Homeland Security Review Of Small Public Water Systems

"Plant A"

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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Midwest Technology Assistance Center
Illinois State Water Survey
2204 Griffith Drive
Champaign, Illinois 61820

Performed by:
Environmental Resources Training Center
Campus Box 1075
Southern Illinois University Edwardsville
Edwardsville, Illinois 62026-1075
618-650-2030
www.siue.edu/ERTC

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 A" water system, which would be representative of small surface water systems throughout the state.

Four ERTC personnel performed the evaluation of the VA and ERP at "Plant A" (a system that treats surface water) during February 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, 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 security (fences and intruder alarms) at the plant, pump house, and raw water pumphouse. The remoteness of the reservoirs, their use for recreational boating, and the improper disposal of wastewater from lakeside residents are also threats to the delivery of safe, reliable drinking water to the water system.

The water system manager was provided with two water system interruption scenarios to address. The first scenario presents the manager with an incident where an accidental fire occurred in the chlorine room. 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 security measures at the plant and the reservoir, and improvements in the Cross Connection Control Program.

The ERP was hand written, which demonstrates the manager's determination to do a good job, even with limited resources. The manager and operator stated that they attempt to make updates to the ERP as time permits. The VA and ERP were adequate and met or exceeded all the requirements. To ensure that the information in the VA and ERP are kept current, it is recommended that the water system perform some type of periodic update of both documents.

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 four 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. Kim Bateman holds a class C/D water operator license and an IEPA Cross Connection Control Inspector license. He also has over 20 years of experience in water and wastewater 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 surface water treatment system, hereafter referred to as "Plant A".

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), the U.S. EPA *Emergency Response Plan for Small and Medium Community Water Systems,* 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 to High	1 to 5	Highly Effective to Ineffective	1 to 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 Surface Water "Plant A"

The source of water for the Plant A water system is surface water supplied by two reservoirs located approximately five miles from the plant. The primary reservoir is 210 acres, the secondary reservoir is smaller, older and only used as an auxiliary supply. The water is pumped from a wetwell in the primary reservoirs to the plant by two, alternating, 1,100 gpm pumps. The plant, which is in the city, is less than five years old and replaces the plant built in the 1920s. It has been supplying water to its customers for approximately 80 years. The distribution system supplies water to two schools, two car washes, two senior citizen's resident homes, five restaurants and four convenience stores, one mortuary, and one laundry mat, along with approximately 1,800 residential service connections. The system also supplies water to seven satellites water system that consists of neighboring small towns. The total number of customers supplied is approximately 7,500. 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 summary of the Plant A system is provided below.

Water Source

1. Two reservoirs

Water Plant

1. Two Raw Water Pumps
2. One Raw Water Pumphouse
3. One Rapid Mix Tower
4. Two Clarifiers
5. Three Filters
6. Two Clearwells
7. Two Raw Water Pumps
8. Two High Service Pumps
9. Two Backwash Pumps
10. Chemical Feeders
11. Chlorination System (150# cylinders)
12. Fluoridation Feed System (hydrofluorisilisic acid)
13. Chemical Inventory
    a. Lime
    b. Soda Ash
    c. Polyphosphate
    d. Ammonium Sulfate
    e. Alum
    f. Hydrochloric Acid
    g. Chlorine Gas
    h. Fluoride (hydrofluorisilisic acid)
    i. Potassium Permanganate
    j. Carbon (PAC)
14. Treatment Plant Building
15. Chlorine Building
16. High Service Pump Building
17. Carbon and Lime Feeder Room
18. Office/Laboratory Room
19. Two Auxiliary Electrical Power Generators (at the plant and raw water pumphouse)
20. Six employees

Distribution System

One 500,000 gallon elevated storage tower
Unknown length of distribution main ranging from 1-inch to 14-inch
1,800 service connections in town
Supplies seven satellite systems
7500 total customers in system
Fire hydrants
Seven master meters
One bulk water sale station

High Priority Customer

- Two Schools
- Five Restaurants
- Four Convenience Stores
- Two Senior Citizen's Homes
- Two Car Washes
- One Mortuary
- One Laundry Mat

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. Two Reservoirs

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

Comments: Reservoirs are not fenced, but do have security patrols & neighborhood watch.

2. Building - Treatment Plant

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

Comments: Bldg locked, not fenced. Only security is neighborhood watch.

3. Treatment Plant – Rapid Mix Tank & Clarifiers

P = 4	C = 4	E = 5	R = 80	N/A

Comments: Tanks not fenced. No security in place for this part of plant.

4. Building - Raw Water Pumphouse

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

Comments: Pumphouse is not Fenced.

5. Building - High Service Pumphouse

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

Comments: Pumphouse is not Fenced.

6. Water Treatment Chemicals

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

Comments: 10 at plant

7. Lab Chemicals -

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

Comments:

8. Storage Tanks

Elevated - 500,000 gal

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

Comments: Fenced and locked. Very visible to public.

9. Ground Storage Tank –

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

Comments:

10. Primary Power

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

Comments:

11. Auxiliary Power – Two Generators

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

Comments: Transfer switch installed at plant, System does not own a generator.

12. Booster Pumps 2

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

Comments: In locked building, needs to be fenced.

13. Piping

Below Ground

P = 3	C = 3	E = 1	R = 9	N/A

Comments:

14. Valves

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: Hydrants

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

Comments:

16. Meters – 1,800 Residential

P = 2	C = 3	E = 3	R = 18	N/A

Comments: Newer meters have dual check valves. Dual check valves required on all new services.

17. Meters – Satellite Master Meters

P = 2	C = 3	E = 3	R = 18	N/A

Comments: Six meters are locked and secured. One is in vault with heavy door.

18. Offices – Offices in Village Hall Building

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

Comments: Very secure bldg, shared with Village

19. Computers 1 PC

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

Comments: Not accessible from outside of plant.

20. 2) SCADA

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

Comments:

21. Files

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

Comments: Stored in secure area at City Hall

22. Transportation

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

Comments: Vehicles are secured at night.

23. Employees – 5 fulltime employees with 1 floater

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

Comments:

24. Telephones – 1

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

Comments: One phone located at plant.

25. Radios –

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

Comments:

26. Critical Customers: Two Schools

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

Comments: RPZs installed at both facilities.

27. Critical Customers – Five Restaurants

P = 2	C = 3	E = 3	R = 18	N/A

Comments: No RPZs at these facilities.

28. Critical Customers – Four Convenience Stores

P = 2	C = 3	E = 3	R = 18	N/A

Comments: No RPZs at these facilities.

29. Critical Customers – Two Senior Citizens Homes

P = 2	C = 3	E = 3	R = 18	N/A

Comments: No RPZs at these facilities.

30. Two Car Washes

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

Comments: RPZs installed at both facilities.

31. Critical Customers – One Mortuary

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

Comments: RPZ installed at facility

32. One Laundry Mat

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

Comments: RPZ installed at facility

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 [x]

   N/A [ ]

   Action Needed/Taken:
   Plant bldgs, and outside tanks not fenced. Access to rapid mixing tank and clarifiers is not restricted.

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

   Yes [ ] No [x]

   N/A [ ]

   Action Needed/Taken:
   None of the plant, tanks or associated buildings are fenced. Raw water pump house is fenced.

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:

   Buildings are locked. Neighborhood watch is only other deterrent.

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

Yes [x] No [ ]

N/A [ ]

Action Needed/Taken:

All areas have lighting except the elevated tank.

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

Yes [x] No [ ]

N/A [ ]

Action Needed/ Taken:

Tower does not have signs.

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

Yes [x] No [ ]

N/A [ ]

Action Needed/Taken:

Water plant is manned daily. The reservoir is patrolled by lake security on a part time basis.

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:

Plant is very visible. Most of the plant is in two buildings.

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

Yes [ ] No [x]

N/A [ ]

Action Needed/Taken

Needed at raw water pump house and at plant.

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 [ ] No [ ]

N/A [x]

Action Needed/Taken:

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

Yes [ ] No [ ]

N/A [x]

Action Needed/Taken:

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

Yes [ ] No [ ]

N/A [x]

Action Needed/Taken:

14. Is your surface water source secured with fences or gates? Do your water system personnel visit the reservoir?

Yes [x] No [x]

N/A [ ]

Action Needed/Taken:
Reservoir is not fenced. Pumphouse is locked. Patrols are made by part time lake security officer.

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:

Raw water is tested several times per day.

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

Yes [x] No [ ]

N/A [ ]

Action Needed/Taken:

A tank ladder can only be accessed through a locked hatch.

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:

Only water system employees flush the hydrants. Fire Dept. has use of hydrants.

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 [ ] No [x]

N/A [ ]

Action Needed/Taken:
Employees need photo ID badges.

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:

Keys are the only item to return at this time.

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

Yes [x] No [x]

N/A [ ]

Action Needed/Taken:
Vehicles are identified as public works owned. Employees do not have uniforms.

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 [x]

N/A [ ]

Action Needed/Taken: Maps and documents are well controlled by public works dept. Documents should be 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 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:

4. Of your 1,800 water customers, how would they be categorized.
   a. high hazard a. 1%
   b. low hazard b. 99%
   c. What factors were used to determine a difference between high hazard and low hazard? The operator estimated the percent of high hazard customer at the time of the survey.

      N/A [ ]

   Action Needed/Taken: Installation of backflow devices at high hazard customers.

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 [x]
3. Class C/D [x]
4. Office workers [x]

N/A [ ]

Action Needed/Taken:

7. Do you incorporate the process of seasonal stuffers with your billing?

Yes [ ] No [x]

N/A [ ]

Action Needed/Taken: CCR is published in 2 newspapers.

8. What type of backflow prevention do you require on lawn sprinkler systems?

RPZ [x]
Other [ ]

N/A [ ]

Action Needed/Taken:
Cross Connection Program in place

9. Does the District do its own water main taps?

Yes [x] No [x]

N/A [ ]

Action Needed/Taken: Taps performed by licensed plumber and inspected by water dept personnel. Some performed by water dept.

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

Yes [ ] No [x]

N/A [ ]

Action Needed/Taken: Only water dept. personnel perform flushing operations.

11. Are flush hydrants kept locked up?

Yes [ ] No [x]

N/A [ ]

Action Needed/Taken:
No hydrants are locked.

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

N/A [x]

Action Needed/Taken:

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

N/A [x]

Action Needed/Taken:

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

N/A [x]

Action Needed/Taken:

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 [ ] No [x]

N/A [ ]

Action Needed/Taken:
None in system.

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 [ ]

   N/A [x]

   Action Needed/Taken:

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

   N/A [X]

   Action Needed/Taken:

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 [ ] No [ ]

   N/A [x]

   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 [ ] No [ ]

N/A [x]

Action Needed/Taken:

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 [ ]

N/A [x]

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 [x] No [ ]

   N/A [ ]

   Action Needed/Taken:

   Active program in place.

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

   N/A [ ]

   Action Needed/Taken:

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

   N/A [ ]

   Action Needed/Taken:

   Required by system

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

   N/A [ ]

   Action Needed/Taken:

   Surveys are on going.

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

Phone [ ]
Mail [x]
Personal Visit [ ]

N/A [ ]

Action Needed/Taken:
Mailed to all residential customers. Perform personal visit to commercial customers and if residential customer does not complete survey.

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

Yes [x] No [ ]

N/A [ ]

Action Needed/Taken:

Inspection performed when the reply on the survey indicates a problem.

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

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

N/A [ ]

Action Needed/Taken:
Water operator inspects residential, CCCDI plumbing inspector is used for commercial customers.

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:

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:

Recommend that they report to the water department.

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

N/A [ ]

Action Needed/Taken

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 new connections to the distribution system or change of ownership?
Yes [x] No [ ]

N/A [ ]

Action Needed/Taken

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:
Fire trucks have collapsible suction lines and tanker trucks bring water to drop tanks.

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

N/A [ ]

Action Needed/Taken:
Customers are required to disconnect well from residential water system.

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

N/A [ ]

Action Needed/Taken:

RPZs required

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:
Works with certain plumbers and contractors that perform taps and main extensions, all are known to the manager.

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 [x] No [ ]

N/A [ ]

Action Needed/Taken:

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:

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 [ ] No [x]

N/A [ ]

Action Needed/Taken:

Considering annual SCBA training

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 =	C =	E =	R =	N/A X

Action Needed/Taken: No private wells.

2. Lawn irrigation systems

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

Action Needed/Taken: RPZs required, along with annual testing.

3. Outside yard hydrants

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

Action Needed/Taken: Not all residents are protected with dual check valves.

4. Outside personal fire hydrants

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

Action Needed/Taken

5. Fire trucks

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

Action Needed/Taken: Fire dept. uses RPZ or drop tanks, they do not connect directly to hydrants.

6. Internal Program Conflicts

a. distribution system hydrant flushing

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

Action Needed/Taken: System employees does all of the flushing.

b. collections system line flushing

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

Action Needed/Taken:

c. cleaning out collection system vac. trucks

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

Action Needed/Taken: Water utility needs a dedicated policy for contractor hook-up to hydrants

d. Sewer jetting

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

Action Needed/Taken:
Jetting truck operated by public works department. Departments communicate well, policy in place for hydrant usage.

7. Auxiliary water system
   a. bulk water station

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

Action Needed/Taken:

Air gap and atmospheric vacuum breaker installed.

8. Residential home water softener

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

Action Needed/Taken: System is progressively changing out old meter services, to newer models with dual check valves.

9. Filling swimming pool---winter chemicals, stagnate water

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

Action Needed/Taken: Residents are not allowed to fill pools from hydrants. Atmospheric vacuum breakers required on new construction and dual check valves on all new meters.

10. Feeding chlorine at plant

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

Action Needed/Taken:
RPZs need to be tested annually..

11. Feeding other types of plant chemicals, etc.

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

Action Needed/Taken:
Protection is provided through in-house isolation. All systems that require a potable water supply need an annual review.

12. Are air gaps installed correctly?

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

Action Needed/Taken:
Yes

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

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

Action Needed/Taken:
Yes, they are installed correctly.

14. Hydrant program,

a. are RPZs required and tested before hydrant is used

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

Action Needed/Taken:

Hydrants are protected by dual checks valves, recommend using RPZs.

b. are hydrants designated/permitted

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

Action Needed/Taken:
System has a designated hydrant and requires a permit.

15. Are hot boxes (outside enclosures) for backflow prevention assemblies kept locked?

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

Action Needed/Taken:

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

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

Action Needed/Taken:

17. Any outside backflow prevention assembly enclosures without freeze protection

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

Action Needed/Taken:

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

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

Action Needed/Taken:

18. RPZ assembly and its relationship to a drain

a. is there potential contamination from flooding due to undersized drain,

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

b. alarm system for backflow prevention assembly discharge

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

Action Needed/Taken: Considering installing an alarm system because of possible flooding and relative damage to surrounding equipment

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

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

Action Needed/Taken:

19. Fertilizer Plant Connections to Water

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

Action Needed/Taken:

20. Water main breaks, unaccounted for water

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

Action Needed/Taken: Breaks repaired by system. Estimate lost water based upon known daily usage.

21. Have your fire or flush hydrants been hit by vehicles?

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

Action Needed/Taken:
The system uses break away hydrants, which have isolation capability.

22. Is your interconnect point protected?

P = 2	C = 3	E = 3	R = 18	N/A

Action Needed/Taken:
One of seven vaults is not locked. One of seven master meters does not have a check valve.

Section 3
Water System Interruption Scenarios

3.1 Introduction

To further test the effectiveness of the water system's ERP, its manager was asked to address two water system interruption scenarios. The first scenario presents the manager with an incident of an accidental fire in the chlorine room at the water plant. 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 one form from USEPA *Emergency Response Plan for Small and Medium Community Water Systems,* and 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

Water Plant Operation Interruption

Scenario #1

3.2 Water Plant Operation Interruption Scenario #1 (Plant A)

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

Scenario:

Its winter time and a fire breaks out in the chlorine room due to a faulty heating unit. The fire eventually spreads over to the stored 150 lb cylinders and melts the fusible plugs. As chlorine gas begins to escape, plant personnel are slowed from putting out the fire in a timely manner due to excessive heat and leaking chlorine gas.

During this same time period, the fire department who would normally be one of the first responders is already busy trying to put out a fire in another part of town. These untimely events that have occurred ultimately result in the loss of all available chlorine and chlorine feeding equipment.

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. **Police & fire department would be notified. Evacuation would be determined by wind direction. Hazmat team would be contacted.**
2. **Treatment plant would be shut down & all available personnel would be called in. Mayor & City council notified to take care of public communication.**
3. **Contact Chlorine suppliers to supply chlorine to set up temporary feed system to get plant back on line.**
4. **After chlorine room is cleared, damage assessment would be made & repairs made as soon as equipment is located.**
5. **Written report made & passed on to relevant agencies.**

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
- ❑ 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?

- ❑ 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:

- **X** Local
  - Local 911
  - **X** Police
  - **X** Fire
  - Local Emergency Planning Committee (LEPC)
  - **X** Elected Officials
  - Power Utility
  - Hazardous Materials (HAZMAT) personnel
- **X** State
  - **X** Drinking Water Primacy Agency
  - **X** Department of Health
  - 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
- ❑ 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
- ❑ 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?

- **X** Bottled water provided by outside sources;
- **X** Bottled water provided by local retailers;
- **X** 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;
- o 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:

- 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.
- 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:

- "Lock down" procedures;
- Access control procedures;
- Establishing a security perimeter following a major event;
- Evidence protection measures for law enforcement (should the major event also be declared a crime scene);
- Securing buildings against forced entry;
- 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
- ☐ 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** Routine water quality sampling
- ☐ Contractor activity
- **X** Utility staff inspections
- ☐ Construction or maintenance
- ☐ 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 Operational Check**

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' ☐ '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): _____

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
☐ Flatbed truck
☐ Other _____
☐ SUV
☐ Construction vehicle
☐ Pickup truck
X None

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
☐ Facility in disarray
☐ Other _____
☐ Open/damaged gates, doors, or windows
☐ Missing/damaged equipment
X None

Are there signs of sequential intrusion (e.g., locks removed from a gate and hatch)? ☐ Yes ☐ 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
X Unexplained clouds or vapors
☐ Other **Chlorine odor**
☐ Unexplained dead animals
☐ Unexplained liquids
☐ None

Describe signs of hazard: _____

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: Superintendent

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

LOCATION OF INVESTIGATION SITE

Site Name: _____

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: Wind Direction

_____

Additional Site Information: Water Drainage Direction & Water Course

_____

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	**X** Unexplained clouds or vapors
☐ Unexplained liquids	☐ Other _____

Describe signs of hazard: _____

_____

Unexplained or Unusual Odors:

☐ None ☐ Pungent ☐ Irritating
☐ Sulfur ☐ Skunky ☐ Bitter almond
☐ Sweet/Fruity ☐ New mown hay **X** 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:

X None ☐ Cut locks/fences
☐ Open/damaged gates, doors, or windows ☐ Open/damaged access hatches
☐ 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:

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

Condition of container:

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

Size of container: _____

Describe labeling on container:

_____

Describe visible contents of container: _____

_____

Rapid Field Testing of the Water

X None	☐ Residual disinfectant	☐ 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? ☐ 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	☐ 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.
- ☐ **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

- **X** 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.
- **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 _____ Date/Time: _____

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 ☐ Known **X** Unknown

Describe _____

Contaminant properties (if known):

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

Route of exposure:

X Ingestion ☐ Inhalation ☐ Dermal Contact

☐ Other _____

Symptoms of exposure to high dose: _____

Symptoms of exposure to low dose: _____

Other: _____

EVALUATION OF CONTAINMENT OPTIONS

Describe the location and extent of the contaminated area. Distribution System

Containment options

☐ Valve closures ☐ Reverse flow conditions ☐ By-pass

☐ Isolate zone(s)

X Other NONE

Critical equipment within contaminated area

X System equipment ☐ Zones **X** Pump stations

X Hydrants ☐ Other _____

Customers with special needs within contaminated area

☐ Critical Care Facilities

- ☐ Hospitals ☐ Clinics
- ☐ Nursing Homes **x** Dialysis Centers
- **X** Other NONE

X Schools

X Businesses

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

Effectiveness of containment options

☐ Complete contaminant isolation ☐ Reduction in spread of contaminant
☐ Unknown **X** Other System Wide Boil Order

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

Timeline for implementation of containment options

Containment procedures to begin: Immediately
Containment procedures to end: After Satisfactory Sample Results

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 ☐ Police departments ☐ Fire departments
☐ Hospitals/clinics ☐ Laboratories **X** Drinking water primacy agency
☐ Regional Poison Control Center
X Other Food Service Establishments

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 ☐ No ☐ Unknown
If no, issue a "Do Not Drink" notice.
If yes or unknown, issue a " Do Not Use" notice.

Content of public notification

☐ Has the contamination incident been confirmed? ☐ Yes ☐ No
☐ Is the contaminant known? ☐ Yes ☐ No
☐ If yes, identity of the contaminant
☐ Characteristics of the contaminant
☐ Restrictions on use
X Ingestion exposure ☐ Inhalation exposure ☐ Dermal exposure
☐ Exposure symptoms
☐ Medical treatments
☐ Transmission mode (if biological)
☐ Duration of restriction
☐ Alternate water supply
☐ Additional instructions to consumers
☐ Other information about the incident
☐ Other

Notification to customers with special needs

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

X Schools

X Businesses
- ☐ Food and Beverage Manufacturers
- **X** Restaurants
- ☐ Power Generation Facilities
- ☐ Other _____
- ☐ Commercial Ice Manufacturers
- **X** 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.
X Yes ☐ No ☐ Not Applicable

Method of dissemination

X	Broadcast media (radio and television)	☐	Government access channels
☐	Web site	☐	Listserve email
☐	Newspaper	☐	Letters by mail
☐	Newsletters (water utility or partner organizations)	☐	Phone banks
☐	Broadcast phone messages	☐	Broadcast faxes
☐	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: Immediately
Notification/restriction to end: After Satisfactory Sample Results

ALTERNATE WATER SUPPLY NEEDS

Is an alternate water supply needed?

X	Drinking water	☐	Fire fighting
X	Other	Bottled Water May Be Used Or Provided For Convenience	

Where can customers obtain the alternate water supply?
- **X** Bottled water provided by local government agencies
- **X** Bottled water provided by local retailers
- ☐ Bulk water provided by certified water haulers
- ☐ Bulk water transported or provided by military assets
- **X** 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)
- ☐ Other _____

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

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

X Schools

X Businesses
- **X** Food and Beverage Manufacturers
- **X** Restaurants
- ☐ 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. And finally, explain what needs to be done to reconcile this problem.

Action Needed / Taken (Completed by Water System Manager)

1. **Bring free chlorine residual to 3.0mg/L**
2. **Public notification made for "Do Not Drink" order. IEPA, County PhD notified, local radio, door to door, police loudspeaker to notify customers of order. All satellite systems contacted to put out notice.**
3. **Sampling schedule will be set up with lab for monitoring.**
4. **Arrange for bottled drinking water to be brought in & distributed.**
5. **Sampling points designated for sample monitoring.**
6. **System flushing done to exit contaminants.**
7. **Continue sampling until regulatory agencies agree to lift order.**

3.3.1 Initiation of ERP Form for Scenario #2

(Transcribed from forms completed by the System Operator)

3.3.1 *Initiation of ERP Form for Scenario #2*

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

- **X** Contamination of the Drinking Water
- ❑ Structural Damage/Physical Attack
- ❑ SCADA, Computer, or Cyber Attack
- o 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:

- **X** Local
  - Local 911
  - **X** Police
  - Fire
  - **X** Local Emergency Planning Committee (LEPC)
  - **X** Elected Officials
  - Power Utility
  - **X** Hazardous Materials (HAZMAT) personnel
- **X** State
  - **X** Drinking Water Primacy Agency
  - **X** Department of Health
  - State 24-hr Emergency Communications Center Telephone
  - **X** State Office of Homeland Security
  - **X** HAZMAT
  - **X** State Police
- **X** Federal
  - FBI
  - **X** EPA Headquarters and Regional Office
  - **X** 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/)

Water System Contamination

Indicate any special actions and notifications to be taken:

- ❑ Initiate full ERP activation
- ❑ Follow State Incident Command System
- **X** Isolate portion of system or backflush
- o Shut down system if obvious or confirmed contamination warrants
- **X** Issue public notice and issue follow-up media press releases
- **X** Continue sampling and water monitoring

Indicate water sampling and monitoring issues to considered:

- **X** Identify proper sampling procedures for types of contaminants
- **X** Obtaining sample containers
- **X** Determining the quantity of required samples
- **X** Identify who is responsible for taking samples
- **X** Identify who is responsible for transporting sample (in time sensitive situations)
- **X** Confirming laboratory capabilities and certifications; and
- **X** Interpreting monitoring or laboratory results.

Assess need to remediate storage tanks, filters, sediments basins, solids handling, etc.

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
- ❑ Deploy damage assessment team
- ❑ 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
- ❑ 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?

- **X** Bottled water provided by outside sources;
- **X** Bottled water provided by local retailers;
- **X** 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;
- o Interconnections with nearby public water systems;
- **X** 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?

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:

- 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.
- 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:

- "Lock down" procedures;
- Access control procedures;
- Establishing a security perimeter following a major event;
- Evidence protection measures for law enforcement (should the major event also be declared a crime scene);
- Securing buildings against forced entry; and
- Other property protection procedures and measures.

3.3.2 Security Incident Report Form for Scenario #2
(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: _____

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: _____

_____

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 User Notification

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

Date and time of previous visit: _____

Name of individual who visited the site: _____

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' ☐ '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 ☐ 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:

- ☐ Discarded PPE (e.g., gloves, masks)
- ☐ Tools (e.g., wrenches, bolt cutters)
- ☐ Lab equipment (e.g., beakers, tubing)
- ☐ None
- **X** Empty containers (e.g., bottles, drums)
- ☐ Hardware (e.g., valves, pipe)
- **X** 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
- ☐ Facility in disarray
- ☐ Open/damaged gates, doors, or windows
- ☐ Missing/damaged equipment
- ☐ None
- **X** Other Check Valve Removed From Meter Yoke

Are there signs of sequential intrusion (e.g., locks removed from a gate and hatch)? ☐ Yes ☐ 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
- ☐ Unexplained dead animals
- **X** Unexplained liquids
- ☐ None
- ☐ Other _____

Describe signs of hazard: _____

SIGNOFF

Name of person responsible for documenting the security incident:

Print name Superintendent

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: Superintendent

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

LOCATION OF INVESTIGATION SITE

Site Name: _____

Type of facility:

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

Address: _____

_____

Weather Conditions at Site: N/A

_____

Additional Site Information: Discarded Containing Pumps, Misc. Equip.

_____

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
- ☐ 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)
- **X** 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? ☐ 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: Empty Liquid Containers, Pd Pumps, Tubing, Fittings, Removed Backflow Device

Unexplained or Unusual Odors:

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

Describe unusual odor: _____

_____

_____

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
☐ 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 ☐ 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)
X Lab equipment (e.g., beakers, tubing)	**X** Pumping equipment
☐ Other _____	

Describe equipment: Pd Pumps, Tubing, Fittings

_____

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	☐ New	☐ Damaged/leaking
☐ Unopened	☐ Old	☐ Intact/dry

Size of container: 50 Gallons

Describe labeling on container: NONE

Describe visible contents of container: Non-Clear Liquid

Rapid Field Testing of the Water

☐ None	**X** Residual disinfectant	☐ 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: Immediate /_____

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

☐ Low hazard	☐ 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.
- **X** **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:

- **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.
- ☐ 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).
- ☐ 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

- ☐ 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.
- ☐ Remove all PPE at site perimeter.
- ☐ 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 Superintendent

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 _____

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: Nausea, Diarrhea, Vomiting, Fever
Symptoms of exposure to low dose: Nausea, Diarrhea, Vomiting, Fever
Other: _____

EVALUATION OF CONTAINMENT OPTIONS

Describe the location and extent of the contaminated area. System Wide Due To Not Knowing Extensive Range Of Contamination

Containment options
X Valve closures ☐ Reverse flow conditions ☐ By-pass
X Isolate zone(s)
☐ Other _____

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

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

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

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 ☐ No **X** Unknown

Timeline for implementation of containment options

Containment procedures to begin: Immediate
Containment procedures to end: After Satisfactory Sample Results

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
☐ Hospitals/clinics **X** Laboratories **X** Drinking water primacy agency
☐ Regional Poison Control Center
☐ Other _____

Type of notification (Follow steps shown)

Is the contaminant known? ☐ Yes **X** 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 ☐ No **X** 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 Pseudomonas, Fecal Coliform
☐ Characteristics of the contaminant _____
X Restrictions on use Boil Water Order
X Ingestion exposure ☐ Inhalation exposure ☐ Dermal exposure
X Exposure symptoms Nausea, Vomiting, Diarrhea, Fever
☐ Medical treatments _____
X Transmission mode (if biological) Ingestion Of Water
X Duration of restriction Until Satisfactory Sample Results Are Obtained
X Alternate water supply Bottled Drinking Water
☐ Additional instructions to consumers _____
☐ Other information about the incident _____
☐ Other _____

Notification to customers with special needs

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

X Schools

X Businesses
- ☐ Food and Beverage Manufacturers
- **X** Restaurants
- ☐ Power Generation Facilities
- ☐ Other _____
- ☐ 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.
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
☐	Posting in conspicuous locations	☐	Mass distribution through partners
☐	Hand delivery	☐	Door-to-door canvassing
X	Town hall meetings	☐	Conference calls
☐	Other _____		

Notification/restriction timeline

Notification/restriction to begin: Immediately
Notification/restriction to end: After Satisfactory Sample Results Are Obtained

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
- ☐ 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?

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

X Schools

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

SIGNOFF

Name of person completing form

Print name _____ Superintendent

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 A" during February 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:

Rapid Mix & Clarifiers	(80)
Treatment Plant & Pump House	(30)
Reservoir	(30)
Raw Water Pumphouse	(30)
Protection from Critical Customers	(18)
Meters	(18)
Master Meters	(18)

ERTC also used general questions from the Section 1 of the NRWA *Vulnerability Self-Assessment for Small Water Systems* to review the areas of greatest concern related to protection of the potable water supply. Listed below are the practices or components of the system that should be considered for improvement.

1. The rapid mixer and the two clarifiers are not fenced and have no security, creating a risk value of 80. The value is high because the tanks are not fenced, access is not restricted, and they are behind the plant building out of view of the neighbors and police. Unauthorized access to the tanks by vandals or saboteurs could interfere with the delivery of safe drinking water throughout the water system.

2. The water treatment plant is not fenced and does not have an intruder alarm system, creating a risk value of 30. This value is relatively high because unauthorized access to the plant by vandals or saboteurs could interfere with the delivery of safe drinking water throughout the water system.

3. The reservoirs, located five miles from the plant, are not fenced hand have limited security, creating a risk value of 30. The value is relatively high because any vandalism or sabotage of the raw water supply would greatly interfere with the delivery of safe drinking water throughout the water system.

4. The raw water pumphouse, located five miles from the plant, has a risk value of 30. The risk value is relatively high because of its remote location, and limited security measures.

5. The critical customers (restaurants and convenient stores) have a risk value of 18. The value is relatively high because of the possibility of cross connection events contaminating the public water supply.

6. The lack of dual check valves at the meters has a relatively high risk value of 18. 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.

7. Of the seven master meters, one is in an unlocked vault and one does not have a check valve, creating a risk value of 18. The value is relatively high because an unsecured entryway to the master meter vault could allow unauthorized persons access to the meter vault providing them with the opportunity to vandalize or sabotage the water system. Without a check valve at the master meter the entire system, could be placed at risk if on system has a problem with contamination of the water supply.

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 where an accidental fire breaks out in the chlorine room, causing 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.

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.

Security for the Rapid Mixer and Clarifiers:

It is highly recommended that the water system install fencing and lighting around the recently installed rapid mixer and clarifiers. Currently there is no access control to this portion of the plant, providing easy entry for anyone who wanted to interfere with its operation.

Security for the Treatment Plant and Pumphouse:

It is highly recommended that the entire water treatment plant be fenced and well light as a strong deterrent to unauthorized entry.

Security for the Reservoirs:

Because of the size and location of the reservoir, its security is difficult and possibly impractical. However, there are several recommendations to help ensure the uninterrupted supply of water to the system.

1) Increase water operator visits to the reservoirs.
2) Increase the patrols by the security guard.
3) Inform all boat operators that the water body is a drinking water reservoir and do not dump oil, gas, or other contaminants into the water.
4) Enforce all Illinois Department of Public Health standards on the disposal residential sewage to ensure that pathogens from human waste do not enter the lake.
5) Remind the residents around the reservoir that it is the source of the community drinking water and that they should limit their use of herbicides and pesticides, and ensure that their sewage does not enter the lake.
6) Post signs that inform the public that the reservoir is the source of the community drinking water.

Security for the Raw Water Pumphouse:

The pumphouse for the raw water is remote unmanned. It is recommended that the water system install an intruder alarms with an auto-dialer that would that would notify the police and the water system manager.

Critical Customers:

There are five restaurants and four conveniences stores that are not isolated or contained by backflow devices. It is recommended that dual check valves or RPZs be installed at each facility.

Dual Check Valves:

As part of the Cross Connection Control Program, Plant A 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

Master Meter Security:

Plant supplies water to seven satellite systems, through master meters. Six of the seven meters have locking vault doors and check valves. It is recommended that a lock be installed on the vault door, and that a check valve be installed at the master meter.

Warning Signs:

Signs stating *Warning-Secure Area* and *Authorized Personnel Only* should be posted at secure areas such as pumphouses, storage tanks, and the water plant.

Intruder Alert:

Plant A is not manned and monitored on 24 hour a day basis, providing an opportunity for intruders during off-duty hours. The water treatment plant, raw water pumphouse, and the high service pump house do not have intruder alarms. It is recommended that the intruder alarms be connected to an automatic dialer to alert the city police and the on-call staff, when unauthorized personnel enter the buildings.

Uniforms and Photo-Id Badges:

The staff at the water system does not wear uniforms and they do not have photo-ID badges. It is recommended that the staff obtain uniforms that have the name of the water system and the employee printed on chest above the pockets.

Back Flow Device Inspection:

The water system should continue to ensure that a physical inspection of back flow prevention devices and assemblies such as RPZs and dual check valves occurs. 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 lawn irrigation systems install and maintain a properly functioning RPZ back flow assembly, as required by IDPH regulations.

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.

Seasonal Bill Stuffers:

Seasonal bill stuffers in the water bills should be considered as a method of informing the customers 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 for your annual backflow prevention assembly testing equipment. 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 A" is a very well managed water plant and distribution system. The water system has done a very good job of using its limited manpower (six employees) and resources to help create and upgrade deterrents to intentional and/or unintentional situations that may lead to contamination of the public water supply. The element presenting the highest risk to the continuing supply of safe and reliable water was the lack of security (fences and intruder alarms) at the plant, pump house, and raw water pumphouse. The remoteness of the reservoirs, their use for recreational boating, and the improper disposal of wastewater from lakeside residents are also threats to the delivery of safe, reliable drinking water to the water system. Therefore, ERTC recommends upgrades to security such as fencing of the entire water plant, especially the exterior rapid mixer and clarifiers, and installing intruder alarms at the plant, pump house, and raw water pumphouse. Also recommended, is improving the security and public awareness of the raw water supply reservoir.

The ERP was hand written, which demonstrates the manager's determination to do a good job, even with limited resources. The manager and operator stated that they attempt to make updates to the ERP as time permits. The VA and ERP were adequate and met or exceeded all the requirements. To ensure that the information in the VA and ERP are kept current, it is recommended that the water system perform some type of periodic update of both documents.

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