / Water Department	Provide notifications to inspected properties (e.g., notifying restaurants of a boil water alert).
Health Department Planners/Water Department	Develop and issue messages to the public.
Health Department Planners and Epidemiologists	Draft messages to distribute through the health alert network.
Health Department Administrators	Administer health alert network.
Health Department/Water Department/Mayor	Approve messages to media/public.
Public Health Laboratory	Provide general microbiology laboratory support and specimen collection supplies. Support investigation of and response to public health incident. Provide laboratory investigative support for a mass casualty incident involving a chemical or disease.
Health Department	Provide staff and material resources to support public health response.
Health Department Information Technology Technicians/Water Department technicians	Information technology support for data transfers from the health department to the water utility. Configure and manage CWS dashboard access rights, data layers, tool-boxes, queries, etc.
Water Quality Group in Water Department	Investigate validated alerts generated by the health department.
Water Quality Group in Water Department	Escalate investigation to Upper Management if alert is validated and cannot be explained by routine or benign causes.
Water Department, Upper Management	Determines whether to activate the consequence management plan based on incident details.

PWD and PDPH attended a 2-day workshop to discuss and better understand PDPH's information systems and to analyze the reportable disease surveillance process, the communicable diseases management system and syndromic surveillance data streams. PDPH's reportable disease surveillance data are managed by an Electronic Disease Surveillance System known as the Communicable Disease Management System (CDMS), a Maven 4.0 system, which PDPH implemented as part of the CWS project. Syndromic surveillance data are processed by custom SAS scripts that PDPH developed in-house and are stored in an SAS archive.

PWD and PDPH recommend that health departments identify all reportable diseases, conditions, and syndromic data that may relate to the CWS before implementing it. The following are suggestions that could facilitate an epidemiology program for CWS purposes:

- Identify all reportable diseases, conditions, and syndromic data that may relate to the CWS before implementation.
- Conduct reportable disease surveillance following the standards set by National Notifiable Disease Surveillance System.
- Monitor and record reports from hospitals, doctors' offices, school nurses, or other health providers suspecting a disease.

Health departments can request laboratory tests from health care providers or can order reference testing and obtain additional reports based on clinical signs and symptoms.

- Assign investigators to ascertain clinical and risk factor information, follow up on laboratory results, and carry out any relevant public health actions pertaining to the case report.
- Investigations may include calling and speaking to the case-patient and clinicians, gathering more information on symptoms and other health information, conducting field interviews if necessary, and recording the information in the surveillance system.
- Develop forms to guide field investigation. Example case investigation forms are appended at the end of this paper.
- Monitor the progress of case investigations in surveillance systems through customized reports and workflows.
- Perform periodic statistical analysis on the data to generate trend reports.
- Use a geographic information system to detect spatial patterns.
- Include information on the chief complaint, age, gender, and zip code in surveillance of complaint data from local hospital emergency departments.
- Identify syndromes of interest and analyze syndromic data daily to develop trends and to identify any anomalies.

Development of Operational Strategy

The purpose of the operational strategy (OS), also known as "concept of operations," is twofold. First, it defines how users monitor and initially respond to component alerts, and second, it provides standard operating procedures for day-to-day operations to minimize response times to potential contamination incidents.

The OS development throughout the PWD CWS project was based on the EPA's *Water Security Initiative: Interim Guidance on Developing an Operational Strategy for Contamination Warning Systems* (2008). The OS is defined through the development of the following:

- PHS data overview
- Roles and responsibilities
- Process flow and information flow diagrams
- Response timeline
- Checklists

The PHS OS presents the process for when a health department notices anomalies that may indicate potential contamination of the water supply. The type of information analyzed by the PHS component includes communicable disease reports, syndromic surveillance data, biochemical incidents, and over-the-counter drug sales. If the health department generates an alert, it would be escalated to the decision-making authority for review and further escalated to upper management if necessary.

A general outline of the PHS operational process includes the following steps using the health data collected regularly through the assessment for abnormalities and notification of alarming trends:

- Analyze different data streams (e.g., notifiable disease data and syndromic data) with statistical analysis tools.
- Note abnormal trends in the data, and conduct additional investigation (public health alert).
- Determine whether alert conditions might be caused by the water supply.
- Notify the water utility of public health alert, and seek assistance from them in field investigation.
- Report results, status, and recommendations to upper management.

Specific questions regarding drinking water source are asked in the investigation of all enteric and waterborne diseases and recorded on a form. A Waterborne Illness Division of Disease Control Environmental Health Services (EHS) Inspection Checklist is appended at the end of this paper.

Development of Event Detection Algorithms

The raw data from each component of a CWS system are subjected to an event detection algorithm (EDA) that identifies deviations and anomalies in the data stream that can indicate possible water contamination. Tools that support EDA development at a public health department can include custom-built programs and data management systems. After being processed by individual component EDAs, the output (an alert) is sent to a central platform. PWD developed a centralized data system called the CWS dashboard. PWD staff use the dashboard to review all components to determine whether a water contamination event has occurred and to facilitate appropriate response and consequence management actions.

PWD decided to use PDPH's in-house EDA for CWS purposes as PDPH has the technical skill and established methods to analyze alerts and to identify possible water quality events. Each public health department has internal capabilities for alert identification and can use the same for CWS purposes. The communication of the public health alerts to the water utility may require changes to existing reports to include reportable diseases and conditions with potential waterborne etiology. Because the time lag for data to be reported to the dashboard is longer because of the nature of public health data, delivering public health alerts in near real time can be challenging for health departments.

The PDPH alert process includes weekly investigation of potential disease increases. Epidemiologists review communicable disease reports reported in the past week and compare the number of new cases for the current week and the past 4 weeks to the 5-year average using a set SAS program. When the number of new cases exceeds the historical average by more than 2 standard deviations, the increase is further investigated for case commonalities. This review process alerts epidemiologists to potential outbreaks or conditions that may warrant heightened surveillance actions. There are no fixed alert levels for diseases related to waterborne pathogens. Each suspected case is evaluated individually for public health implications.

PDPH utilizes spatial-temporal scan statistics software, SatScan, to analyze syndromic data. At the heart of the SatScan software is a cumulative sum control chart (CUSUM), a method of anomaly detection algorithms, that detects alarms at three levels:

- C1 alarm (acute, 1-day increase)
- C2 alarm (acute, 1-day or continuous increase)
- C3 alarm (ongoing increase)

Integration with the Dashboard

Public health alert information related to CWS can be shared with the water utility via the CWS Dashboard. It is important for the health and water departments to understand that certain limitations are imposed on sharing health data to maintain confidentiality. Public health alerts on the CWS Dashboard provide at-a-glance component status and visualization of public health data in a spatial context. PWD and PDPH recommend that the CWS Dashboard be Web-based to provide remote access to multiple users.

If the health department is unable to implement a CWS Dashboard, alert information can be shared with water department counterparts by telephone or e-mail. Alert information should include complaint type, alert date, zip code, and number of cases reported. Weekly trend reports can be sent by e-mail to water quality group personnel to familiarize them with health data.

Review and Evaluation

Metrics Development

The goal of review and evaluation is to demonstrate how well the CWS, along with each of its components, meets the design objectives as identified by EPA:

- Contaminant coverage to detect a broad spectrum of contaminant classes
- Spatial coverage to achieve aerial coverage of the entire distribution system

- Timeliness of detection to detect contamination in sufficient time for effective response
- Operational reliability to maintain a functional system that reliably generates complete and accurate data
- Alert occurrence to indicate a contamination incident with a minimum number of false positives
- Sustainable architecture to monitor distribution system water quality

It is suggested that a systematic evaluation of each component be performed to achieve the above-listed objectives. EPA suggests two evaluation techniques: field evaluations and data analysis. Field evaluations include drills and exercises, direct observation and performance testing, and staff interviews. Data analysis and integration require statistical, time series, or other analysis of data. Methods used to analyze data may vary widely depending on the nature of the data and the component, from relatively simple methods to advanced categorical data analysis methods using complex regression models.

The health department should focus on developing metrics to evaluate its surveillance system. These metrics will provide a dual benefit for both the health department and the water utility through improved and timely data collection. Below are some recommended ideas on developing metrics:

- Develop general metrics based on CWS design objectives.
- Identify an appropriate evaluation method for each metric. The evaluation method describes how the necessary information will be gathered to characterize each of the metrics; for example, literature review, data analysis, discussion-based and operational exercises, laboratory studies, and forums.
- Identify a data source for each metric.
- Identify employees responsible for collecting data and evaluating the metrics.
- Develop periodic performance reports with summary of metrics, descriptions of events, modifications to the system, and recommendations for improvement.

Table 2 lists the recommended metrics evaluated by PWD and PDPH.

TABLE 2
Recommended Evaluation Metrics

Operational Mode	PHS Metric	Description
Operation	Data completeness	Validity of data captured in the disease management system.
Performance	Reliability	Adoption of operational strategy during drills and exercises.
Performance	Timeliness specimen collection and laboratory results, field investigations by Environmental Health	Time taken by utility personnel to respond to field investigations.
Performance	Timeliness alert investigation	Time taken by utility personnel to complete respond to events.
Sustainability	Acceptability	Usability of the disease management system.
Sustainability	Cost	Capital cost of PHS component software, operation, and maintenance costs to sustain the component.

Training and Exercises

Training for the public health and water utility staff with CWS responsibilities should include component-specific operations as well as project-wide technology (dashboard) and Incident Command Structure/National Incident Management System. Training is a continual process, and periodic training and exercises should be provided for users. Health departments can choose to incorporate CWS-related exercises into their public health emergency preparedness activities.

The purpose of exercises is to give participants an opportunity to perform duties set forth in the OS and Consequence Management Plan. Implementation of the procedures can be evaluated during a simulated contamination scenario to identify gaps in planning, training, interagency communication, and resources. The scenario that was developed for PHS was to provide participating players the opportunity to interact in response to a potential public health impact that possibly originated from the water system. All exercises conducted during the PWD CWS project were in compliance with the Homeland Security Exercise and Evaluation Program and used the Target Capabilities List to select exercise objectives. Recommendations based on Exercise Evaluation Guides and participant feedback should be used to make necessary changes to health department and water utility operations.

Conclusions and Recommendations

Potential system enhancements and required modifications can sometimes be identified only after assessing the implemented CWS. Based on PWD's review and evaluation of the PHS process flow and feedback gathered from training and exercises, minor changes were made to the process flow for optimal performance of the system. Enhancements and modifications made to PWD's process flow are listed below for the benefit of other utilities:

- PDPH had no standard documentation procedures to record field investigation data and no formalized process established to engage PWD in PDPH investigations. A formal operational strategy was developed for the two agencies, thus providing a comprehensive, step-by-step process flow for handling water related alerts by either agency. A waterborne illness form was developed to record field investigation data by PDPH (appended to the end of this paper).
- Risk factor information specifically leading to Water Quality Investigations was added to the PDPH surveillance system database.
- Collection of review and evaluation metrics for CWS resulted in better documentation of PDPH response times.
- PWD and PDPH decided to co-investigate reports of illness if water is suspected to efficiently utilize each other's expertise.
- PDPH laboratory capabilities have enhanced coordination with PWD, for example, PDPH can use PWD labs for tracking water quality that may inform *Legionella* investigations.

Lessons learned in designing and implementing the PHS component of the CWS project are summarized below:

- Working closely with the PDPH organization to develop the Non-Analytical Quality Assurance Project Plan proved significantly advantageous to the project team in understanding the level of effort involved in engaging external partners and also in understanding PDPH's operational strategy.
- PDPH's operational strategy did not allow for tracking average response times for investigations as anticipated at the beginning of the project.
- The Environmental Health Services unit should have been involved at an earlier stage in the project. Involving them earlier may have avoided multiple iterations of the OS.
- PDPH needed to standardize documentation procedures to record field investigation data. An illness intake form was developed as a part of the effort to formalize a portion of the PDPH data collection process.
- The PWD team is working with real-time data on other components such as Online Water Quality Monitoring and Enhanced Security Monitoring, and has access to Customer Complaint Surveillance nearly real time. With PHS, the time lag for data to actually appear on the CWS dashboard is a factor that needs to be considered when developing the OS and determining the way that PHS data are to be used in consequence management.
- PDPH and PWD historically have worked closely together. The CWS grant has given both departments the opportunity to strengthen this relationship (and improve communications), giving each a better understanding of their respective roles and responsibilities.
- Integration of the PHS data streams was easier compared to other components as event detection existed at PDPH, and PDPH had already established alert levels specific to waterborne diseases.

- Although the ease of integration was mentioned, only a limited amount of data that PDPH collects can be related to a CWS; therefore, the type of data being integrated into the CWS dashboard is limited. However, PDPH now has an integrated Web-based platform to review water-related outbreaks against the water distribution system.
- Review and evaluation metrics developed at the beginning of the project proved not to be as critical as the project progressed.
- Response partner agencies like PDPH should have been involved at an earlier stage in developing the PWD's Consequence Management Plan.
- Improved communication and coordination between PDPH and PWD led to a better understanding and sharing of laboratory capabilities.
- Some necessary roles and responsibilities became apparent during exercises. For example, PWD realized the importance of including an EHS sanitarian in the site characterization team, as EHS has the authority to enter a facility and make water use restrictions.

PWD and PDPH have identified and prioritized critical elements of the PHS component to allow utilities to direct resources, time, and energy to the issues that are most critical and practical to address. Below are the critical elements in order of priority.

1. Water utilities should reach out to their health department counterparts.
2. Water utilities should establish strong relations with the health department. Assessing the health department capabilities will allow water utilities to understand the processes and level of effort required to implement the PHS component of a CWS.
3. Standard documentation procedures should be developed to record field investigation data and a formal OS for the two agencies. This will result in a comprehensive step-by-step process flow for handling water-related alerts by either agency.
4. Custom reports of surveillance data for diseases with possible waterborne etiology should be developed.
5. A data management system should be procured to improve data collection and analysis and to ease integration of PHS data streams with the CWS dashboard.

Abbreviations and Acronyms

CDMS	Communicable Diseases Management System
CUSUM	Cumulative sum control chart
CWS	Contamination Warning System
EDA	Event Detection Algorithm
EHS	Environmental Health Services
EPA	United States Environmental Protection Agency
OS	Operational Strategy
PDPH	Philadelphia Department of Public Health
PHS	Public Health Surveillance
PWD	Philadelphia Water Department
WS	Water Security

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Additional information on PWD's PHS development and implementation can be found at the following sources:

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DIVISION OF DISEASE CONTROL
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Illness Intake form
DDC -EHS Inspection Checklist

General Information

Reporters Name	Reporter's Phone Number	Date of Report
		___/____/___

Suspected Source of Illness	Suspected Etiology (Bacteria, Toxin)	Dates of Interest

Facility/Residence Name	Facility Type	Facility/Residence Address	Facility Phone Number
	☐ Private Residence ☐ Restaurant ☐ School ☐Day care ☐Long Term Care Facility		

PDPH contact:	Title/Position of PDPH Contact:

Clinical information

1. What is the nature of your complaint?
   _____

   _____

2. Please describe symptoms
   ☐Nausea ☐Diarrhea ☐ Vomiting ☐ Fever ☐ Other _____

3. Number of persons affected_____

4. Has anyone been seen by a health care provider? ☐ Yes ☐ No ☐ Unknown

   If yes, Name of(s) Health care provider _____

   Address_____ _____

   Phone _____

5. Has anyone been hospitalized? ☐ Yes ☐ No ☐ Unknown

   If yes, Name(s) of hospital: _____ How long? _____days

Exposures

1. Is there a facility related to the symptoms? ☐ Yes (If yes, proceed to Q) ☐ No ☐ Unknown
2. How many people reside or work in the facility? _____
3. Are there other people in the facility who are sick? _____
4. Did you attend any large gatherings the week before your illness? (e.g., wedding reception, showers, church events, clubs, school events, athletic events, office parties or banquets, parties, festivals, fairs)

   If yes, what events?

   Event 1: _____location: _____When? ____ / ____ / ____

   Contact person _____

   Event 2: _____location:_____ When? ____ / ____ / ____

   Contact person _____
5. Did you travel anywhere during the seven days before your illness?

   If yes, where? _____When? ____ / ____ / ____ to ____ / ____ / ____
6. Where did you shop for groceries eaten during the week before your illness?

   _____
7. Did you eat in any restaurants during the seven days before your illness? ☐ Yes ☐ No

   If Yes, List the restaurants:

   Name _____Address _____

   Name _____Address _____

   Name _____Address _____
8. From what sources of water did you drink during the seven days before your illness?

   Municipal tap water ☐ Yes ☐ Other ☐ Unknown (**If Yes, Proceed to section Municipal Tap Water)**

   If other, **proceed to section Other Sources**
9. Were you exposed to recreational water during the seven days before your illness?

If yes, where?	Ocean/sea	Y	N	*If yes:* Location_____
	Pool	Y	N	*If yes:* Location_____
	Note! : If yes, please fill out the pool inspection form.			
	Lake	Y	N	*If yes:* Location_____
	Pond	Y	N	*If yes:* Location_____
	River	Y	N	*If yes:* Location_____
	Other	Y	N	*If yes:* Location_____

NOTE: If the source is identified as associated with drinking water proceed to the sections below. If the source of contamination is identified as food from customer feedback, use a food borne illness form to complete the investigation.

Drinking water

1. Did anyone notice any difference in the tap water shortly before you became sick? _____

   a. If yes, how was it different? _____

2. Where did you drink the tap water? _____

3. *For PDPH use only:* Additional investigation required? ☐ Yes ☐ No

   ! If Yes, Proceed to the On-Site Investigation Form

4. From what sources of water did you drink during the seven days before your illness?

   Private well water ☐ Yes □ No □ Unknown

   Untreated water (river, spring, lake) ☐ Yes ☐ No ☐ Unknown

   Bottled water ☐ Yes ☐ No ☐ Unknown If Yes, Which brand? _____

   Work place ☐ Yes ☐ No ☐ Unknown

   Other _____

Complaint Resolution (for PDPH Use Only)

☐ Isolate complaint
☐ Referral to EHS
☐ DDC Investigation- Outbreak code/file path : _____
☐ Referral to PWD

Notes

Philadelphia Department of Public Health
Environmental Health Services

Sanitation and Safety Record
for Swimming Places

PERSON INTERVIEWED / TITLE

DESCRIPTION

ID NUMBER

TRADE NAME

Type Est. 41 ☐ 42 ☐ 43 ☐

Telephone Number

Time In AM ☐ PM ☐

ADDRESS

HD Sub-D CenTract

DO Telephone No.

Time Out AM ☐ PM ☐

PERMITTEE

Action: Initial ☐ Follow-Up ☐ Complaint ☐ Other ☐

Total Inspection Time 1 ☐ 2 ☐ 3 ☐ 4 ☐ 00 05 10 15 20 25 30 35 40 45 50 55

UNSATISFACTORY ☐ Chlorine ☐ Bromine

WATER QUALITY

15 00			0 <.4 .4 .8 1.0 >5.0 Deep ☐
16 00			0 <.4 .4 .8 1.0 >5.0 Shallow ☐
17 pH			<7.2 7.2 7.4 7.6 >8.2 ☐
18			Temperature F (Indoor only)
19			Water Supply
20			Waste Water
21			Clarity - Surface
22			Chemical Test Kit
23			Daily Log

RECIRCULATION SYSTEM

24		Haircatcher
25		Pump
26		Filters & Media
27		Pressure Gauges
28		Chemical Feeders
29		Chemicals
30		Flow Meter
31		Recirculation Rate
32		Sight Glass
33		Water Heater
34		Piping System

UNSATISFACTORY

POOL

35		Premises
36		Decks, Walls, Bottom
37		Drains
38		Depth Markings
39		Diving Board
40		Water Level
41		Ladders, Steps, Railings

HEALTH and SAFETY

42		Supervision
43		First Aid, Sores
44		Bather Load
45		Bathing Suit Sanitation
46		Common Cups, Combs, Etc.
47		Rescue Equipment
48		Housekeeping-Waste Disposal
49		Fencing or Enclosure
50		Electric Hazards
51		Floors, Walls, Ceilings

FACILITIES

52		Toilets 1/60-Male 1/40-Female
53		Dressing and Locker Rooms
54		Shower Rooms
55		Wash Basins
56		Lighting
57		Ventilation
58		Food Service

UNSATISFACTORY

59		Telephone-Emergency Number
60		Permit Posted
61		Regulations Posted
62		Electrical Certificate Posted
63		Laboratory Records
64	Samples	☐ Yes ☐ No
65	Reinspection	☐ Yes ☐ No

No. of Violations	Sanitarian Number	Date
1 2 3 4 5 6 7 8 9 0 None ☐	1 2 3 4 5 6 7 8 9 0	1 2 3 4 5 6 7 8 9 0

Sample Identification Number(s):

Item No.		Recommendation	Correct by
			/
			/
			/
			/
			/
			/
			/
			/

SIGNATURE

Sanitarian

Continuation Sheet

PHILADELPHIA Department of Public Health	**DIVISION OF DISEASE CONTROL** **ACUTE COMMUNICABLE DISEASE CONTROL PROGRAM** **Telephone (215) 685-6748 Fax (215) 545-8362**	**Waterborne Illness** **On site Investigation Form**

Observations about potable water (please check one):

☐ Bad Taste/Odor, Explain :	☐ Particles in water	☐ Rusty/Brown color
☐ Unusual in appearance	☐ Discolored	☐ Loss of water

Is the problem occurring now? ☐ Yes ☐ No	When did it begin? _____/_____/_____ (mm/dd/yyyy)

Where is it occurring? ☐ One Tap ☐ Multiple Taps ☐ Every Tap ☐ Observations on occurrence in multi level facilities:

What is it affecting? ☐ Hot Water ☐ Cold Water ☐ Both

Point of use device? ☐ Whole house filter ☐ Under the sink filter ☐ Tap filter ☐ Water softener ☐ Other

Backflow Preventer Present? ☐ Yes ☐ No	Backflow preventer last Inspected ____/_____/____

Cross Connection Found? ☐ Yes ☐ No

Observations of loss of water or water pressure? ☐ Yes ☐ No

Observations of any construction or street work done recently? ☐ Yes ☐ No

Observations of plumbing work done recently? ☐ Yes ☐ No

Is the water contamination isolated to interior plumbing? ☐ Yes ☐ No
Note!: If No, contact PWD SRA immediately

Complaint resolved? ☐ Yes ☐ No	Sample collected? ☐ Yes ☐ No (Please follow the sampling instructions provided on the following page)

Sample delivered to PWD? ☐ Yes ☐ No Date _____ Time _____

On site Inspection Results/Notes:

Issues for resolution (if any) :

Signature of DSI/ EHS sanitarian	Date	Arrived:	Finished:

Sampling instructions

1. Determine the correct sampling faucet	**5. Sample Collection Wrap-up**
Ensure the tap is the one used for drinking/cooking.	• Inform the customer that PWD will telephone him/her with the results in about three working days. If unusual test results are found, PWD laboratory personnel will promptly contact the customer. • If the customer asks what they should do for water until they get the lab results, advise them to use their own judgment since we cannot guarantee the safety of any alternative water. • The phrases "Buy Bottled Water" and "Do Not Drink the Water" are to **NEVER BE USED** by PWD employees. • Keep the sample in a cooler, out of direct sunlight; take to the Lab immediately. • If you have reason to suspect that there is a serious problem, contact BLS (on-hour)or the Water Treatment Stand-by Engineer (Off-hours) immediately so that proper instructions can be given to the affected customer.
If the tap is "unusually dirty", sample from a different tap.	
2. If possible, remove the tap's aerator	
3. Turn on the cold water and allow to flush for at least 3 minutes.	
If customer objects to flushing, explain that it allows us to sample the water being supplied to their house, and not water sitting in their plumbing, which doesn't reflect the water we are delivering to them.	
4. Sample Collection	
Rinse the sample bottle at least three times before filling up.	

Water Quality Complaints - Comments and Instructions

Description	Possible Sources	Inform the Customer
Redish, Rusty, Brown	Nearby construction; recent plumbing work; occaisonal rusty surge of water. Confirm whether in hot only, cold only, or both.	The rusty/brown partcles are often caused by construction or repair work performed by PWD or other city agencies. Instruct them to flush their taps until the rust disappears. If the rust appears in only the hot water, it is most likely a hot water heater problem; instruct them to contact a plumber.
Cloudy	Cold water retains large amount of dissolved air; air stuck in household plumbing; temperture differences between the water and air.	Cold water retains a large amount of dissolved air and when it hits the heated interior of the house, it releases it in the form of many small air bubbles giving a milky appearance to the water. It is not harmful. If a glass of this milky water is allowed to sit for a few minutes, the water will clear.
Particles	Possible plumbing problem or old point-of-use device; Confirm whether in hot only, cold only, or both.	Inform the customer this couled be realted to an old point-of-use device (ie. A improperly mainted filter), stagnant plumbing (due to low use or radiators), a hot water heater that needs maintenance (Have a plumber exmaine and/or flush the hot water heater).

Taste and Odor Complaints - Comments and Instructions

Description	Possible Sources	Inform the Customer
Earthy, musty, cucumber	Seasonal growth of algae in rivers	People vary in sensitivity, some people won't even notice the odor and/or taste; Temporary problem usually in the Spring; Treatment plants alter treatment to eliminate odor.
swimming pool, bleachy, chlorine	Imparted by the disinfectant, a chloramine reisudal	Plants are required by state and federal regulations to add disinfectant, and people vary in sensitivity.
Sulfurous, rotten egg, fishy	Possible plumbing problem or old point-of-use device; Confirm whether in hot only, cold only, or both.	Inform the customer this could be related to an old point-of-use device (ie. a improperly mainted filter), stagnant plumbing (due to low use), a hot water heater that needs maintenance (have a plumber exmaine and/or flush the hot water heater), or a sink drain or basin trap that has dried out.
Musty, stale	Stagnant water	Flushing the plumbing and increasing water use should help; Lab will test for total chlorine to see if water is stagnant.
Chemical, solventy	Cross connection or backflow problem	Possible plumbing problem, cross connection should be eliminated and system should be flushed.
Plastic	Plastic pipe chemicals	This can be an issue with new pipe or with poorly made pipe and system should be flushed.