Homeland Security Review Of Small Public Water Systems

"Plant B"

Funded by the
Midwest Technology Assistance Center
Illinois State Water Survey
Champaign, Illinois

Prepared by the **Environmental Resources Training Center**
Southern Illinois University Edwardsville

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of
Small Public Water Systems

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Disclaimer

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Executive Summary

In response to the terrorist attack on September 11, 2001, the Federal Department of Homeland Security required all water systems to perform a vulnerability assessment (VA) and submit it to U.S. EPA and prepare or update their emergency response plan (ERP).

The VA process up to this point had been a self-assessment by the individual water systems. A third party appraisal of the VA process was considered the most effective method to evaluate the implementation of the measures identified by the VA. ERTC evaluated the VA and ERP process on the "Plant B" water system, which would be representative of small water distribution systems throughout the state.

Three ERTC personnel performed the evaluation of the VA and ERP at "Plant B" (a groundwater treatment system) during December of 2005. The evaluation was performed in three parts: initial visit; follow-up visit; and the system manager's response to the two water system interruption scenarios. To assess the VAs and ERPs at the water system, ERTC developed an evaluation method based upon protocol developed by the U.S. EPA, the Kansas Department of Health and Environment (KDHE), and the National Rural Water Association (NRWA). Using a risk assessment method modified from the KDHE method, ERTC evaluated existing deterrents in the water system while at the same time determining which elements of the system are at greatest risk.

The element presenting the highest risk to the continuing supply of safe and reliable water was the lack of an active Cross Connection Control Program. The program has been submitted to Illinois EPA, and the plant awaiting their approval. Once the Cross Connection Control Program is implemented, it will alleviate the majority of the vulnerabilities found in the Plant B system.

The water system manager was provided with two water system interruption scenarios to address. The first scenario presents the manager with an incident of vandalism by an former employee. The second scenario is an act of a terrorist introducing a biological contaminant into the water system. This was a cognitive exercise designed to make the manager dust-off his ERP and use it to complete the *incident report forms* and *worksheets* provided to them by ERTC. The second benefit of working through the exercise was that the manager would realize the value of updating and upgrading his ERP and VA.

ERTC made sixteen recommendations to the water system, the most important being the implementation of the Cross Connection Control Program (CCCP). Implementing the CCCP would mandate the use of RPZ backflow protection at hydrants and the installation of dual check valves at all meter settings.

It is our conclusion that “Plant B” is a very well managed water plant and distribution system. It has a backup power supply, a fenced plant and well field with each wellhead and pump in a secure, locked building. The plant is patrolled routinely (at least twice per shift) by the village police, and the building has an intruder alert that calls the police department when activated. All are very important elements of a reliable water system.

The water system has done a very good job of using its limited manpower and resources to help create and upgrade deterrents to intentional and/or unintentional situations that may lead to contamination of the public water supply. However, ERTC recommends the implementation of a Cross Connection Control Program, which will eliminate most of the potential threats to the water system. Also recommended, is the installation of a backup power supply to operate the booster pump station during the inevitable electrical outage.

The VA and ERP prepared by the water system were adequate and met all the requirements. However, there were a few discrepancies found between the VA prepared by the water system and the one prepared by ERTC evaluation staff. It was evident that few, if any, of the security issues identified in the VA have been addressed. It is our belief that after the original VA was prepared and forwarded to U.S. EPA, a copy was placed into a file cabinet and not looked at again until a day or two before the ERTC visit. This is typical human behavior, for the manager who uses all of his work time addressing the daily responsibilities of running the water system, while placing the VA out-of-site and out-of-mind. To alleviate the problem of the out-of-site-out-of-mind VA, it is recommended that all of the subject water systems perform some type of periodic update of the VA.

The water system does use its ERP, as evidenced by the report provided by the manager describing a recent break in a large transmission main that threatened the entire water distribution system. The manager also states that he makes an attempt to upgrade the ERP each year.

Section 1
Introduction, Need and Methodology

1.1 Introduction and Need

In response to the terrorist attack on September 11, 2001, the Federal Department of Homeland Security required water systems to perform a vulnerability assessment (VA) and prepare or update their emergency response plan (ERP). The VA was required to be completed and submitted to U. S. Environmental Protection Agency by June of 2004, and the ERPs were to have been certified as updated to incorporate findings of the VA by the end of the same year.

The need to evaluate the effectiveness of the VA and the implementation of the security measures was realized in discussions between the Midwest Technical Assistance Center (MTAC) at the Illinois State Water Survey in Champaign, Illinois and the Environmental Resources Training Center (ERTC) at Southern Illinois University Edwardsville. The evaluations would be targeted at the small water systems serving populations of 10,000 and less.

The VA process up to this point had been a self-assessment by the individual water systems. A third party appraisal of the VA process was deemed the most effective method to evaluate the implementation of the measures identified by the VA. ERTC entered into an agreement with MTAC to evaluate the VA and ERP process in four water systems that would be representative of small water systems throughout the state.

1.2 Personnel

The evaluation team consisted of three of the ERTC staff members. The staff performing the evaluations was:

Barb Woods holds an Illinois Class A Water Operator License and has 18 years of experience in water plant operations. Paul Shetley holds an Illinois Class C/D Water Operator License, and has over 20 years of water quality experience including six years as manager of a water distribution system. John Harper holds an Illinois Class A Water Operator License, an Illinois Class 1 Wastewater Operator License, and an IEPA Cross Connection Control Inspector license. He also has over 12 years of experience in water and wastewater operations.

1.3 Methodology

It is not practical or possible to evaluate every water system in the state of Illinois. Therefore, MTAC and ERTC agreed to evaluate one water system from each of the following four categories: (1) groundwater treatment, (2) surface water treatment,

(3) distribution system, and (4) a system that treats and buys water wholesale. The water system evaluated in this document is a groundwater treatment system, hereafter referred to as "Plant B".

To be able to evaluate the water systems, ERTC compiled and developed an evaluation protocol that was applicable to each type of system. The protocol was used to compare and contrast the VA prepared by the water system to the security issues found during the ERTC visits to the facility. The security issues evaluated would be each water system's physical assets (buildings, vehicles, tanks, pumps, water mains, valves, and hydrants), IT assets (computer systems and SCADA systems), and cross connection controls.

The protocol utilized to evaluate the water systems was based upon the U.S. EPA *Emergency Response Protocol Toolbox*, the *Simplified Vulnerability Assessment Tool for Drinking Water* designed by the Kansas Department of Health and Environment (KDHE) and the National Rural Water Association (NRWA) *Security Vulnerability Self-Assessment Guide for Small Drinking Water Systems*. The ERTC staff employed a three-step procedure to evaluate each water system, which consisted of three one-half day, visits to the system.

Day 1 Initial site visit to the water system was used to explain the evaluation procedures to the manager of the system. The VA prepared by the system was reviewed and its contents discussed with the manager. System manager was interviewed regarding security systems and cross connection control programs. The system manager was also asked to complete a questionnaire evaluating the VA and security measures at his facility.

Day 2 After review of the data collected during the initial site visit, the ERTC personnel prepared additional questions tailored to the specific security issues observed. The ERTC survey team returned to the water system to ask the manager specific questions related to his water system.

Day 3 The manager of each system was asked to address two "water system interruption scenarios" that were prepared by the ERTC staff. The manager completed the questionnaires associated with each of the two scenarios.

During each site visit, the ERTC evaluation team reviewed the potential for intentional and unintentional contamination or interruption of the water supply. Intentional contamination of the water supply would include:

a. Vandalism
b. Terrorism
c. Sabotage

Unintentional contamination or interruption of the water supply would include:

a. Water main break
b. Cross connection event
c. Drop in water pressure
d. Malfunction of chlorine feed system
e. Contamination of the source of water
f. Tornadoes
g. Floods
h. Earthquakes

1.4 Evaluation of Risk

The risk evaluation method presented below was modified from the KDHE *Simplified Vulnerability Assessment Tool for Drinking Water*. This method was chosen because it places a numeric value to the risk of each element of the water system.

Risk:

The individual components of risk (R), the probability of an asset being at risk (P), the consequences to the supply of water if the threat to a asset is carried out (C), and the effectiveness of any deterrents that would mitigate the threat (E) are expressed in the equation below. The risk is simply the product of the components P, C, and E:

$$R = P \times C \times E$$

It should be emphasized that R represents relative risk. The goal of risk management should be to balance risk across the water system's highest-ranking asset. By modifying the deterrent for each asset at risk, a greater effectiveness of control is asserted toward each system's protection of potable water quality.

Factors for P, E, and C

Probability of this asset being at risk (P)		Effectiveness of Deterrents (E)	
Low	1	Highly Effective	1
to		to	
High	5	Ineffective	5

Consequence of Action (C)

Normal supply of safe water – all demands met	1
Adequate supply of safe water – all *emergency* demands met	2
Inadequate supply of safe water – parts of the system without water	3
No supply of safe water – only contaminated water available for fire fighting and sanitary needs	4
No water available – system shut down	5

Example 1 Master Meter

P = 1 C = 3 E = 1	R = 3 N/A

Comments:
By convenience store

Explanation for this asset:
P = because of this asset's location, it was considered a low probability
C = occurrence at this asset would eliminate water service to many customers
E = well lighted, high traffic area, with security camera
R = 3 is considered a relatively low risk

Example 2 Storage Tanks

P = 5 C = 3 E = 5	R = 75	N/A

Comments:
Elevated Tank is remote.

Explanation for this asset:
P = because of this asset's remote location, it was considered a high probability
C = occurrence at this asset would eliminate service to many customers
E = no security measures, no effective deterrents in place
R = 75 is considered a very high risk

1.5 Summary of Groundwater "Plant B"

The source of water for the Plant B water system is groundwater, supplied by its eight wells, which are operated on a rotating basis. The wells are owned and operated by the system and utilize the extensive groundwater resources available in the alluvial deposits in the Mississippi River valley. It has been supplying water to its customers for approximately 40 years. The distribution system supplies water to one electric power plant, two large industries, three schools, two large multi-family dwellings, one resident home for the developmentally disabled, over 20 restaurants and convenience stores, along with approximately 2,700 residential customers. The manager of the water system completed the VA in June of 2004 as required by the regulations. He also updated the system's ERP and submitted the certificate of completion to EPA in the fall of 2004. A SCADA (supervisor control and data acquisition) system monitors the water treatment plant, elevated water tower, and booster pump station. A summary of the Plant D system is provided below.

Well Field

1. 8 Wells in service on a rotating basis

Water Plant

1. 1 Aerator
2. One Claricone Clarifier
3. Two Filters
4. Two Clearwells
5. Two, 500,000 gallon ground storage tanks
6. Six high service pumps
7. One Backwash pump
8. Chemical feeders
9. Chlorination system (two 1-ton gas cylinders)
10. Fluoridation feed system (hydrofluorisilisic acid)
11. Chemical Inventory
    a. Lime
    b. Caustic Soda (Sodium Hydroxide)
    c. Ferric Chloride
    d. Polymer ( )
    e. Chlorine Gas
    f. Fluoride (hydrofluorisilisic acid)
    g. Potassium Permanganate
12. Chlorine Room
13. Meter shop
14. Office/Laboratory building
15. One maintenance building
16. Five employees
17. Computer System
18. SCADA monitoring of entire plant

Distribution System

One booster pump station in underground vault
One 250,000 gallon elevated storage tower
250 miles of distribution main ranging from 2-inch to 16-inch
2700 customers
Two potential interconnects
Approximately 25 backflow prevention assemblies in system
Fire Hydrants
Meters
SCADA system monitoring plant and elevated tank

High Priority Customer

Three Schools
Two Large Industries
One Electrical Power Plant
Two Large Multi-Family Dwellings
One Resident Home for Developmentally Disabled

Section 2
Findings of Field Evaluations

2.1 Results of Interview with System Manager (Day #1)

For the following nineteen items, ERTC assigned a value from 1 to 5 for the factors P,C, and E.

Note: An explanation of the factors used in completing the risk equations is presented again for the convenience of the reader. Modified from: *Simplified Vulnerability Assessment Tool for Drinking Water* (KDHE) as explained in Section 1.

P = probability of occurrence at this asset
C = consequences to the supply of water if the threat to this asset is carried out
E = the effectiveness of any deterrents that would mitigate the threat
R = individual components of risk
N/A = does not apply, put a X

1. 8 wells

P = 1	C = 2	E = 1	R = 2	N/A

Comments: Well field fenced on plant grounds with individual well houses

2. Buildings - Treatment

P = 1	C = 5	E = 1	R = 5	N/A

Comments: Secured with fence and locked, and patrolled by police

3. Claricone

P =1	C = 4	E = 1	R = 4	N/A

Comments: Has backup located in treatment building.

4. Clearwells 2

P = 1	C = 4	E = 1	R = 4	N/A

Comments: Each w/ 500,000 gal. capacity

5. Filters

P = 1	C = 4	E = 1	R = 4	N/A

Comments:
2 Decelerating
4 Greenleaf

6. Backwash Tank

P = 1	C = 4	E = 1	R = 4	N/A

Comments:

7. Water Treatment Chemicals

P = 1	C = 5	E = 1	R = 5	N/A

Comments: 7 at plant
Lime, caustic, fluoride, polymer, chlorine gas, ferric chloride, $KMnO_4$

8. Lab Chemicals

P = 1	C = 1	E = 1	R = 1	N/A

Comments: Approx. 35 chemicals in lab, under good security

9. Elevated Storage Tank - 250,000 gal

P = 1	C = 5	E = 1	R = 5	N/A

Comments: Fenced, lit, located on dead end street among homes.

10. Power 110/220/440

P = 3	C =5	E = 1	R = 15	N/A

Comments: Illinois Power main supply

11. Auxiliary Power - Diesel Generator

P = 1	C = 5	E = 1	R = 5	N/A

Comments:
Aux. Power adequate to operate entire system

12. High Service Pumps 7 (6 H.S., 1 B.W.)

P = 1	C = 3	E = 1	R = 3	N/A

Comments: 4 turbine, 3 split case; Back Wash pump can be used for High Service

13. Piping

Above Ground			
P = 1	C = 3	E = 1	R = 3	N/A
Below Ground			
P = 3	C = 3	E = 1	R = 9	N/A

Comments: Approx. 250 miles of main

14. Valves ("many")

Above Ground			
P = 1	C = 3	E = 1	R = 3	N/A
Below Ground			
P = 1	C = 3	E = 3	R = 9	N/A

Comments: Updated valve book/map

15. Appurtenances: 200 hydrants

P = 3	C = 2	E = 4	R = 24	N/A

Comments:

16. 2705 meters

P = 2	C = 3	E = 4	R = 24	N/A

Comments: Most of the meters do not have dual check valves.

17. Booster Station with 2 pumps – 1 functioning with normal operation, 2 pumps functioning if needed for fire fighting.

P = 3	C = 3	E = 3	R = 27	N/A

Comments: Boosts pressure for 30-40 homes. In ground, latched, well lit area, no backup power

18. Offices – Offices in Village Hall Building

P = 1	C = 1	E = 1	R = 1	N/A

Comments: Very secure bldg, share with police and fire dept

19. Computers (2 at plant) 1 PC

P = 1	C = 1	E = 1	R = 1	N/A

Comments: Not accessible from outside of plant.

20. SCADA

P = 1	C = 1	E = 1	R = 1	N/A

Comments: Not accessible from outside of plant.

21. Files

P = 1	C = 1	E = 1	R = 1	N/A

Comments: Stored in secure areas of plant and City Hall

22. Transportation - 12 trucks

P = 1	C = 1	E = 1	R = 1	N/A

Comments: Locked at night in garage

23. Employees – 5 employees with water system, 14 total in Public Works

P = 1	C = 2	E = 1	R = 2	N/A

Comments:

24. Telephones – 6

P = 1	C = 1	E = 1	R = 1	N/A

Comments: 3 land line, 3 cordless

25. Cell phones – 4

P = 1	C = 1	E = 1	R = 1	N/A

Comments: Cell phones not used to control system

26. Radios – 20 units (In trucks & handheld)

P = 1	C = 1	E = 1	R = 1	N/A

Comments: Not used to control system

27. Critical Customers: Power Plant

P = 1	C = 3	E = 1	R = 3	N/A

Comments: Security at Power Plant is good.

28. Critical Customers - City Wastewater Treatment Plant

P = 1	C = 1	E = 1	R = 1	N/A

Comments: Security at plant is good.

29. Critical Customers - 3 Schools

P = 2	C = 3	E = 4	R = 24	N/A

Comments: Meters are not secured

30. Other Larger Customers

P = 1	C = 3	E = 4	R = 12	N/A

Comments: Security at industries is good. Security of meters at other large customers is inherently inadequate.

Larger customers include:

Two dozen restaurants and convenience stores
One Resident Home for Developmentally Disabled
Two Large Multi-Family Dwellings
Two Large Manufacturing facilities

2.2 Results of Questionnaire Completed by System Manager (Day #1)

(Questionnaire based upon *Security Vulnerability Self-Assessment Guide for Small Water Systems,* NRWA)

1. Is access to the critical components of the water system (i.e., a part of the physical infrastructure of the system that is essential for water flow and/or water quality) restricted to authorized personnel only?

   Yes [x] No [ ]

   N/A [ ]

Action Needed/Taken

2. Are facilities fenced, including wellhouses and pump pits, and are locked where appropriate?

   Yes [x] No [ ]

   N/A [ ]

Action Needed/Taken

3. Are your doors, windows, and other points of entry such as tank and roof hatches and vents kept closed and locked?

   Yes [x] No [ ]

   N/A [ ]

Action Needed/Taken: Security system in place includes neighborhood watch, intruder alarm, and routine police patrols.

4. Is there external lighting around critical components of your water system?

Yes [x] No [ ]

N/A [ ]

Action Needed/Taken

5. Are warning signs (tampering, unauthorized access, etc.) posted on all critical components of your water system? For example, wellhouses and storage tanks.

Yes [ ] No [x]

N/A [ ]

Action Needed/ Taken Operator feels that signs would draw attention to critical components of the system.

6. Do you patrol and inspect your buildings, storage tanks, equipment, and other critical components?

Yes [x] No [ ]

N/A [ ]

Action Needed/Taken

7. Is the area around the critical components of your water system free of objects that may be used for breaking and entering?

Yes [x] No [ ]

N/A [ ]

Action Needed/Taken

8. Are the entry points to your water system easily seen?

Yes [x] No [ ]

N/A [ ]

Action Needed/Taken

9. Do you have an alarm system that will detect unauthorized entry or attempted entry at critical components?

Yes [x] No [ ]

N/A [ ]

Action Needed/Taken: Intruder alarm notifies the police department dispatcher when activated.

10. Do you have a key control and accountability policy for all locked water system facilities?

Yes [x] No [ ]

N/A [ ]

Action Needed/Taken

11. Are your wellheads sealed properly?

Yes [x] No [ ]

N/A [ ]

Action Needed/Taken

12. Are well vents and caps screened and securely attached?

Yes [x] No [ ]

N/A [ ]

Action Needed/Taken

13. Are observation/test and abandoned wells properly secured to prevent tampering?

Yes [x] No [ ]

N/A [ ]

Action Needed/Taken

14. Is your well field secured with fences or gates. Do water system personnel visit the well field?

Yes [x] No [ ]

N/A [ ]

Action Needed/Taken: Well field is adjacent to plant.

15. Are deliveries of chemical and other supplies made in the presence of water system personnel?

Yes [x] No [ ]

N/A [ ]

Action Needed/Taken

16. Have you discussed with your supplier(s) procedures to ensure the security of their products?

Yes [x] No [ ]

N/A [ ]

Action Needed/Taken

17. Are chemicals, particularly those that are potentially hazardous or flammable, properly stored in a secure area?

Yes [x] No [ ]

N/A [ ]

Action Needed/Taken

18. Do you monitor raw and treated water so that you can detect changes in water quality?

Yes [x] No [ ]

N/A [ ]

Action Needed/Taken

19. Are tank ladders, access hatches, and entry points secured?

Yes [x] No [ ]

N/A [ ]

Action Needed/Taken

20. Are vents and overflow pipes properly protected with screens and/or grates?

Yes [x] No [ ]

N/A [ ]

Action Needed/Taken

21. Can you isolate the storage tank from the rest of the system?

Yes [x] No [ ]

N/A [ ]

Action Needed/Taken

22. Do you control the use of all hydrants and valves?

Yes [x] No [ ]

N/A [ ]

Action Needed/Taken: Access to hydrants by contractors is prohibited, but it does occur.

23. Does your system monitor for, and maintain, positive pressure?

Yes [x] No [ ]

N/A [ ]

Action Needed/Taken

24. Are your personnel issued photo-identification?

Yes [x] No [ ]

N/A [ ]

Action Needed/Taken

25. When terminating employment, do you require employees to turn in photo IDs, keys, access codes, and other security-related items?

Yes [x] No [ ]

N/A [ ]

Action Needed/Taken

26. Do you use uniforms and vehicles with your water system prominently displayed?

Yes [x] No [ ]

N/A [ ]

Action Needed/Taken

27. Have water system personnel been advised to report security vulnerability concerns and to report suspicious activity?

Yes [x] No [ ]

N/A [ ]

Action Needed/Taken

28. Are vehicles locked and secured at all times?

Yes [ ] No [x]

N/A [ ]

Action Needed/Taken: Vehicles not locked during work day. They are secured in locked bldg at night.

29. Are maps, records, and other information stored in a secure location?

Yes [x] No [ ]

N/A [ ]

Action Needed/Taken

30. Are copies of records, maps, and other sensitive information labeled confidential, and are all copies controlled and returned to the water system?

Yes [x] No [ ]

N/A [ ]

Action Needed/Taken:
Documents are not marked confidential.

31. Is there information on the Web that can be used to disrupt your system or help induce a contaminant into your water system?

Yes [ ] No [x]

N/A [ ]

Action Needed/Taken

2.3 Results of Questionnaire Completed by the System Manager (Day #1)

(Questions developed by ERTC)

1. Do all of your distribution system meters have backflow prevention protection?
   Yes [ ] No [x]
   Dual checks [x]

   N/A [ ]

   Action Needed/Taken: Only newer meters (20%) have dual check valves. Every new or replacement meter has dual check valves.

2. Are your water storage vessels inspected periodically for:

	Yes	No
Water quality	[x]	[ ]
Proper operation	[x]	[ ]
Vandalism	[x]	[ ]

   N/A [ ]

   Action Needed/Taken

3. Do you have some form of validation process for entering the water storage vessels.
   Yes [x] No [ ]

   N/A [ ]

   Action Needed/Taken: Only authorized personnel enter vessels, with notification of operator and/or manager.

4. Of your 2,700 water customers, how would they be categorized.
   a. high hazard a. [ ]
   b. low hazard b. [X]
   c. What factors are used to determine a difference between high hazard and low hazard?

   N/A [ ]

   Action Needed/Taken: The potential for contamination of the water system through a cross connection event is low.

5. Are materials located at your maintenance building protected from:

		Yes	No
a.	vandalism	[x]	[ ]
b.	theft	[x]	[ ]
c.	weather	[x]	[ ]
d.	terrorism	[x]	[ ]

N/A [ ]

Action Needed/Taken

6. How would you classify your water distribution system operators and employees?

1.	Class A	[x]
2.	Class B	[ ]
3.	Class C/D	[x]
4.	office workers	[ ]

N/A [ ]

Action Needed/Taken: Operator Certificates are currant and up to date.

7. Do you incorporate the process of seasonal stuffers with your billing?
Yes [ ] No [x]

N/A [ ]

Action Needed/Taken

8. What type of backflow prevention do you require on lawn sprinkler systems?
RPZ [x]
Other [ ]

N/A [ ]

Action Needed/Taken

9. Does the District do its own water main taps?
Yes [x] No [ ]

N/A [ ]

Action Needed/Taken

10. Does fire hydrant flushing incorporate other departments or people?

a. fire department
Yes [ ] No [x]

N/A [ ]

Action Needed/Taken; Water dept. personnel only perform flushing operations.

11. Are flush hydrants kept locked up?
Yes [ ] No [x]

N/A [ ]

Action Needed/Taken

12. Is your computer software protected from outside intruders?
Yes [x] No [ ]

N/A [ ]

Action Needed/Taken

13. Are passwords and virus protection periodically upgraded?
Yes [x] No [ ]

N/A [ ]

Action Needed/Taken

14. Is there computer software for the backflow prevention program?
Yes [ ] No [x]

N/A [ ]

Action Needed/Taken: Backflow prevention program is in development stage.

15. Are all truck drivers that deliver chemicals to your plant properly checked out for correct identification, to include contents of truck?

Yes [x] No [ ]

N/A [ ]

Action Needed/Taken

16. Are all residential above ground potable water sources protected and locked. Example: Farmer has a "Hot Box" enclosure for his RPZ backflow prevention assembly.

Yes [x] No [ ]

N/A [ ]

Action Needed/Taken: Only one hotbox at one industrial site that is fenced, light, and patrolled.

2.4 Results of in-depth discussion with System Manager (Day 2) Part 1

The checklist items 1-7 presented below include distribution system assets taken from the *Security Vulnerability Self-Assessment Guide for Small Water Systems* (NRWA).

1. Are facilities that house backflow prevention assemblies locked or resistant to tampering?
   Yes [x] No [ ]

   N/A [ ]

Action Needed/Taken

2. Are warning signs (tampering, unauthorized access, etc.) posted on all critical components of your water system. (For example, Hot Box /backflow prevention outside enclosure)?
   Yes [ ] No [x]

   N/A [ ]

Action Needed/Taken: Operator believes that signage brings attention to his critical Components.

3. Do you patrol and inspect your outside backflow prevention assembly enclosures?
   Yes [x] No [ ]

   N/A [ ]

Action Needed/Taken: The outside RPZ is in a locked enclosure, well light and has 24-hour security.

4. Is the area around the critical components of your outside backflow prevention assembly enclosure free of objects that may be used for breaking and entering?

Yes [x] No [ ]

N/A [ ]

Action Needed/Taken

5. Are the entry points to your outside backflow prevention assembly easily seen? Can someone hide close to your outside backflow prevention enclosure and not be seen?

Yes [x] No [ ]

N/A [ ]

Action Needed/Taken:

The outside RPZ is in a locked enclosure, well light and has 24-hour security.

6. Do you have a video camera or alarm system that will detect unauthorized entry or attempted entry at your outside backflow prevention enclosures?

Yes [ ] No [x]

N/A [ ]

Action Needed/Taken

7. Do you have a neighborhood watch program for your water system?

Yes [x] No [ ]

N/A [ ]

Action Needed/Taken

2.5 Results of in-depth discussion with System Manager (Day 2) Part #2

The checklist items 1-21 were developed by ERTC from the Illinois Environmental Protection Agency (IEPA) Title 35 regulations.

1. Do you have a Cross Connection Control Program?
   Yes [ ] No [x]

   N/A [ ]

   Action Needed/Taken: Program has been submitted to IEPA. Village has passed the CCC ordinance, adopting the plumbing code. Waiting for approval from IEPA

2. Do you have a Cross Connection Control Program ordinance approved by the IEPA?
   Yes [ ] No [x]

   N/A [ ]

   Action Needed/Taken: Program has been submitted to IEPA. Village has passed the CCC ordinance, adopting the plumbing code. Waiting for approval from IEPA

3. What type of program do you have?
   a. isolation [ ]
   b. containment [x]
   c. total protection [ ]

   N/A [ ]

   Action Needed/Taken:

   Dual check valves required on every new service. Old services will be retrofitted.

4. Is your distribution system current with its requirement of biannual system surveying?
   Yes [ ] No [x]

   N/A [ ]

   Action Needed/Taken

5. How is the process of question number (4) carried out?

Phone [ ]
Mail [ ]
Personal Visit [ ]

N/A [x]

Action Needed/Taken

6. Is a physical inspection required if the received survey is not completely filled out?

Yes [ ] No [ ]

N/A [x]

Action Needed/Taken

7. If a physical inspection is required, who is required to do the inspection?

a. water operator [ ]
b. plumber [ ]
c. water operator/CCCDI [ ]
d. plumber/CCCDI [ ]

N/A [x]

Action Needed/Taken

8. Does your ordinance require a physical test of all testable backflow prevention assemblies upon installation and annually there after?

Yes [x] No [ ]

N/A [ ]

Action Needed/Taken:
In accordance with IL Plumbing Code

9. Do you require all backflow prevention testers (CCCDI) to be listed with your distribution department before work is done?
Yes [ ] No [x]

N/A [ ]

Action Needed/Taken:

System has a short list of testers

10. Does your program have a policy requiring disconnection of the service if the backflow prevention assembly is not annually tested?
Yes [ ] No [ ]

N/A [x]

Action Needed/Taken:

Pending. In accordance with new city ordinance.

11. Does your program have a policy that also requires a fee for reconnection of the service?
Yes [x] No [ ]

N/A [ ]

Action needed/Taken

12. Does your Cross Connection Control Program have a set procedure for all <u>new</u> connections to the distribution system or change of ownership?
Yes [x] No [ ]

N/A [ ]

Action Needed/Taken:

Pending approval by IEPA

13. Does your program take into account other sources of water that might be introduced during a fire situation?
Yes [x] No [ ]

N/A [ ]

Action Needed/Taken:

Operator believes that there is a check valve on the FD pumpers.

14. Does your program take into account that rural water system residents often have private well systems?
Yes [ ] No [ ]

N/A [x]

Action Needed/Taken:

No wells known to exist. Area is not rural.

15. Does your program take into account that water system customers may have lawn irrigation systems?
Yes [x] No [ ]

N/A [ ]

Action Needed/Taken

16. Do you require any person who will be working in your distribution system to be acknowledged or permitted?
Yes [x] No [ ]

N/A [ ]

Action Needed/Taken:

Only licensed plumbers permitted or onsite

17. Does your Cross Connection Control program interact with other distribution system programs?

a. valve location and exercise Yes [x] No [ ]

b. hydrant flushing, swabbing/pigging Yes [ ] No [x]

N/A [ ]

Action Needed/Taken:
Hydrant flushing is performed only by water dept employees.

18. In case of a loss of pressure or contamination, are your operators trained in proper sampling techniques and location.

Yes [x] No [ ]

N/A [ ]

Action Needed/Taken:

Managers and supervisors collect all the samples.

19. Is proper notification of service connection customers completely understood by your distribution system employees?

Yes [x] No [ ]

N/A [ ]

Action Needed/Taken

20. Does your distribution system ERP take into account all measures needed?

Yes [x] No [ ]

N/A [ ]

Action Needed/Taken

21. Do you facilitate real time exercises regarding distribution system interruption or pressure loss due to intentional or unintentional situations?

Yes [x] No [ ]

N/A [ ]

Action Needed/Taken:
Rely on actual experience. Try to review and update ERP on a yearly basis.

2.6 Results of in-depth discussion with System Manager (Day 2) Part 3

The risk evaluation method was modified from the KDHE Simplified *Vulnerability Assessment Tool for Drinking Water* as explained in Section 1.

For the following 22 items, ERTC assigned a value from 1 to 5 for the factors P,C, and E.

Note: An explanation of the factors used in completing the risk equations is presented again for the convenience of the reader.

P = probability of occurrence at this asset
C = consequences to the supply of water if the threat to this asset is carried out
E = the effectiveness of any deterrents that would mitigate the threat
R = individual components of risk
N/A = does not apply, put a X

1. Private wells

P = 1	C = 1	E = 1	R = 1	N/A x

Action Needed/Taken

2. Lawn irrigation systems

P = 1	C = 3	E = 1	R = 3	N/A

Action Needed/Taken: RPZ on system

3. Outside yard hydrants

P =	C =	E =	R =	N/A x

Action Needed/Taken: Operator is not aware of any yard hydrants

4. Outside personal fire hydrants

P =	C =	E =	R =	N/A x

Action Needed/Taken

5. Fire trucks

P = 3	C = 3	E = 3	R = 27	N/A

Action Needed/Taken

6. Internal Program Conflicts:

a. distribution system hydrant flushing

P = 2	C = 2	E = 2	R = 8	N/A

Action Needed/Taken: Water dept. and street dept. work together. Fire Dept performs hydrant flow testing.

b. collections system line flushing

P = 2	C = 3	E = 5	R = 30	N/A

Action Needed/Taken: Street dept. needs to use RPZ with jet truck

c. cleaning out collection system vac. trucks

P =	C =	E =	R =	N/A x

Action Needed/Taken

7. Auxiliary water system
   a. bulk water station

P =	C =	E =	R =	N/A	x

Action Needed/Taken

8. Residential home water softener

P =	C =	E =	R =	N/A

Action Needed/Taken:
Do not keep track of water softeners in homes

9. Sewer rodding

P = 2	C = 3	E = 5	R = 30	N/A

Action Needed/Taken:
Street dept. needs to use RPZ for any flushing associated with sewer rodding.

10. Filling swimming pool, backflow hazard from winter chemicals, stagnate water, etc.

P = 2	C = 3	E = 5	R = 30	N/A

Action Needed/Taken:
Atmospheric breakers required on new construction.

11. Feeding chlorine at plant

P = 4	C = 4	E = 1	R = 16	N/A

Action Needed/Taken: Install RPZs in chlorine room to protect the plant operators from accidental overdose of chlorine in their drinking water.

12. Feeding other types of plant chemicals, etc.

P = 1	C = 1	E = 1	R = 1	N/A

Action Needed/Taken

13. Air gaps, are they installed correctly

P =	C =	E =	R =	N/A x

Action Needed/Taken:

Yes, they are installed correctly

14. Atmospheric Vacuum Breaker (AVB), are they installed correctly

P =	C =	E =	R =	N/A x

Action Needed/Taken:

Yes, they are installed correctly

15. Hydrant program,

a. are RPZ required and tested before hydrant is used

P =	C =	E =	R =	N/A x

Action Needed/Taken:

Use of hydrants by contractors is not allowed

b. are hydrants designated/permitted

P =	C =	E =	R =	N/A x

Action Needed/Taken

16. Are *Hot Boxes* (outside enclosures) for backflow prevention assemblies kept locked?

P = 1	C = 3	E = 1	R = 3	N/A

Action Needed/Taken:

Yes. Fenced, locked and patrolled

17. Any pits or vaults, assemblies have test cocks or relief valves which can create a potential point of entry for contaminants

P = 2	C = 3	E = 2	R = 12	N/A

Action Needed/Taken:
Bleeders for booster pump in the vault are a potential source of contamination to the water system.

18. Any outside backflow prevention assembly enclosures without freeze protection

P =	C =	E =	R =	N/A x

Action Needed/Taken:

None known

a. any outside backflow prevention assemblies with landscape or poor drainage issues

P =	C =	E =	R =	N/A x

Action Needed/Taken

19. RPZ assembly and its relationship to a drain

a. flooding due to undersized drain, potential contamination

P =	C =	E =	R =	N/A x

b. alarm system for backflow prevention assembly discharge

P =	C =	E =	R =	N/A x

Action Needed/Taken

c. Is flooding alarm connected to a SCADA, caller ID

P =	C =	E =	R =	N/A x

Action Needed/Taken

20. Do you have fertilizer plant connections to the water system?

P =	C =	E =	R =	N/A x

Action Needed/Taken

21. During water main breaks, is water loss estimated and values used in the unaccounted for water calculations?

P = 5	C = 1	E = 2	R = 10	N/A

Action Needed/Taken: System should perform audit for unaccounted for water.

22. Have any of your fire or flush hydrants been hit by vehicles?

New Hydrants

P = 1	C = 1	E = 1	R = 1	N/A

Action Needed/Taken: Yes New hydrants have breakaway fittings

Old Hydrants

P = 3	C = 3	E = 3	R = 27	N/A

Action Needed/Taken: Yes Old hydrants do not have breakaway fittings

Section 3
Distribution System Interruption Scenarios

3.1 Introduction

To further test the effectiveness of the water system's ERP, its manager was asked to address two distribution system interruption scenarios. The first scenario presents the manager with an incident of sabotage of the water plant by an ex-employee. The second scenario is an act of a terrorist introducing a biological contaminant into the water system. This was a cognitive exercise designed to make the manager dust-off his ERP and use it to complete the *incident report forms* and *worksheets* provided to them by ERTC. The second benefit of working through the exercise was that the manager would realize the value of updating and upgrading his ERP and VA.

For each scenario, the manager was asked to complete two forms and a worksheet taken from the USEPA *Emergency Response Toolbox, Planning For and Responding to Drinking Water Contamination Threats and Incidents*. The forms and worksheets completed by the water system manager for each scenario, are listed below along with their corresponding section numbers where they can be found in the EPA document.

Initiating the ERP, Compiled from USEPA *Emergency Response Plan for Small and Medium Community Water Systems*

Security Incident Report Form, Section 2.4 of USEPA *Emergency Response Toolbox*

Site Characterization Report Form, Section 3.6 of USEPA *Emergency Response Toolbox*

Public Health Response Action Worksheet, Section 5.4 of USEPA *Emergency Response Toolbox*

The organization of Section 3 of this report is as follows:

Section 3.2 Presentation of Scenario #1 and response by the water system personnel
Section 3.2.1 Initiating the ERP Form for Scenario # 1 completed by the system manager
Section 3.2.2 Security Incident Report Form for Scenario #1 completed by the system manager
Section 3.2.3 Site Characterization Report Form for Scenario #1 completed by the system manager
Section 3.2.4 Public Health Response Action Worksheet for Scenario #1 completed by the system manager
Section 3.3 Presentation of Scenario #2 and response by the water system personnel
Section 3.3.1 Initiating the ERP Form for Scenario # 2 completed by the system manager
Section 3.3.2 Security Incident Report Form for Scenario #2 completed by the system manager
Section 3.3.3 Site Characterization Report Form for Scenario #2 completed by the system manager
Section 3.3.4 Public Health Response Action Worksheet for Scenario #2 completed by the system manager

Section 3.2

Distribution System Interruption

Scenario #1

3.2 Water Plant Operation Interruption Scenario #1

Condition:
Intentional sabotage of the water treatment plant and loss of disinfectant in the distribution system.

Scenario:

A disgruntled former employee who possesses unauthorized keys and gains access to the treatment plant during the night while the plant in unmanned. Proceeding to the chlorine room, the disgruntled employee has the material to start a fire under a Two (2) ton container in the chlorine room and then quickly leaves. The fire is hot enough to melt the fusible plugs on the container and liquid chlorine escapes.

The plant personnel and emergency responders arrive on the scene, are met with additional delays because the former employee has also tampered with the door locks, and pad locks. Besides the chlorine release and subsequent emergency, the chlorine room and the rest of the chlorine containers are damaged beyond repair.

Using your ERP, explain what needs to be done to resolve the initial problem. Also, explain what needs to be done to reduce the possibility of any people getting ill from a loss of disinfection.

Action Needed / Taken (To be Completed by Water System Manager)

1. **Upon realizing I have a chlorine leak, I will notify the police and fire departments and the HazMat team. Then check the wind direction and weather conditions to prepare to evacuate all residents that could be in danger. I would also contact all other agencies to make them aware of the problem.**

2. **I would get the B chlorine kits ready for the Haz Mat team, and contact neighboring supplies that we have water interconnects to see if they can supply my system with water until I can get my system back on line.**

3. **Thirdly, I would contact the Mayor and Council so they can deal with the press and the public. Once the leaks are fixed and the room has been ventilated to a safe level, I would enter the room and assess what other damages there may be.**

4. **I would contact my chlorine supplier to make arrangements for an emergency shipment and let them know about the damaged cylinders.**

5. **We would make repairs as soon as possible and return to normal operations. As soon as possible, a report would also be written on the incident, weather conditions, and corrective measures that were taken at the time.**

3.2.1 Initiation of ERP Form for Scenario #1

(Transcribed from forms completed by the System Operator)

3.2.1 *Initiating the ERP for Scenario #1*

Indicate the ERP Action Plan(s) to be followed:

X Contamination of the Drinking Water
X Structural Damage/Physical Attack
❑ SCADA, Computer, or Cyber Attack
X Intentional Hazardous Chemical Release (e.g., release of chlorine or ammonia from storage).

Is there a copy of the ERP off the water system premises? **Yes** No

Does the Action Plan include the following basic information?

X Any special notification requirements;
X Special response steps to be taken upon ERP activation; and
X Recovery actions to bring the CWS back into operation.

Indicate which first responders would be notified:

- ❑ Local
  - \- Local 911
  - **x** Police
  - **x** Fire
  - \- Local Emergency Planning Committee (LEPC)
  - **x** Elected Officials
  - \- Power Utility
  - **x** Hazardous Materials (HAZMAT) personnel
- ❑ State
  - **X** Drinking Water Primacy Agency
  - **X** Department of Health
  - **X** State 24-hr Emergency Communications Center Telephone
  - \- State Office of Homeland Security
  - \- HAZMAT
  - \- State Police
- ❑ Federal
  - \- FBI
  - \- EPA Headquarters and Regional Office
  - \- Department of Homeland Security (DHS)
  - \- Department of Health and Human Services (HHS)
  - \- National Response Center (800-424-8802, http://www.nrc.uscg.mil/)
- ❑ Other
  - \- Water Information Sharing & Analysis Center (http://www.waterisac.org/)

Hazardous Chemical Release from Water System Facility(ies)

Indicate any special actions and notifications to be taken:

- ❑ Initiate full ERP activation
- ❑ Follow State Incident Command System

X Determine extent/concentration of chemical release and deploy damage assessment team

X Turn off chemical treatment equipment and isolate chemical treatment areas from rest of water system

X Depending on extent and concentration of release, issue evacuation or shelter in place order per Risk Management Program and ERP

X Coordinate alternative water supply, as needed, or consider alternate (interim) treatment schemes

X Issue public notice and issue follow-up media press releases

X Repair damaged facilities

Assess need for additional protection/security measures

Structural Damage/Physical Attack to Water System or Facility(ies)

Indicate special actions and notifications to be taken:

X Initiate full ERP activation

X Follow State Incident Command System

X Deploy damage assessment team

X Isolate chemical treatment areas from rest of water system

X Coordinate alternative water supply, as needed, or consider alternate (interim) treatment schemes

X Issue public notice and issue follow-up media press releases

X Repair damaged facilities

X Assess need for additional protection/security measures

Remediation and Recovery

What alternate water sources are identified in the system's ERP?

- ❑ Bottled water provided by outside sources;
- ❑ Bottled water provided by local retailers;
- ❑ Bulk water provided by certified water haulers;
- ❑ Bulk water transported or provided by military assets (i.e., National Guard or U.S. Army Corps of Engineers (USACE));

X Bulk water provided by neighboring water utilities by truck or via pipeline;

- ❑ Bulk water from hospitals, universities, and local industry that maintain backup water supplies for consumption;

X Interconnections with nearby public water systems;

- ❑ Water treated by plant and hauled to distribution centers (i.e., in the case of water distribution system contamination);
- ❑ Water pumped from surface water sources, treated at the plant or nearby plants, and hauled to distribution centers;
- ❑ Water for firefighting from Federal agencies such as the USACE and FEMA; and
- ❑ Water from unaffected wells owned by local citizens and businesses.

Is a list maintained which includes accurate information on points of contacts for the alternate sources?

YES

Replacement Equipment and Chemical Supplies

Do you maintain an updated inventory of:

- **X** Current equipment (e.g., pumps);
- **X** Repair parts;
- **X** Chemical supplies for normal maintenance and operations; and
- **X** Information on mutual aid agreements.

Additional equipment may be available from:

X Local businesses such as dairies, well drillers, irrigation supply firms, or distributors that may have tank trucks that can be made suitable for carrying water, chlorinators or generators that can be used for emergency disinfection, and pipe that can be used to extend water supply lines.

Other water utilities in the area that may have spare parts (such as valves, pumps, and pipe) available for use in an emergency.

X FEMA, USACE, and the U.S. Forest Service that may be able to provide firefighting equipment.

Property Protection

Protecting CWS facilities, equipment and vital records is essential to restoring operations once a major event has occurred. Items considered should include:

- **X** "Lock down" procedures;
- **X** Access control procedures;
- **X** Establishing a security perimeter following a major event;

Evidence protection measures for law enforcement (should the major event also be declared a crime scene);

- **X** Securing buildings against forced entry; and
- **X** Other property protection procedures and measures.

3.2.2 Security Incident Report Form for Scenario #1
(Transcribed from forms completed by the System Operator)

3.2.2 Security Incident Report Form for Scenario #1

INSTRUCTIONS

The purpose of this form is to help organize information about a security incident, typically a security breach, which may be related to a water contamination threat. The individual who discovered the security incident, such as a security supervisor, the WUERM, or another designated individual may complete this form. This form is intended to summarize information about a security breach that may be relevant to the threat evaluation process. This form should be completed for each location where a security incident was discovered.

DISCOVERY OF SECURITY INCIDENT

Date/Time security incident discovered: _____

Name of person who discovered security incident: _____

Mode of discovery:

- ☐ Alarm (building)
- ☐ Alarm (gate/fence)
- ☐ Alarm (access hatch)
- ☐ Video surveillance
- ☐ Utility staff discovery
- ☐ Citizen discovery
- ☐ Suspect confession
- ☐ Law enforcement discovery
- ☐ Other _____

Did anyone observe the security incident as it occurred? ☐ Yes **x** No

If "Yes", complete the 'Witness Account Report' (Appendix 8.4)

SITE DESCRIPTION

Site Name: _____

Type of facility

- ☐ Source water
- **x** Treatment plant
- ☐ Pump station
- ☐ Ground storage tank
- ☐ Elevated storage tank
- ☐ Finished water reservoir
- ☐ Distribution main
- ☐ Hydrant
- ☐ Service connection
- ☐ Other _____

Address: _____

_____

Additional Site Information: _____

_____

BACKGROUND INFORMATION

Have the following "normal activities" been investigated as potential causes of the security incident?

- **X** Alarms with known and harmless causes
- **x** Utility staff inspections
- ☐ Routine water quality sampling
- ☐ Construction or maintenance
- ☐ Contractor activity
- ☐ Other _____

Was this site recently visited *prior* to the security incident? **X** Yes ☐ No
If "Yes," provide additional detail below

Date and time of previous visit: **Daily Morning**

Name of individual who visited the site: **Operator on duty**

Additional Information: _____

Has *this location* been the site of previous security incidents? ☐ Yes **x** No
If "Yes," provide additional detail below

Date and time of most recent security incident: _____

Description of incident: _____

What were the results of the threat evaluation for this incident?
☐ 'Possible' ☐ 'Credible' **x** 'Confirmed'

Have security incidents occurred at *other locations* recently? ☐ Yes **x** No
If "Yes", complete additional 'Security Incident Reports' (Appendix 8.3) for each site

Name of 1st additional site: _____
Name of 2nd additional site: _____
Name of 3rd additional site: _____

SECURITY INCIDENT DETAILS

Was there an alarm(s) associated with the security incident? **X** Yes ☐ No
If "Yes," provide additional detail below

Are there sequential alarms (e.g., alarm on a gate and a hatch)? ☐ Yes **x** No

Date and time of alarm(s): _____

Describe alarm(s): **Chlorine alarm**

Is video surveillance available from the site of the security incident? ☐ Yes **x** No
If "Yes," provide additional detail below

Date and time of video surveillance: _____

Describe surveillance: _____

Unusual equipment found at the site and time of discovery of the security incident:

- ☐ Discarded PPE (e.g., gloves, masks)
- ☐ Tools (e.g., wrenches, bolt cutters)
- ☐ Lab equipment (e.g., beakers, tubing)
- **x** None
- ☐ Empty containers (e.g., bottles, drums)
- ☐ Hardware (e.g., valves, pipe)
- ☐ Pumps or hoses
- ☐ Other _____

Describe equipment: _____

Unusual vehicles found at the site and time of discovery of the security incident:

- ☐ Car/sedan
- ☐ SUV
- ☐ Pickup truck
- ☐ Flatbed truck
- ☐ Construction vehicle
- **x** None
- ☐ Other _____

Describe vehicles (including make/model/year/color, license plate #, and logos or markings): ____

Signs of tampering at the site and time of discovery of the security incident:

- ☐ Cut locks/fences
- ☐ Open/damaged access hatches
- **x** Facility in disarray
- ☐ Other _____
- ☐ Open/damaged gates, doors, or windows
- ☐ Missing/damaged equipment
- ☐ None

Are there signs of sequential intrusion (e.g., locks removed from a gate and hatch)? ☐ Yes **X** No

Describe signs of tampering: _____

Signs of hazard at the site and time of discovery of the security incident:

- ☐ Unexplained or unusual odors
- ☐ Unexplained dead or stressed vegetation
- ☐ Unexplained clouds or vapors
- **x** Other **Chlorine door**
- ☐ Unexplained dead animals
- ☐ Unexplained liquids
- ☐ None

Describe signs of hazard: **Yellow/green low cloud and dead and dieing vegetation and animals**

SIGNOFF

Name of person responsible for documenting the security incident:

Print name _____

Signature _____ Date/Time: _____

3.2.3 Site Characterization Report Form for Scenario #1

(Transcribed from forms completed by the System Operator)

3.2.3 Site Characterization Report Form for Scenario #1

INSTRUCTIONS

Members of the site characterization team can use this form to record their observations at the investigation site. It also serves as a checklist for notifying incident command at key points during the characterization. Additional checklists are included in this form for sample collection and exiting the site. The completed form can also be used as a component of the site characterization report. A form should be completed for each investigation site that is characterized

GENERAL INFORMATION

Date: _____ **Time arrived investigation at site:** _____

Name of Site Characterization Team Leader: **Sam Smith**

Phone No.: _____ **Fax No.:** _____

LOCATION OF INVESTIGATION SITE

Site Name: **Chlorine room**

Type of facility:

☐ Source water	**x** Treatment plant	☐ Pump station
☐ Finished water reservoir	☐ Elevated storage tank	☐ Ground storage tank
☐ Distribution main	☐ Hydrant	☐ Service connection
☐ Other _____		

Address: _____

_____

Weather Conditions at Site: **Important**

_____

Additional Site Information: **Important**

_____

APPROACH TO SITE

Time of Approach to Site: _____

Initial Field Safety Screening (as listed in the "Site Characterization Plan"):

☐ None	☐ Radiation	☐ Volatile chemicals
x HAZCAT	☐ Chemical weapons	☐ Biological agents
☐ Other _____		

Report results of field safety screening in Section 3.7 "Field Testing Results Form."
If any field safety screening result is above the corresponding reference value, immediately notify incident command and do not proceed further into the site.

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)
- **x** Signs of a potential chemical hazard (e.g., dead animals, unusual fogs, unusual odors)
- ☐ Unusual and unexplained equipment at the site
- ☐ Other signs of immediate hazard _____

If there are any indicators of immediate hazard, immediately notify incident command and do not proceed further into the site.

Report initial observations and results to incident commander.

Approval granted to proceed further into the site? **X** Yes ☐ No

SITE INVESTIGATION

Time of Entry to Site: _____

Repeat Field Safety Screening

☐ None	☐ Radiation	☐ Volatile chemicals
x HAZCAT	☐ Chemical weapons	☐ Biological agents
☐ Other _____		

Report results of field safety screening in Section 3.7 "Field Testing Results Form."
If any field safety screening result is above the corresponding reference value, immediately notify incident command and do not proceed further into the site.

Signs of Hazard:

☐ None	☐ Unexplained dead animals
☐ Unexplained dead or stressed vegetation	☐ Unexplained clouds or vapors
☐ Unexplained liquids	**x** Other _____

Describe signs of hazard: **Yellow/green cloud and dead and dieing animals and vegetation**

Unexplained or Unusual Odors:

☐ None	**x** Pungent	☐ Irritating
☐ Sulfur	☐ Skunky	☐ Bitter almond
☐ Sweet/Fruity	☐ New mown hay	☐ Other _____

Describe unusual odor: **Chlorine**

Unusual Vehicles Found at the Site:

☐ Car/sedan	☐ SUV	☐ Pickup truck
☐ Flatbed truck	☐ Construction vehicle	**x** None
☐ Other _____		

Describe vehicles (including make/model/year/color, license plate #, and logos or markings):

Signs of Tampering:

☐ None	☐ Cut locks/fences
x Open/damaged gates, doors, or windows	☐ Open/damaged access hatches
x Missing/damaged equipment	☐ Facility in disarray
☐ Other _____	

Signs of sequential intrusion (e.g., locks removed from a gate and hatch)?

☐ Yes **x** No

Describe signs of tampering:

Unusual Equipment:

X None	☐ Discarded PPE (e.g., gloves, masks)
☐ Tools (e.g., wrenches, bolt cutters)	☐ Hardware (e.g., valves, pipe)
☐ Lab equipment (e.g., beakers, tubing)	☐ Pumping equipment
☐ Other _____	

Describe equipment:

Unusual Containers:

Type of container:

☐ None	☐ Drum/Barrel	☐ Bottle/Jar
☐ Plastic bag	☐ Box/Bin	☐ Pressurized cylinder
☐ Test Tube	☐ Bulk container	**x** Other **Fire**

Condition of container:

☐ Opened	☐ New	**x** Damaged/leaking
☐ Unopened	☐ Old	☐ Intact/dry

Size of container: (2) one ton containers

Describe labeling on container: Company name, skull and cross bones placard

Describe visible contents of container: _____

Rapid Field Testing of the Water

☐ None	☐ Residual disinfectant	**x** pH / conductivity
☐ Cyanide	☐ Radiation	☐ VOCs and SVOCs
☐ Pesticides	☐ Biotoxins	☐ General toxicity
☐ Other _____		

Report results of rapid field testing of the water in Section 3.7 "Field Testing Results Form."

If any field test result is above the corresponding reference value, immediately notify incident command and wait for instruction regarding how to proceed.

Report findings of site investigation to incident commander.

Approval granted to proceed with sample collection? **X** Yes ☐ No

SAMPLING

Time Sampling was Initiated / Completed: _____ /_____

Implement Sampling Procedures Appropriate for the Hazard Conditions at the Site:

☐ Low hazard	**x** Chemical hazard
☐ Radiological hazard	**x** Biological hazard

If the site is characterized as a chemical, radiological, or biological hazard, then special sampling and safety procedures should be followed.

Safety Checklist:

- **X** **Do not** eat, drink, or smoke at the site.
- **X** **Do not** taste or smell the water samples.
- ☐ **Do** use the general PPE included in the emergency water sampling kit.
- **X** **Avoid** all contact with the water, and flush immediately with clean water in the case of contact.
- **X** **Slowly fill** sample bottles to avoid volatilization and aerosolization.
- **X** **Minimize** the time that personnel are on site and collecting samples.

General Sampling Guidelines:

- **X** Properly label each sample bottle.
- **X** Carefully flush sample taps prior to sample collection, if applicable.
- **X** Collect samples according to method requirements (e.g., w/o headspace for VOCs).
- **X** Add preservatives or dechlorinating agents as specified.
- **X** Carefully close sample containers and verify that they don't leak.
- ☐ Wipe the outside of sample containers with a mild bleach solution if needed.
- **X** Place sample containers into a sealable plastic bag.
- **X** Place samples into an appropriate, rigid shipping container.
- ☐ Pack container with frozen ice packs.
- **X** Complete "Sample Documentation Form" (Section 3.8).
- **X** Complete "Chain of Custody Form" (Section 3.9).
- ☐ Secure shipping container with custody tape.
- **X** Comply with any other sample security provisions required by participating agencies.

EXITING THE SITE

Time of Site Exit: _____

Site Exit Checklist

- **X** Verify that hatches, locks, etc. are properly secured.
- **X** Remove all samples, equipment, and materials from the site.
- **X** Verify that all samples are in the cooler and properly seal the cooler.
- **X** Remove all PPE at site perimeter.
- **X** Place disposable PPE and other trash into a heavy-duty plastic trash bag.
- **X** Verify that the perimeter has been properly secured before leaving the site.
- **X** Ensure that all documentation has been completed before leaving the site perimeter.
- **X** Comply with any site control measures required by participating agencies.
- **X** Contact incident commander and inform them that the team is leaving the site.

SIGNOFF

Site Characterization Team Leader:

Print name _____

Signature _____

3.2.4 Public Heath Response Action Worksheet for Scenario #1

(Transcribed from forms completed by the System Operator)

3.2.4 Public Health Response Action Worksheet for Scenario #1

INSTRUCTIONS

The purpose of this form is to help organize information to aid in the evaluation of containment options and public notification options. The objectives of public health response actions (operational and public notification) are to prevent or limit public exposure to potentially contaminated water by either restricting further propagation of the contaminant through the distribution system or restricting use of the water through public notification. This worksheet assumes that the "Contaminant Characterization and Transport Worksheet" in Section 5.3 has been completed to the extent possible.

ASSESSMENT OF PUBLIC HEALTH IMPACT

Identity of the contaminant ☐ Suspected **x** Known ☐ Unknown
Describe **Chlorine**

Contaminant properties (if known):
Toxic or infectious dose (LD_{50}/ID_{50}): **Toxic**
Route of exposure:
x Ingestion **x** Inhalation **x** Dermal Contact
☐ Other
Symptoms of exposure to high dose: **Death**
Symptoms of exposure to low dose: **Nasal burning and trouble breathing**
Other:

EVALUATION OF CONTAINMENT OPTIONS

Describe the location and extent of the contaminated area.

Containment options
☐ Valve closures ☐ Reverse flow conditions ☐ By-pass
☐ Isolate zone(s)
x Other **B kit**

Critical equipment within contaminated area
x System equipment ☐ Zones ☐ Pump stations
☐ Hydrants ☐ Other

Customers with special needs within contaminated area
☐ Critical Care Facilities
- ☐ Hospitals ☐ Clinics
- ☐ Nursing Homes **x** Dialysis Centers
- ☐ Other

☐ Schools
☐ Businesses
- ☐ Food and Beverage Manufacturers ☐ Commercial Ice Manufacturers
- **x** Restaurants **x** Agricultural Operations
- **x** Power Generation Facilities
- **x** Other **Factory**

Effectiveness of containment options

☐ Complete contaminant isolation ☐ Reduction in spread of contaminant
x Unknown ☐ Other _____

Is containment expected to provide adequate public health protection?
☐ Yes **x** No ☐ Unknown

Timeline for implementation of containment options

Containment procedures to begin: **ASAP**
Containment procedures to end: **When danger passes**

EVALUATION OF PUBLIC NOTIFICATION OPTIONS

Is public notification necessary? **x** Yes ☐ No

Collaboration Agencies (identified in Public Health Response Plan and Utility's ERP)

x Public health agencies **x** Police departments **x** Fire departments
☐ Hospitals/clinics ☐ Laboratories **x** Drinking water primacy agency
☐ Regional Poison Control Center
☐ Other _____

Type of notification (Follow steps shown)

Is the contaminant known? **x** Yes ☐ No
If no, issue a " Do Not Use" notice.
- If yes, is boiling effective and advisable? **x** Yes ☐ No ☐ Unknown
If yes, issue a "Boil Water" notice.
- - If no or unknown, is there a risk of dermal or inhalation exposure? **x** Yes ☐ No ☐ Unknown
If no, issue a "Do Not Drink" notice.
If yes or unknown, issue a " Do Not Use" notice.

Content of public notification

x Has the contamination incident been confirmed? **x** Yes ☐ No
x Is the contaminant known? **x** Yes ☐ No
x If yes, identity of the contaminant **Chlorine**
x Characteristics of the contaminant **Yellow and green low cloud**
x Restrictions on use _____
x Ingestion exposure **x** Inhalation exposure **x** Dermal exposure
x Exposure symptoms **Breathing problems and burning**
☐ Medical treatments _____
☐ Transmission mode (if biological) _____
x Duration of restriction **Unknown**
x Alternate water supply **3 interconnects**
☐ Additional instructions to consumers _____
☐ Other information about the incident _____
☐ Other _____

Notification to customers with special needs

x Critical Care Facilities
- ☐ Hospitals
- ☐ Clinics
- ☐ Nursing Homes
- ☐ Dialysis Centers
- ☐ Other _____

x Schools

x Businesses
- ☐ Food and Beverage Manufacturers
- ☐ Commercial Ice Manufacturers
- x Restaurants
- ☐ Agricultural Operations
- x Power Generation Facilities
- ☐ Other _____

Are there subpopulations that will be affected at a greater rate than general population?

☐ Yes x No ☐ Unknown

Describe _____

Notification to consecutive system.

x Yes ☐ No ☐ Not Applicable

Method of dissemination

x	Broadcast media (radio and television)	☐	Government access channels
☐	Web site	☐	Listserve email
x	Newspaper	☐	Letters by mail
☐	Newsletters (water utility or partner organizations)	☐	Phone banks
☐	Broadcast phone messages	☐	Broadcast faxes
x	Posting in conspicuous locations	☐	Mass distribution through partners
☐	Hand delivery	☐	Door-to-door canvassing
☐	Town hall meetings	☐	Conference calls
☐	Other _____		

Notification/restriction timeline

Notification/restriction to begin: **Now**

Notification/restriction to end: **After two good samples**

ALTERNATE WATER SUPPLY NEEDS

Is an alternate water supply needed?

x	Drinking water	☐	Fire fighting
☐	Other _____		

Where can customers obtain the alternate water supply?

- ☐ Bottled water provided by local government agencies
- x Bottled water provided by local retailers
- x Bulk water provided by certified water haulers
- ☐ Bulk water transported or provided by military assets
- ☐ Bulk water providing by neighboring water utilities
- ☐ Water treated at plant and hauled to distribution centers (i.e., in the case of distribution system contamination)
- x Other **Interconnect**

What customers with special needs should be notified of the alternate water supply availability?

☐ Critical Care Facilities
- ☐ Hospitals
- ☐ Nursing Homes
- ☐ Other _____
- ☐ Clinics
- **x** Dialysis Centers

x Schools

☐ Businesses
- ☐ Food and Beverage Manufacturers
- **x** Restaurants
- **x** Power Generation Facilities
- ☐ Other _____
- ☐ Commercial Ice Manufacturers
- ☐ Agricultural Operations

SIGNOFF

Name of person completing form

Print name _____

Signature _____ Date/Time: _____

Section 3.3

Distribution System Interruption

Scenario #2

3.3 Distribution System Interruption Scenario #2

Condition:
Intentional contamination of a portion of the distribution system.

Scenario:

A saboteur rents a small house.
The individual then removes the dual check from the house meter yoke.
The individual then takes two (2) 5 gallon containers of biological material then injects them with two (2) small PD pumps into your distribution system.
Biological contaminants in the system are:
a. pseudomonas bacteria
b. fecal coliform bacteria

He then leaves the farm house.
Several days later, a number of people on the same line get ill.

Using your ERP, explain what needs to be done in order to reduce the possibility of more people getting ill. How other distribution service customers will be notified. Finally, explain what needs to be done to reconcile this problem.

Action Needed / Taken (Completed by Water System Manager)

1. **Once I realized there was a possible problem, I would sample the affected area for Bac. T's and VOC.**

2. **Then start flushing the whole system and increase the disinfection chemicals until we know what we are dealing with or until we get two (2) good samples.**

3. **I would issue a city wide boil order through the media and post notices and/or directly contact them. I would also contact the IEPA and the IDPH.**

4. **When everything settles down, I would implement a Cross Connection Control Program to include occupancy permits to help stay on top of any future issues regarding rental property.**

3.3.1 Initiation of ERP Form for Scenario #2

(Transcribed from forms completed by the System Operator)

3.3.1 Initiating the ERP for Scenario #2

Indicate the ERP Action Plan(s) to be followed:

X Contamination of the Drinking Water
X Structural Damage/Physical Attack
❑ SCADA, Computer, or Cyber Attack
X Intentional Hazardous Chemical Release (e.g., release of chlorine or ammonia from storage).

Is there a copy of the ERP off the water system premises? **YES** No

Does the Action Plan include the following basic information?

X Any special notification requirements;
X Special response steps to be taken upon ERP activation; and
X Recovery actions to bring the CWS back into operation.

Indicate which first responders would be notified:

- ❑ Local
  - Local 911
  - **x** Police
  - **x** Fire
  - Local Emergency Planning Committee (LEPC)
  - **x** Elected Officials
  - Power Utility
  - Hazardous Materials (HAZMAT) personnel
- ❑ State
  - **X** Drinking Water Primacy Agency
  - **X** Department of Health
  - **X** State 24-hr Emergency Communications Center Telephone
  - State Office of Homeland Security
  - HAZMAT
  - State Police
- ❑ Federal
  - FBI
  - EPA Headquarters and Regional Office
  - Department of Homeland Security (DHS)
  - Department of Health and Human Services (HHS)
  - National Response Center (800-424-8802, http://www.nrc.uscg.mil/)
- ❑ Other
  - Water Information Sharing & Analysis Center (http://www.waterisac.org/)

Hazardous Chemical Release from Water System Facility(ies)

Indicate any special actions and notifications to be taken:

- ❑ Initiate full ERP activation
- ❑ Follow State Incident Command System

X Determine extent/concentration of chemical release and deploy damage assessment team

X Turn off chemical treatment equipment and isolate chemical treatment areas from rest of water system

X Depending on extent and concentration of release, issue evacuation or shelter in place order per Risk Management Program and ERP

X Coordinate alternative water supply, as needed, or consider alternate (interim) treatment schemes

X Issue public notice and issue follow-up media press releases

X Repair damaged facilities

Assess need for additional protection/security measures

Structural Damage/Physical Attack to Water System or Facility(ies)

Indicate special actions and notifications to be taken:

- ❑ Initiate full ERP activation
- ❑ Follow State Incident Command System

X Deploy damage assessment team

X Isolate chemical treatment areas from rest of water system

X Coordinate alternative water supply, as needed, or consider alternate (interim) treatment schemes

X Issue public notice and issue follow-up media press releases

X Repair damaged facilities

X Assess need for additional protection/security measures

Remediation and Recovery

What alternate water sources are identified in the system's ERP?

- ❑ Bottled water provided by outside sources;
- ❑ Bottled water provided by local retailers;
- ❑ Bulk water provided by certified water haulers;
- ❑ Bulk water transported or provided by military assets (i.e., National Guard or U.S. Army Corps of Engineers (USACE));

X Bulk water provided by neighboring water utilities by truck or via pipeline;

- ❑ Bulk water from hospitals, universities, and local industry that maintain backup water supplies for consumption;

X Interconnections with nearby public water systems;

- ❑ Water treated by plant and hauled to distribution centers (i.e., in the case of water distribution system contamination);
- ❑ Water pumped from surface water sources, treated at the plant or nearby plants, and hauled to distribution centers;
- ❑ Water for firefighting from Federal agencies such as the USACE and FEMA; and
- ❑ Water from unaffected wells owned by local citizens and businesses.

Is a list maintained which includes accurate information on points of contacts for the alternate sources?

YES

Replacement Equipment and Chemical Supplies

Do you maintain an updated inventory of:

- **X** Current equipment (e.g., pumps);
- **X** Repair parts;
- **X** Chemical supplies for normal maintenance and operations; and
- **X** Information on mutual aid agreements.

Additional equipment may be available from:

X Local businesses such as dairies, well drillers, irrigation supply firms, or distributors that may have tank trucks that can be made suitable for carrying water, chlorinators or generators that can be used for emergency disinfection, and pipe that can be used to extend water supply lines.

X Other water utilities in the area that may have spare parts (such as valves, pumps, and pipe) available for use in an emergency.

FEMA, USACE, and the U.S. Forest Service that may be able to provide firefighting equipment.

Property Protection

Protecting CWS facilities, equipment and vital records is essential to restoring operations once a major event has occurred. Items considered should include:

- **X** "Lock down" procedures;
- **X** Access control procedures;
- **X** Establishing a security perimeter following a major event;

Evidence protection measures for law enforcement (should the major event also be declared a crime scene);

- **X** Securing buildings against forced entry; and
- **X** Other property protection procedures and measures.

3.3.2 Security Incident Report Form for Scenario #1

(Transcribed from forms completed by the System Operator)

3.3.2 Security Incident Report Form for Scenario #2

INSTRUCTIONS

The purpose of this form is to help organize information about a security incident, typically a security breach, which may be related to a water contamination threat. The individual who discovered the security incident, such as a security supervisor, the WUERM, or another designated individual may complete this form. This form is intended to summarize information about a security breach that may be relevant to the threat evaluation process. This form should be completed for each location where a security incident was discovered.

DISCOVERY OF SECURITY INCIDENT

Date/Time security incident discovered: _____

Name of person who discovered security incident: _____

Mode of discovery:

☐ Alarm (building)	☐ Alarm (gate/fence)	☐ Alarm (access hatch)
☐ Video surveillance	☐ Utility staff discovery	**x** Citizen discovery
☐ Suspect confession	☐ Law enforcement discovery	
☐ Other _____		

Did anyone observe the security incident as it occurred? ☐ Yes **x** No

If "Yes", complete the 'Witness Account Report' (Appendix 8.4)

SITE DESCRIPTION

Site Name: **A single family home**

Type of facility

☐ Source water	☐ Treatment plant	☐ Pump station
☐ Ground storage tank	☐ Elevated storage tank	☐ Finished water reservoir
☐ Distribution main	☐ Hydrant	**x** Service connection
☐ Other _____		

Address: _____

Additional Site Information: **Condition of house**

BACKGROUND INFORMATION

Have the following "normal activities" been investigated as potential causes of the security incident?

☐ Alarms with known and harmless causes	☐ Utility staff inspections
☐ Routine water quality sampling	☐ Construction or maintenance
☐ Contractor activity	**x** Other **N/A**

Was this site recently visited *prior* to the security incident? **x** Yes ☐ No
If "Yes," provide additional detail below

Date and time of previous visit: **Zoning Inspector**

Name of individual who visited the site: **Joe Blow**

Additional Information: **Found to be normal**

Has *this location* been the site of previous security incidents? ☐ Yes **x** No
If "Yes," provide additional detail below

Date and time of most recent security incident:

Description of incident:

What were the results of the threat evaluation for this incident?
☐ 'Possible' ☐ 'Credible' **x** 'Confirmed'

Have security incidents occurred at *other locations* recently? ☐ Yes **x** No
If "Yes", complete additional 'Security Incident Reports' (Appendix 8.3) for each site

Name of 1st additional site:
Name of 2nd additional site:
Name of 3rd additional site:

SECURITY INCIDENT DETAILS

Was there an alarm(s) associated with the security incident? ☐ Yes **x** No
If "Yes," provide additional detail below

Are there sequential alarms (e.g., alarm on a gate and a hatch)? ☐ Yes **x** No

Date and time of alarm(s):

Describe alarm(s):

Is video surveillance available from the site of the security incident? ☐ Yes **x** No
If "Yes," provide additional detail below

Date and time of video surveillance:

Describe surveillance:

Unusual equipment found at the site and time of discovery of the security incident:

- **x** Discarded PPE (e.g., gloves, masks)
- **x** Tools (e.g., wrenches, bolt cutters)
- ☐ Lab equipment (e.g., beakers, tubing)
- ☐ None
- **x** Empty containers (e.g., bottles, drums)
- **x** Hardware (e.g., valves, pipe)
- ☐ Pumps or hoses
- ☐ Other _____

Describe equipment: **Two (2) pumps, garden hoses, pipe wrenches, pipe, and valves**

Unusual vehicles found at the site and time of discovery of the security incident:

- ☐ Car/sedan
- ☐ SUV
- ☐ Pickup truck
- ☐ Flatbed truck
- ☐ Construction vehicle
- **x** None
- ☐ Other _____

Describe vehicles (including make/model/year/color, license plate #, and logos or markings): _____

Signs of tampering at the site and time of discovery of the security incident:

- ☐ Cut locks/fences
- ☐ Open/damaged access hatches
- **x** Facility in disarray
- ☐ Other _____
- **x** Open/damaged gates, doors, or windows
- ☐ Missing/damaged equipment
- ☐ None

Are there signs of sequential intrusion (e.g., locks removed from a gate and hatch)? ☐ Yes **x** No

Describe signs of tampering: _____

Signs of hazard at the site and time of discovery of the security incident:

- **x** Unexplained or unusual odors
- ☐ Unexplained dead or stressed vegetation
- ☐ Unexplained clouds or vapors
- ☐ Other _____
- ☐ Unexplained dead animals
- ☐ Unexplained liquids
- ☐ None

Describe signs of hazard: **Unusual smell, two (2) containers with some unknown liquid**

SIGNOFF

Name of person responsible for documenting the security incident:

Print name _____

Signature _____ Date/Time: _____

3.3.3 Site Characterization Report Form for Scenario #2

(Transcribed from forms completed by the System Operator)

3.3.3 Site Characterization Report Form for Scenario #2

INSTRUCTIONS

Members of the site characterization team can use this form to record their observations at the investigation site. It also serves as a checklist for notifying incident command at key points during the characterization. Additional checklists are included in this form for sample collection and exiting the site. The completed form can also be used as a component of the site characterization report. A form should be completed for each investigation site that is characterized

GENERAL INFORMATION

Date: _____ **Time arrived investigation at site:** _____

Name of Site Characterization Team Leader: **Sam Smith**

Phone No.: _____ **Fax No.:** _____

LOCATION OF INVESTIGATION SITE

Site Name: **#1 Main Street**

Type of facility:

☐ Source water	☐ Treatment plant	☐ Pump station
☐ Finished water reservoir	☐ Elevated storage tank	☐ Ground storage tank
☐ Distribution main	☐ Hydrant	☐ Service connection
☐ Other _____		

Address: **#1 Main Street**

Weather Conditions at Site: **Not Important**

Additional Site Information: **House run down, trash and junk all around**

APPROACH TO SITE

Time of Approach to Site: _____

Initial Field Safety Screening (as listed in the "Site Characterization Plan"):

☐ None	☐ Radiation	☐ Volatile chemicals
☐ HAZCAT	☐ Chemical weapons	**x** Biological agents
☐ Other _____		

Report results of field safety screening in Section 3.7 "Field Testing Results Form."
If any field safety screening result is above the corresponding reference value, immediately notify incident command and do not proceed further into the site.

Initial Observation and Assessment of Immediate Hazards

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

If there are any indicators of immediate hazard, immediately notify incident command and do not proceed further into the site.

Report initial observations and results to incident commander.

Approval granted to proceed further into the site? **x** Yes ☐ No

SITE INVESTIGATION

Time of Entry to Site: _____

Repeat Field Safety Screening

☐ None	☐ Radiation	☐ Volatile chemicals
☐ HAZCAT	☐ Chemical weapons	**x** Biological agents
☐ Other _____		

Report results of field safety screening in Section 3.7 "Field Testing Results Form."
If any field safety screening result is above the corresponding reference value, immediately notify incident command and do not proceed further into the site.

Signs of Hazard:

☐ None	☐ Unexplained dead animals
☐ Unexplained dead or stressed vegetation	☐ Unexplained clouds or vapors
x Unexplained liquids	☐ Other _____

Describe signs of hazard: **Two (2) containers, 2 PD pumps with suction lines inside containers and discharge plumbed to house service**

Unexplained or Unusual Odors:

☐ None **x** Pungent ☐ Irritating
☐ Sulfur ☐ Skunky ☐ Bitter almond
☐ Sweet/Fruity ☐ New mown hay ☐ Other _____

Describe unusual odor: **Smelled bad**

Unusual Vehicles Found at the Site:

☐ Car/sedan ☐ SUV ☐ Pickup truck
☐ Flatbed truck ☐ Construction vehicle **x** None
☐ Other _____

Describe vehicles (including make/model/year/color, license plate #, and logos or markings): _____

Signs of Tampering:

☐ None ☐ Cut locks/fences
x Open/damaged gates, doors, or windows ☐ Open/damaged access hatches
x Missing/damaged equipment ☐ Facility in disarray
☐ Other _____

Signs of sequential intrusion (e.g., locks removed from a gate and hatch)?

x Yes ☐ No

Describe signs of tampering: _____

Unusual Equipment:

☐ None **x** Discarded PPE (e.g., gloves, masks)
x Tools (e.g., wrenches, bolt cutters) **x** Hardware (e.g., valves, pipe)
☐ Lab equipment (e.g., beakers, tubing) **x** Pumping equipment
☐ Other _____

Describe equipment: **Two (2) PD pumps, garden hoses, pipe wrenches, pipes and valves**

Unusual Containers:

Type of container:

☐ None	**x** Drum/Barrel	☐ Bottle/Jar
☐ Plastic bag	☐ Box/Bin	☐ Pressurized cylinder
☐ Test Tube	☐ Bulk container	☐ Other _____

_____

Condition of container:

x Opened	**x** New	☐ Damaged/leaking
☐ Unopened	☐ Old	☐ Intact/dry

Size of container: **Two (2) Five-gallon drums**

Describe labeling on container: **None**

Describe visible contents of container: **Dark**

Rapid Field Testing of the Water

☐ None	**x** Residual disinfectant	**x** pH / conductivity
☐ Cyanide	☐ Radiation	☐ VOCs and SVOCs
☐ Pesticides	☐ Biotoxins	☐ General toxicity
☐ Other _____		

Report results of rapid field testing of the water in Section 3.7 "Field Testing Results Form."

If any field test result is above the corresponding reference value, immediately notify incident command and wait for instruction regarding how to proceed.

Report findings of site investigation to incident commander.

Approval granted to proceed with sample collection? **x** Yes ☐ No

SAMPLING

Time Sampling was Initiated / Completed: _____ /_____

Implement Sampling Procedures Appropriate for the Hazard Conditions at the Site:

☐ Low hazard	**x** Chemical hazard
☐ Radiological hazard	**x** Biological hazard

If the site is characterized as a chemical, radiological, or biological hazard, then special sampling and safety procedures should be followed.

Safety Checklist:

- **Do not** eat, drink, or smoke at the site.
- **Do not** taste or smell the water samples.
- **Do** use the general PPE included in the emergency water sampling kit.
- **Avoid** all contact with the water, and flush immediately with clean water in the case of contact.
- **Slowly fill** sample bottles to avoid volatilization and aerosolization.
- **Minimize** the time that personnel are on site and collecting samples.

General Sampling Guidelines:

- Properly label each sample bottle.
- Carefully flush sample taps prior to sample collection, if applicable.
- Collect samples according to method requirements (e.g., w/o headspace for VOCs).
- Add preservatives or dechlorinating agents as specified.
- Carefully close sample containers and verify that they don't leak.
- Wipe the outside of sample containers with a mild bleach solution if needed.
- Place sample containers into a sealable plastic bag.
- Place samples into an appropriate, rigid shipping container.
- Pack container with frozen ice packs.
- Complete "Sample Documentation Form" (Section 3.8).
- Complete "Chain of Custody Form" (Section 3.9).
- Secure shipping container with custody tape.
- Comply with any other sample security provisions required by participating agencies.

EXITING THE SITE

Time of Site Exit: _____

Site Exit Checklist

- Verify that hatches, locks, etc. are properly secured.
- Remove all samples, equipment, and materials from the site.
- Verify that all samples are in the cooler and properly seal the cooler.
- Remove all PPE at site perimeter.
- Place disposable PPE and other trash into a heavy-duty plastic trash bag.
- Verify that the perimeter has been properly secured before leaving the site.
- Ensure that all documentation has been completed before leaving the site perimeter.
- Comply with any site control measures required by participating agencies.
- Contact incident commander and inform them that the team is leaving the site.

SIGNOFF

Site Characterization Team Leader:

Print name _____

Signature _____ Date/Time: _____

3.3.4 Public Heath Response Action Worksheet for Scenario #2

(Transcribed from forms completed by the System Operator)

3.3.4 Public Health Response Action Worksheet for Scenario #2

INSTRUCTIONS

The purpose of this form is to help organize information to aid in the evaluation of containment options and public notification options. The objectives of public health response actions (operational and public notification) are to prevent or limit public exposure to potentially contaminated water by either restricting further propagation of the contaminant through the distribution system or restricting use of the water through public notification. This worksheet assumes that the "Contaminant Characterization and Transport Worksheet" in Section 5.3 has been completed to the extent possible.

ASSESSMENT OF PUBLIC HEALTH IMPACT

Identity of the contaminant **x** Suspected ☐ Known ☐ Unknown

Describe **Fecal matter**

Contaminant properties (if known):

Toxic or infectious dose (LD_{50}/ID_{50}): _____

Route of exposure:

x Ingestion ☐ Inhalation ☐ Dermal Contact

☐ Other _____

Symptoms of exposure to high dose: **Death**

Symptoms of exposure to low dose: **Sickness**

Other: _____

EVALUATION OF CONTAINMENT OPTIONS

Describe the location and extent of the contaminated area. **One neighborhood about six blocks**

Containment options

☐ Valve closures ☐ Reverse flow conditions ☐ By-pass

☐ Isolate zone(s)

x Other **Flush the system**

Critical equipment within contaminated area

☐ System equipment ☐ Zones ☐ Pump stations

x Hydrants ☐ Other _____

Customers with special needs within contaminated area

☐ Critical Care Facilities

- ☐ Hospitals
- ☐ Clinics
- ☐ Nursing Homes
- **x** Dialysis Centers
- ☐ Other _____

☐ Schools

☐ Businesses

- ☐ Food and Beverage Manufacturers
- ☐ Commercial Ice Manufacturers
- **x** Restaurants
- ☐ Agricultural Operations
- **x** Power Generation Facilities
- **x** Other _____

Effectiveness of containment options

☐ Complete contaminant isolation
x Reduction in spread of contaminant
☐ Unknown
☐ Other _____

Is containment expected to provide adequate public health protection?

x Yes ☐ No ☐ Unknown

Timeline for implementation of containment options

Containment procedures to begin: **72 hours**
Containment procedures to end: _____

EVALUATION OF PUBLIC NOTIFICATION OPTIONS

Is public notification necessary? **x** Yes ☐ No

Collaboration Agencies (identified in Public Health Response Plan and Utility's ERP)

x Public health agencies **x** Police departments ☐ Fire departments
x Hospitals/clinics **x** Laboratories **x** Drinking water primacy agency
☐ Regional Poison Control Center
☐ Other _____

Type of notification (Follow steps shown)

Is the contaminant known? **x** Yes ☐ No
If no, issue a " Do Not Use" notice.
- If yes, is boiling effective and advisable? **x** Yes ☐ No ☐ Unknown
If yes, issue a "Boil Water" notice.
- - If no or unknown, is there a risk of dermal or inhalation exposure? ☐ Yes **x** No ☐ Unknown
If no, issue a "Do Not Drink" notice.
If yes or unknown, issue a " Do Not Use" notice.

Content of public notification

x Has the contamination incident been confirmed? **x** Yes ☐ No
x Is the contaminant known? **x** Yes ☐ No
x If yes, identity of the contaminant _____
x Characteristics of the contaminant _____
x Restrictions on use _____
x Ingestion exposure ☐ Inhalation exposure **x** Dermal exposure
☐ Exposure symptoms _____
☐ Medical treatments _____
☐ Transmission mode (if biological) _____
☐ Duration of restriction **Until two good samples received**
x Alternate water supply _____
x Additional instructions to consumers **Do not consume**
☐ Other information about the incident _____
☐ Other _____

Notification to customers with special needs

☐ Critical Care Facilities
- ☐ Hospitals
- ☐ Nursing Homes
- ☐ Other
- ☐ Clinics
- **x** Dialysis Centers

x Schools

x Businesses
- ☐ Food and Beverage Manufacturers
- **x** Restaurants
- **x** Power Generation Facilities
- ☐ Other **Factories**
- ☐ Commercial Ice Manufacturers
- ☐ Agricultural Operations

Are there subpopulations that will be affected at a greater rate than general population?
☐ Yes **x** No ☐ Unknown
Describe

Notification to consecutive system.
☐ Yes **x** No ☐ Not Applicable

Method of dissemination

x	Broadcast media (radio and television)	☐	Government access channels
☐	Web site	☐	Listserve email
x	Newspaper	☐	Letters by mail
☐	Newsletters (water utility or partner organizations)	☐	Phone banks
☐	Broadcast phone messages	☐	Broadcast faxes
x	Posting in conspicuous locations	☐	Mass distribution through partners
☐	Hand delivery	☐	Door-to-door canvassing
☐	Town hall meetings	☐	Conference calls
☐	Other		

Notification/restriction timeline

Notification/restriction to begin: **ASAP**
Notification/restriction to end: **After two good samples**

ALTERNATE WATER SUPPLY NEEDS

Is an alternate water supply needed?

x	Drinking water	☐	Fire fighting
☐	Other		

Where can customers obtain the alternate water supply?
- **x** Bottled water provided by local government agencies
- **x** Bottled water provided by local retailers
- **x** Bulk water provided by certified water haulers
- ☐ Bulk water transported or provided by military assets
- **x** Bulk water providing by neighboring water utilities
- **x** Water treated at plant and hauled to distribution centers (i.e., in the case of distribution system contamination)
- ☐ Other

What customers with special needs should be notified of the alternate water supply availability?

☐ Critical Care Facilities
- ☐ Hospitals
- ☐ Nursing Homes
- ☐ Other _____
- ☐ Clinics
- **x** Dialysis Centers

x Schools

x Businesses
- ☐ Food and Beverage Manufacturers
- **x** Restaurants
- **x** Power Generation Facilities
- ☐ Other **Factories**
- ☐ Commercial Ice Manufacturers
- ☐ Agricultural Operations

SIGNOFF

Name of person completing form

Print name _____

Signature _____ Date/Time: _____

Section 4

SUMMARY, RECOMMENDATIONS, and CONCLUSIONS

4.1 Summary

Three ERTC personnel performed the evaluation of the VA and ERP at "Plant B" during January of 2006. The evaluation was performed in three parts: initial visit; follow-up visit; and the system manager's response to the two water system interruption scenarios. To assess the VAs and ERPs at the water system, ERTC developed an evaluation method based upon protocol developed by the U.S. EPA, the Kansas Department of Health and Environment (KDHE), and the National Rural Water Association (NRWA). Using a risk assessment method modified from the KDHE method, allowed ERTC to evaluate existing deterrents in the water system while at the same time determining which elements of the system are at greatest risk.

All areas of the system were evaluated for risk. Using the evaluation results, ERTC ranked specific elements of the system with the highest risk, based upon their numeric risk value. The water system management should make it the highest priority to work toward reducing the risk to the element with the high-risk values. The elements of the water system with the highest risk values are ranked and presented below:

1.	Filling from Hydrants	(45)
2.	Sewer System Maintenance	(30)
3.	Fire Truck Connection to Hydrants	(27)
4.	Booster Pump Station	(27)
5.	Meters	(24)
6.	Flush Hydrants	(24)

ERTC also used general questions from the Section 1 of the NRWA Vulnerability Self-Assessment for Small Water Systems to further review the areas of greatest concern related to protection of the potable water supply. Areas in the distribution system that had already been protected in a positive manner were also noted. Listed below are the practices or components of the system that should be considered for improvement.

1. Allowing haulers to fill from hydrants has a risk value of 45. This value is high because of the potential for cross connection event occurring and contaminating the water system. During the flood of 1993, Plant B performed a valuable service to the community by allowing water tanker trucks to fill from its hydrants and haul water to facilities deprived of water service. Because of the reliability of the Plant B water system, it is likely that in another emergency situation it would again be a supplier of water to fill tanker trucks. The hydrant used to fill the tanker trucks is not protected with a RPZ backflow prevention assembly.

2. Allowing the public works department uses water from fire hydrants during maintenance of the sewer collections system such as jetting and rodding has a risk value of 30. This value is high because of the potential of a cross connection event occurring and contaminating the drinking water system. At this time, RPZs are not used by crews when they draw water from a hydrant during sewer maintenance operations.

3. Allowing fire trucks free access to fire hydrants creates a risk value of 27. The value is relatively high due to the potential risks associated with the possibility of chemical (fire retardants and foaming agents) and biological (bacteria) contaminants being present in fire truck tanks. There is also a potential for the fire truck pumps to exceed the capacity of the water flow in the distribution mains, resulting in a vacuum that could create a backflow condition with the potential for contamination of the potable water supply. This risk is an inherent problem with the use of potable water in firefighting.

4. The booster pump station that serves from 30 to 40 residents has a risk value of 27. The value is relatively high because it does not have an auxiliary power supply. If the electrical power supply is interrupted, 30 to 40 residents will not have a safe reliable source of water.

5. The lack of dual check valves at the meters has a relatively high risk value of 24. Only about 20% of the meter settings have dual check valve installations. Dual check valves at the meter settings are a very strong deterrent to the potential for either intentional or unintentional contamination of the distribution system. All new meter settings are installed with dual check valves. However, there are many old meter services that do not have dual check valves.

6. Flush hydrants are located at water main termination points create a risk value of 24. The value is relatively high because of the remote locations of the hydrants.

4.2 Water System Interruption Scenarios

The water system manager was provided with two water system interruption scenarios to address. The first scenario presents the manager with an incident of vandalism by a disgruntled ex-employee, who causes a chlorine release and subsequently disables the chlorination system. The second scenario is an act of a terrorist introducing a biological contaminant into the water system. This was a cognitive exercise designed to make the manager dust-off his ERP and use it to complete the *incident report forms* and *worksheets* provided to them by ERTC. The second benefit of working through the exercise was that the manager would realize the value of updating and upgrading his ERP and VA.

In an interview subsequent to the completion of the system interruption scenario *incident report forms* and *worksheets*, he stated that the exercise was very worthwhile and made him realize the value of maintaining a current VA and ERP.

4.3 Recommendations to the System Manager

The following recommendations have been compiled by the ERTC evaluation staff to aid the water system manager in upgrading his facility and avoiding possible contamination of the potable water supply. The review committee also noted elements of the water system that had already been protected. The recommendations are based on the evaluation of the VA prepared by the water system using the NRWA Vulnerability Self-Assessment Guidelines. The Kansas Department of Health and Environment (Bureau of Water) *Simplified Vulnerability Assessment Tool for Drinking Water* was used as a tool to evaluate the VA.

Cross Connection Control Program:

With a well-maintained and well-managed system such as Plant B, the greatest threat to the delivery of safe potable water to its customers is the possibility of contamination during a backflow incident. The initiation of a Cross Connection Control Program is highly recommended. This includes the passage of an ordinance by the city government, approval of the program by Illinois EPA, and continued diligence in administering the program. At this time, the City has passed an ordinance, and it is awaiting the approval of the program by Illinois EPA. As soon as the City receives approval of its ordinance by IEPA, the Cross Connection Control Program should be initiated.

RPZ Backflow Prevention:

During emergency situations such as the flood of 1993, Plant B allowed water haulers to fill at their plant; in the event of another such emergency, will probably do so again. To ensure the safety of the Plant B water distribution system during the filling of the water tanker trucks, an RPZ backflow prevention assembly should be installed at the fill hydrant. The RPZ prevention assembly should be installed as soon as possible because emergencies, by their very nature, occur without warning.

Fire Trucks:

Allowing fire trucks free access to fire hydrants is a relatively high risk. The potential risks are associated with the possibility of fire retardants and contaminated water being present in fire truck tanks. There is also a potential for the fire truck pumps to exceed the capacity of the water flow in the distribution mains, resulting in a vacuum that could create a backflow condition with the potential for contamination of the potable water supply. It is recommended that water system personnel be present when fire trucks are using water from hydrants.

Dual Check Valves:

As a part of the Cross Connection Control Program, Plant B should begin replacing or retrofitting all of its meter settings to include dual check valves. Dual check valves at the meters settings are a very strong deterrent to the potential for either intentional or unintentional contamination of the distribution system.

Hydrant Replacement Program:

The water system should initiate a hydrant replacement program. The program should be designed to replace all of the old, non-breakaway hydrants within the next five to ten years.

Booster Pump Station:

The booster pump station that serves 30 to 40 residents does not have a backup power supply. It is recommended that the water system ensure that the booster pump can be operated by a portable electrical power supply to prevent interruption of service.

Warning Signs:

Warning and *Do Not Enter* signs should be posted at secure areas such as pumphouses and storage tanks.

Intruder Alert:

Plant B is not manned and monitored on 24 hour a day basis, providing an opportunity for intruders during off-duty hours. The water treatment plant has intruder alarms that will call the village police department. It is recommended that the intruder alarms be connected to the SCADA system and the automatic dialer to alert the on-call staff when unauthorized personnel enter the buildings.

Back Flow Device Inspection:

The water system should continue to ensure that a physical inspection of back flow prevention devices such as RPZs and dual check valves occurs in the water system.

Back Flow Device Inspection

A licensed plumber who is also a certified Cross Connection Control Device Inspector (CCCDI) should perform all inspections of backflow devices.

List of Registered Contractors:

It is recommended that all people who will be working in the distribution system register with the water system in some manner. A list of CCCDI professionals should be kept at the office and provided to water customers who are in need of their services.

Lawn Irrigation System:

The water system should continue to ensure that all customers with a lawn irrigation system install and maintain the required back flow device such as RPZs and dual check valves.

Periodic Inspections:

Periodic inspections of the water towers and ground storage tanks should be scheduled as a significant deterrent to intentional/unintentional threat to the water quality of the system.

High Hazard Areas:

High hazard areas in the distribution system should always take a high priority by way of periodic review. It only takes a small amount of certain chemicals to create a very big problem in the potable water system.

Seasonal Bill Stuffers:

Seasonal bill stuffers in the water bills should be considered as a method of informing the customer of possible unintentional system contamination through cross connection violations. Spring is an opportune time of year, since people are active out of doors filling swimming pools and using hand held chemical spray bottles.

Computer Software:

Computer software might be considered to help assist in managing your annual backflow prevention assembly testing requirements. These programs are now capable of doing a variety of other duties such as scheduling water quality monitoring, hydrant flushing, flow testing, and valve exercising.

4.4 Conclusions

It is our conclusion that "Plant B" is a very well managed water plant and distribution system. It has a backup power supply, a fenced plant and well field with each wellhead and pump in a secure, locked building. The plant is patrolled routinely (at least twice per shift) by the village police, and the building has an intruder alert that calls the police department when activated. All are very important elements of a reliable water system.

The water system has done a very good job of using its limited manpower and resources to help create and upgrade deterrents to intentional and/or unintentional situations that may lead to contamination of the public water supply. However, ERTC recommends the implementation of a Cross Connection Control Program, which will eliminate most of the potential threats to the water system. Also recommended, is the installation of a backup power supply to operate the booster pump station during the inevitable electrical outage.

The VA and ERP prepared by the water system were adequate and met all the requirements. However, there were a few discrepancies found between the VA prepared by the water system and the one prepared by ERTC evaluation staff. It was evident that few, if any, of the security issues identified in the VA have been addressed. It is our belief that after the original VA was prepared and forwarded to U.S. EPA, a copy was placed into a file cabinet and not looked at again until a day or two before the ERTC visit. This is typical human behavior, for the manager who uses all of his work time addressing the daily responsibilities of running the water system, while placing the VA out-of-site and out-of-mind. To alleviate the problem of the out-of-site-out-of-mind VA, it is recommended that all of the subject water systems perform some type of periodic update of the VA.

The water system does use its ERP, as evidenced by the report provided by the manager describing a recent break in a large transmission main that threatened the entire water distribution system. The manager also states that he makes an attempt to upgrade the ERP each year.

References:

Emergency Response Protocol Toolbox

U.S. Environmental Protection Agency
www.epa.gov/safewater/watersecurity/pubs/rptb_response_guidelines.pdf

Simplified Vulnerability Assessment Tool for Drinking Water

Kansas Department of Health and Environment.
www.kdheks.gov/water/security.html
Click on KDHE Simplified Vulnerability Analysis

Security Vulnerability Self-Assessment Guide for Small Drinking Water Systems

National Rural Water Association
www.ilrwa.org
Click on Security, then click on Water Vulnerability Assessment

Emergency Response Plan Guidance for Small and Medium Community Water Systems to comply with the Public Health Security and Bioterrorism Preparedness and Response Act of 2002

U.S. Environmental Protection Agency, Office of Water. EPA 816-R-04-002. April 2004
www.epa.gov/safewater/security

Title 35, Environmental Protection, Rules and Regulations of the State of Illinois

Subtitle F: Public Water Supplies
- Chapter I: Pollution Control Board
  - Section 607.104 Cross Connection
- Chapter II: Environmental Protection Agency
  - Section 653.801 Cross Connection Control Program
  - Section 653.802 Specified Conditions and Installation Procedures
  - Section 653.803 Cross Connection Control Devices
  - Section 653.804 Heat Exchange Cross Connections
  - Section 653.805 Fire Protection

Illinois Pollution Control Board/Illinois Environmental Protection Agency
www.ipcb.state.il.us/SLR/IPCB and IEPA Environmental Regulations - Title 35.asp