



Homeland Security
Review
Of
Small Public Water Systems

“Plant C”



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

Prepared by the **Environmental Resources Training Center**
SOUTHERN ILLINOIS UNIVERSITY EDWARDSVILLE

**Homeland Security Review
of
Small Public Water Systems**

“Plant C”

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Disclaimer

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Executive Summary

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

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

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

The element presenting the highest risk to the continuing supply of safe and reliable water was the lack of adequate backflow prevention on high-risk customers and lack of auxiliary power supply to operate the wells, plant and booster pumps.

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

It is our conclusion that “Plant C” is a very well managed water system. It has two sources of water, its wells and the bulk purchase supply. If the wells or plant are out of service, the water system can use the bulk supplier to provide safe drinking water for the community.

The water system has done a very good job of using its limited manpower (two 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. However, ERTC recommends the upgrade of security such as fencing the water plant and building well houses and fencing the well field, locking the interconnect with the bulk supplier, and installing intruder alarms at the plant and booster pump house. Also recommended, is the acquisition of a backup power supply to operate the booster pump station, water plant and wells during the inevitable electrical outage.

Because of the size of the water system, it was not required to perform a VA. However, the manager took it upon himself to complete the VA because he believed that it would be beneficial to the plant and his customers. His VA and ERP are hand written, which are a testament to the manager's determination to do a good job, even with limited resources. The manager stated that he attempts to make updates to the ERP as often as he can. The VA and ERP were adequate and met or exceeded all the requirements.

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 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 system that treats and buys water wholesale, hereafter referred to as “Plant C”.

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

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

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

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

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

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

- a. Vandalism
- b. Terrorism
- c. Sabotage

Unintentional contamination or interruption of the water supply would include:

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

1.4 Risk Assessment Methodology

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 an asset is carried out (C), and the effectiveness of any deterrents that would mitigate the threat (E) are expressed in the equation below. The risk is simply the product of the components P, C, and E:

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

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

Factors for P, E, and C

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

Consequence of Action (C)

Normal supply of safe water – all demands met	1
Adequate supply of safe water – all <i>emergency</i> 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

Explanation for this asset:

P = because of this assets 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 "Plant C"

The source of water for the Plant C water system is a combination of groundwater produced from their wells, and treated surface water purchased from a wholesale supplier.

The groundwater is supplied by its three wells, which are operated on a rotating basis. The wells are owned and operated by the system and utilize the limited groundwater resources available in the glacial drift found in south-central Illinois. To augment their limited supply of well water, the system began purchasing water from a bulk supplier in 2000. On the weekends, the system takes their pumps and treatment system off line and operates using only the purchased water. Plant C has been supplying water to its customers for approximately 45 years. The distribution system supplies water to two nursing homes and one school, along with approximately 300 residential customers. Since the water system served a population of less than 3,300, regulations did not require

the completion of a VA. However, the plant operator believed that it would be advantageous to him and his system to complete a VA. He completed a VA that was hand written on the print-outs of the forms from the National Rural Water Association (NRWA) *Security Vulnerability Self-Assessment Guide for Small Drinking Water Systems*. The operator also has an updated version of the system's ERP that was compiled and hand written in a spiral-bound notebook. A summary of the Plant C system is provided below.

Well Field

1. 3 Wells in service on a rotating basis

Water Plant

1. One Filter
2. One 150,000 gallon ground storage tank
3. Chemical feeders
4. Chlorination system (two 150 pound gas cylinders)
5. Chemical Inventory
 - a. Ferric Chloride
 - b. Polymer (non-anionic)
 - c. Chlorine Gas
6. Chlorine Room
7. Office in City Hall
8. Two building
9. Two full time employees, one part time billing clerk
10. SCADA system (only used during trouble shooting by the plant manufacturer)

Distribution System

One 150,000 gallon elevated storage tower
One 150,000 gallon ground storage tank
Three booster pumps
One booster pump station
16 miles of distribution main ranging from 3-inch to 6-inch
300 customers
One interconnect with bulk water supplier
One master meter at bulk water supply interconnect
Two backflow prevention assemblies in system
50 Fire Hydrants
300 Meters
83 Valves

High Priority Customer

Two Nursing Homes
One School
Two Restaurants

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. 3 wells

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

Comments: Well field not fenced, only security is 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. Building - Pump House

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

Comments: Fenced and locked. Very visible to public.

4. Water Treatment Chemicals

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

Comments: 3 at plant: polymer, chlorine gas, ferric chloride,

5. Lab Chemicals -

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

Comments:

6. Storage Tanks

Elevated - 150,000 gal

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

Comments: Fenced and locked. Very visible to public.

Ground Storage Tank – 150,000 gal

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

Comments: Fenced and locked. Very visible to public.

7. Primary Power

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

Comments:

8. Auxiliary Power - None

P = 3	C = 3	E = 5	R = 45	N/A
-------	-------	-------	--------	-----

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

9. Booster Pumps 2

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

Comments: Only used for purchased water.

10. Piping

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

Comments: Approx. 15 miles of main

11. Valves (83)

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

12. Appurtenances: 64 hydrants

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

Comments: 49 full size, 15 flush Neighborhood watch is only deterrent.

13. 300 meters

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

Comments: 25% of the meters have dual check valves. Dual check valves required on all new services.

14. Offices – Offices in Village Hall Building

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

Comments: Very secure bldg, shared with Village

15. Computers - 1 PC

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

Comments: Not accessible from outside of City Hall. Only used for billing

16. SCADA

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

Comments: Only on line during trouble-shooting system with manufacturer.

17. Files

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

Comments: Stored in secure area at City Hall

18. Transportation – Four vehicles

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

Comments: Vehicles are secured at night.

19. Employees – Two water operators and one part time billing clerk

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

Comments:

20. Telephones – 1

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

Comments: One phone located at plant

21. Radios –

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

Comments:

22. Critical Customers: Two Nursing Homes

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

Comments: RPZs installed at both facilities.

23. Critical Customers – Two Restaurants

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

Comments: No RPZ at either facility

24. Critical Customers – One Schools

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

Comments: System protected by dual check valve only

25. Critical Customers – Funeral Home

P = 3	C = 3	E = 4	R = 36	N/A
-------	-------	-------	--------	-----

Comments: No backflow prevention devices at the facility

26. Five Multifamily Dwellings

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

Comments: Residents not protected by dual check valves

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

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

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 [] No [x]

N/A []

Action Needed/Taken:

The well field and treatment plant should be fenced to deter intruders.

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

Yes [] No [x]

N/A []

Action Needed/Taken:

Well houses should be constructed at each well. The well field and treatment plant should be fenced to deter intruders.

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 No

N/A

Action Needed/Taken:

The treatment plant and well field do not have external lighting. The Booster pump station, ground storage and elevated tank are light.

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

Yes No

N/A

Action Needed/ Taken:

Operator feels that signs would draw attention to critical components of the system.

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

Yes No

N/A

Action Needed/Taken:

Water system is visited twice daily in daylight hours. City does not have a police department to patrol at night. Farm owner watches property.

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

Yes No

N/A

Action Needed/Taken:

Remove all objects that could be used for breaking and entering.

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

Yes No

N/A

Action Needed/Taken:
The treatment plant and well field are not easily seen. The Booster pump station, ground storage and elevated tank are in town and easily seen.

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

Yes No

N/A

Action Needed/Taken: Intruder alarm notifies should be installed at treatment plant.

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

Yes No

N/A

Action Needed/Taken:
Key control log and keys are secured in key control box.

11. Are your wellheads sealed properly?

Yes No

N/A

Action Needed/Taken:
One well is in need of re-grouting.

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

Yes No

N/A

Action Needed/Taken:

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

Yes No

N/A

Action Needed/Taken:
All abandoned wells have been properly sealed.

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

Yes No

N/A

Action Needed/Taken:
Well field should be fenced. Wells should be visited on daily basis.

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

Yes No

N/A

Action Needed/Taken:

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

Yes No

N/A

Action Needed/Taken:

Operator will coordinate security issues with suppliers.

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

Yes No

N/A

Action Needed/Taken:

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

Yes No

N/A

Action Needed/Taken:

Water is tested several times per day.

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

Yes No

N/A

Action Needed/Taken:

A ladder is needed to access the tank ladders.

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

Yes No

N/A

Action Needed/Taken:

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

Yes No

N/A

Action Needed/Taken:

Both storage tanks can be isolated with valves.

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

Yes No

N/A

Action Needed/Taken:

Access to hydrants by contractors is prohibited. Neighborhood watch is a proven deterrent to unauthorized use of hydrants. Fire Dept. has use of hydrants.

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

Yes No

N/A

Action Needed/Taken:

24. Are your personnel issued photo-identification?

Yes No

N/A

Action Needed/Taken:

There are only two full time employees, manager plans to have photo IDs for all employees.

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

Yes 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 No

N/A

Action Needed/Taken:

Manager plans to have uniform shirts issued to full time employees. 3 of the 4 vehicles are identified as water system owned.

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

Yes No

N/A

Action Needed/Taken:

28. Are vehicles locked and secured at all times?

Yes No

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 No

N/A

Action Needed/Taken:

All records and maps secured at City Hall. Some maps are kept in trucks.

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

Yes No

N/A

Action Needed/Taken:
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

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 Dual checks

N/A

Action Needed/Taken: Only newer meters (25%) 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	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Proper operation	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Vandalism	<input checked="" type="checkbox"/>	<input type="checkbox"/>

N/A

Action Needed/Taken:

3. Do you have some form of validation process for entering the water storage vessels.

Yes No

N/A

Action Needed/Taken:

 Only authorized personnel enter vessels, with notification of operator and/or City Hall.

4. Of your 300 water customers, how would they be categorized.
- a. high hazard a. 11
 - b. low hazard b. 289
 - c. What factors were used to determine a difference between high hazard and low hazard? The operator had not identified high hazard customer at the time of the survey. The survey team identified 11 customers based upon the potential for contamination of the drinking water from a cross connection event.

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

N/A []

Action Needed/Taken: Manager has a Class A Operator Certificate, other operator is in the process of obtaining his Class D & C Certification.

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

Yes [] No [x]

N/A []

Action Needed/Taken:

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

RPZ []

Other []

N/A [x]

Action Needed/Taken:
No sprinkler systems are known to be installed in the system.

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

Yes [x] No []

N/A []

Action Needed/Taken:

10. Does fire hydrant flushing incorporate other departments or people?
Yes No
N/A

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

11. Are flush hydrants kept locked up.
Yes No
N/A

Action Needed/Taken:
No hydrants are locked.

12. Is your computer software protected from outside intruders?
Yes No
N/A

Action Needed/Taken:

13. Are passwords and virus protection periodically upgraded?
Yes No
N/A

Action Needed/Taken:

14. Is there computer software for the backflow prevention program.
Yes No
N/A

Action Needed/Taken: Backflow prevention program is in development stage, with only two RPZs in system.

15. Are all truck drivers that deliver chemicals to your plant properly checked out for correct identification, to include contents of truck?
Yes No
N/A

Action Needed/Taken:
Security of deliveries of chemicals should be initiated.

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

N/A

Action Needed/Taken:

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 No

N/A

Action Needed/Taken:

RPZ is inside of bldg. at nursing home

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

Action Needed/Taken:

Signs have been ordered. Chlorine room has warning sign.

3. Do you patrol and inspect your outside backflow prevention assembly enclosures?

Yes No

N/A

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

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

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

Action Needed/Taken:

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

Yes No

N/A

Action Needed/Taken:

A proven neighborhood watch program exists.

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

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

1. Do you have a Cross Connection Control Program?

Yes No

N/A

Action Needed/Taken:

2. Do you have a Cross Connection Control Program ordinance approved by the IEPA?

Yes No

N/A

Action Needed/Taken:

3. What type of program do you have?

a. isolation

b. containment

c. total protection

N/A

Action Needed/Taken:

Dual check valves required on all new service installed.

4. Is your distribution system current with its requirement of biannual system surveying?

Yes No

N/A

Action Needed/Taken:

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

Phone

Mail

Personal Visit

N/A

Action Needed/Taken:

Mailed to all customers

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

Yes No

N/A

Action Needed/Taken: A personal visit is performed on commercial buildings and residents with wells. Phone calls are made to all others.

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

a. water operator

b. plumber

c. water operator/CCCDI

d. plumber/CCCDI

N/A

Action Needed/Taken:

Water operator is 1st to inspect, if needed, a CCCDI plumbing inspector is called to perform the inspection.

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

Yes 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

N/A

Action Needed/Taken:

The system will initiate this procedure.

10. Does your program have a policy requiring disconnection of the service if the backflow prevention assembly is not annually tested?

Yes No

N/A

Action Needed/Taken:

11. Does your program have a policy that also requires a fee for reconnection of the service?

Yes 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 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 No

N/A

Action Needed/Taken:
System hydrants are used to fill portable tanks. Fire Dept. does not connect to hydrants.

14. Does your program take into account that rural water system residents often have private well systems?

Yes No

N/A

Action Needed/Taken:

15. Does your program take into account that water system customers may have lawn irrigation systems?

Yes 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 No

N/A

Action Needed/Taken:

Only water system employees work on distribution system.

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

- a. valve location and exercise Yes No
- b. hydrant flushing, swabbing/pigging Yes No

N/A

Action Needed/Taken:
Maps of system need to be upgraded.

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

- Yes No

N/A

Action Needed/Taken:

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

- Yes No

N/A

Action Needed/Taken:

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

- Yes 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

N/A

Action Needed/Taken:

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

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

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

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

P = probability of occurrence at this asset

C = consequences to the supply of water if the threat to this asset is carried out

E = the effectiveness of any deterrents that would mitigate the threat

R = individual components of risk

N/A = does not apply, put a X

1. Private wells

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

Action Needed/Taken:

System is separate from 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 = 3 R = 12 N/A

Action Needed/Taken:

Dual checks should be required.

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: System hydrants are used to fill portable tanks. Fire Dept. does not connect 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: System employees on site and require an RPZ or air gap.

c. cleaning out collection system vac. trucks

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

Action Needed/Taken: System employees on site and require an RPZ or air gap.

d. Sewer rodding

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

Action Needed/Taken: System employees on site and require an RPZ or air gap.

7. Auxiliary water system
a. bulk water station

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

Action Needed/Taken: No bulk load station on system.

8. Residential home water softener

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

Action Needed/Taken: System will add this to the Cross Connection Survey form. Duals checks at meter will contain potential problems.

9. Filling swimming pool- hazard from winter chemicals & stagnate water

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

Action Needed/Taken: Atmospheric vacuum breakers required on new construction. Dual check valves on new meters.

10. Feeding chlorine at plant

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

Action Needed/Taken: Install RPZ on chlorine room water lines.

11. Feeding other types of plant chemicals, etc.

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

Action Needed/Taken: Other chemical feed lines have air gapped.
--

12. Are air gaps installed correctly?

P = 2	C = 1	E = 2	R = 4	N/A
-------	-------	-------	-------	-----

Action Needed/Taken: Also needs atmospheric vacuum breakers.

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

P = 4	C = 1	E = 2	R = 8	N/A
-------	-------	-------	-------	-----

Action Needed/Taken: Yes, they are installed correctly. Add AVB to air gaps for backup.
--

14. Hydrant program,
a. are RPZ required and tested before hydrant is used

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

Action Needed/Taken: Yes

- b. are hydrants designated/permitted

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

Action Needed/Taken: Yes

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 which can create a potential point of entry for contaminants

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

Action Needed/Taken: Master Meter

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

- b. alarm system for backflow prevention assembly discharge

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

Action Needed/Taken: When RPZs are installed, drains should be considered.
--

- 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 operators.

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

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

Action Needed/Taken: Hydrants have breakaway fittings.

22. Is your interconnect point protected?

P = 3	C = 3	E = 4	R = 36	N/A
-------	-------	-------	--------	-----

Action Needed/Taken: Some type of physical barrier is needed to secure the vault.
--

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 distribution system interruption scenarios. The first scenario presents the manager with an accidental fire 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.

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

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

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

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

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

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

Section 3.2 Presentation of Scenario #1 and response by the water system personnel

Section 3.2.1 Initiating the ERP Form for Scenario # 1 completed by the system manager

Section 3.2.2 Security Incident Report Form for Scenario #1 completed by the system manager

Section 3.2.3 Site Characterization Report Form for Scenario #1 completed by the system manager

Section 3.2.4 Public Health Response Action Worksheet for Scenario #1 completed by the system manager

Section 3.3 Presentation of Scenario #2 and response by the water system personnel

Section 3.3.1 Initiating the ERP Form for Scenario # 2 completed by the system manager

Section 3.3.2 Security Incident Report Form for Scenario #2 completed by the system manager

Section 3.3.3 Site Characterization Report Form for Scenario #2 completed by the system manager

Section 3.3.4 Public Health Response Action Worksheet for Scenario #2 completed by the system manager

Section 3.2

Water Plant Operation Interruption

Scenario #1

3.2 Water Plant Operation Interruption Scenario #1

*Condition: Structural Damage and Chemical Release
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. The 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 (Completed by Water System Manager)

1. **Shut down plant**
2. **Storage tank will still provide pressure. We would establish a line from a fire hydrant located at the plant to fill tanks for fire fighting. Instruct fire personnel to use all needed, allow to go to waste what they do not need.**
3. **Sample from fire hydrant at scene, if it has good residual, stop water to waste thru hydrant, if not continue to use waste.**
4. **Take samples upstream to determine area affected.**
5. **Post boil orders (1 person) turn on High service pumps. Purchase system (1 person).**
6. **Call EPA and Department of Public to inform them of problem.**
7. **Check on flushing at plant/flush until good residual if possible/feasible, remembering to maintain enough water to operate well above 20 psi.**
8. **Flushing may need to be slowed, but should be resumed until good residual is through system. Thereby no areas other than originally affected will be required to boil water.**
9. **Abide with all EPA guidelines on boil orders, before lifting order.**
10. **Assess fire damage, restore plant chlorine room and other equipment needed. Keeping EPA posted as to progress.**

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:

- Contamination of the Drinking Water
- Structural Damage/Physical Attack
- SCADA, Computer, or Cyber Attack
- Intentional/Unintentional 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? **YES** No

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

Indicate which first responders would be notified:

- Local
 - Local 911
 - Police
 - Fire
 - Local Emergency Planning Committee (LEPC)
 - Elected Officials
 - Power Utility
 - Hazardous Materials (HAZMAT) personnel
- State
 - Drinking Water Primacy Agency **disinfection/operation, Collinsville Office only**
 - Department of Health **disinfection**
 - State 24-hr Emergency Communications Center Telephone
 - State Office of Homeland Security
 - HAZMAT
 - State Police **Madison county sheriff, help isolate and evacuate if needed**
- Federal
 - FBI **none**
 - 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:

- X Initiate full ERP activation
- X Follow State Incident Command System
- X Determine extent/concentration of chemical release and deploy damage assessment team
- X Turn off chemical treatment equipment and isolate chemical treatment areas from rest of water system
- X Depending on extent and concentration of release, issue evacuation or shelter in place order per Risk Management Program and ERP
- X Coordinate alternative water supply, as needed, or consider alternate (interim) treatment schemes **our purchase system**
- X Issue public notice and issue follow-up media press releases
- X Repair damaged facilities
- Assess need for additional protection/security measures

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

Indicate special actions and notifications to be taken:

- x Initiate full ERP activation
- x Follow State Incident Command System
- x Deploy damage assessment team
- x Isolate chemical treatment areas from rest of water system
- x Coordinate alternative water supply, as needed, or consider alternate (interim) treatment schemes
- x Issue public notice and issue follow-up media press releases
- x Repair damaged facilities
- x Assess need for additional protection/security measures

Remediation and Recovery

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

- X Bottled water provided by outside sources;
- 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));
- Bulk water provided by neighboring water utilities by truck or via pipeline;
- Bulk water from hospitals, universities, and local industry that maintain backup water supplies for consumption;
- x Interconnections with nearby public water systems;

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

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

Replacement Equipment and Chemical Supplies

Do you maintain an updated inventory of: **Yes**

- Current equipment (e.g., pumps);
- Repair parts;
- Chemical supplies for normal maintenance and operations; and
- 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.

3.2.2 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: 3/5/06

Name of person who discovered security incident: Carrie Michum, fire dept. reported smoke

Mode of discovery:

- | | | |
|---|--|---|
| <input type="checkbox"/> Alarm (building) | <input type="checkbox"/> Alarm (gate/fence) | <input type="checkbox"/> Alarm (access hatch) |
| <input type="checkbox"/> Video surveillance | <input type="checkbox"/> Utility staff discovery | <input checked="" type="checkbox"/> Citizen discovery |
| <input type="checkbox"/> Suspect confession | <input type="checkbox"/> Law enforcement discovery | |
| <input checked="" type="checkbox"/> Other | <u>follow up fire dept.</u> | |

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

If "Yes", complete the 'Witness Account Report' (Appendix 8.4) **N/A accident**

SITE DESCRIPTION

Site Name: Plant C WTP

Type of facility

- | | | |
|--|---|---|
| <input type="checkbox"/> Source water | <input checked="" type="checkbox"/> Treatment plant | <input type="checkbox"/> Pump station |
| <input type="checkbox"/> Ground storage tank | <input type="checkbox"/> Elevated storage tank | <input type="checkbox"/> Finished water reservoir |
| <input type="checkbox"/> Distribution main | <input type="checkbox"/> Hydrant | <input type="checkbox"/> Service connection |
| <input type="checkbox"/> Other | _____ | |

Address: 1212 Lincoln Way

Additional Site Information: Wooded rural area

BACKGROUND INFORMATION **N/A accident**

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

- | | |
|--|--|
| <input type="checkbox"/> Alarms with known and harmless causes | <input type="checkbox"/> Utility staff inspections |
| <input type="checkbox"/> Routine water quality sampling | <input type="checkbox"/> Construction or maintenance |
| <input type="checkbox"/> Contractor activity | <input type="checkbox"/> Other _____ |

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

Date and time of previous visit: 3/5/06 0810

Name of individual who visited the site: Joe Smo

Additional Information: Regular plant visit approx. 4 hours prior to fire

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

Date and time of most recent security incident: N/A

Description of incident: _____

What were the results of the threat evaluation for this incident? **N/A**
 'Possible' 'Credible' 'Confirmed'

Have security incidents occurred at *other locations* recently? Yes 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 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): No alarms

Describe alarm(s): _____

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

Date and time of video surveillance: _____

Describe surveillance: _____

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: 3/5/06 Time arrived investigation at site: 1205

Name of Site Characterization Team Leader: _____

Phone No.: _____ Fax No.: _____

LOCATION OF INVESTIGATION SITE

Site Name: WT Plant

Type of facility:

- | | | |
|---|---|--|
| <input type="checkbox"/> Source water | <input checked="" type="checkbox"/> Treatment plant | <input type="checkbox"/> Pump station |
| <input type="checkbox"/> Finished water reservoir | <input type="checkbox"/> Elevated storage tank | <input type="checkbox"/> Ground storage tank |
| <input type="checkbox"/> Distribution main | <input type="checkbox"/> Hydrant | <input type="checkbox"/> Service connection |
| <input type="checkbox"/> Other _____ | | |

Address: 1212 Lincoln Way

Weather Conditions at Site: Cold, Clear 24 degree F

Additional Site Information: 911 called by resident who saw smoke

APPROACH TO SITE

Time of Approach to Site: 1215

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

- None
 - HAZCAT
 - Other
 - Radiation
 - Chemical weapons
 - Volatile chemicals
 - Biological agents
- Fire / Unintentional**

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)
- 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? Yes No

SITE INVESTIGATION

Time of Entry to Site: 1217

Repeat Field Safety Screening

- None
- HAZCAT
- Other
- Radiation
- Chemical weapons
- Volatile chemicals
- Biological agents

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 or stressed vegetation
- Unexplained liquids
- Unexplained dead animals
- Unexplained clouds or vapors
- Other chlorine gas leaking

Describe signs of hazard: Approx. 600 lbs of chlorine gas
(will vent to atmosphere)

Unexplained or Unusual Odors:

- | | | |
|---------------------------------------|---------------------------------------|--|
| <input type="checkbox"/> None | <input type="checkbox"/> Pungent | <input type="checkbox"/> Irritating |
| <input type="checkbox"/> Sulfur | <input type="checkbox"/> Skunky | <input type="checkbox"/> Bitter almond |
| <input type="checkbox"/> Sweet/Fruity | <input type="checkbox"/> New mown hay | <input type="checkbox"/> Other _____ |

Describe unusual odor: Chlorine gas smell

Unusual Vehicles Found at the Site:

- | | | |
|--|---|--|
| <input type="checkbox"/> Car/sedan | <input type="checkbox"/> SUV | <input type="checkbox"/> Pickup truck |
| <input type="checkbox"/> Flatbed truck | <input type="checkbox"/> Construction vehicle | <input checked="" type="checkbox"/> None |
| <input type="checkbox"/> Other _____ | | |

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

Signs of Tampering:

- | | |
|--|--|
| <input checked="" type="checkbox"/> None | <input type="checkbox"/> Cut locks/fences |
| <input type="checkbox"/> Open/damaged gates, doors, or windows | <input type="checkbox"/> Open/damaged access hatches |
| <input type="checkbox"/> Missing/damaged equipment | <input type="checkbox"/> Facility in disarray |
| <input type="checkbox"/> Other _____ | |

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

Yes No

Describe signs of tampering: _____

Unusual Equipment:

- | | |
|--|--|
| <input checked="" type="checkbox"/> None | <input type="checkbox"/> Discarded PPE (e.g., gloves, masks) |
| <input type="checkbox"/> Tools (e.g., wrenches, bolt cutters) | <input type="checkbox"/> Hardware (e.g., valves, pipe) |
| <input type="checkbox"/> Lab equipment (e.g., beakers, tubing) | <input type="checkbox"/> Pumping equipment |
| <input type="checkbox"/> Other _____ | |

Describe equipment: _____

Unusual Containers:

Type of container:

- | | | |
|--|---|---|
| <input checked="" type="checkbox"/> None | <input type="checkbox"/> Drum/Barrel | <input type="checkbox"/> Bottle/Jar |
| <input type="checkbox"/> Plastic bag | <input type="checkbox"/> Box/Bin | <input type="checkbox"/> Pressurized cylinder |
| <input type="checkbox"/> Test Tube | <input type="checkbox"/> Bulk container | <input type="checkbox"/> Other _____ |
-

Condition of container:

- | | | |
|-----------------------------------|------------------------------|---|
| <input type="checkbox"/> Opened | <input type="checkbox"/> New | <input checked="" type="checkbox"/> Damaged/leaking |
| <input type="checkbox"/> Unopened | <input type="checkbox"/> Old | <input type="checkbox"/> Intact/dry |

Size of container: 150 lb cylinder times 4 ---600 lbs

Describe labeling on container: Chlorine gas

Describe visible contents of container: Steel cylinder / red bonnet cover

Rapid Field Testing of the Water

- | | | |
|--------------------------------------|---|--|
| <input type="checkbox"/> None | <input checked="" type="checkbox"/> Residual disinfectant | <input type="checkbox"/> pH / conductivity |
| <input type="checkbox"/> Cyanide | <input type="checkbox"/> Radiation | <input type="checkbox"/> VOCs and SVOCs |
| <input type="checkbox"/> Pesticides | <input type="checkbox"/> Biotoxins | <input type="checkbox"/> General toxicity |
| <input type="checkbox"/> 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: 1225 / 3/1/06

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

- | | |
|--|---|
| <input type="checkbox"/> Low hazard | <input checked="" type="checkbox"/> Chemical hazard |
| <input type="checkbox"/> Radiological hazard | <input type="checkbox"/> Biological hazard |

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

Safety Checklist:

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

General Sampling Guidelines: N/A

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

EXITING THE SITE

Time of Site Exit: _____

Site Exit Checklist

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

SIGNOFF

Site Characterization Team Leader:

Print name _____

Signature _____

Date/Time: _____

3.2.4 Public Health Response Action Worksheet for Scenario #1
(Transcribed from forms completed by the System Operator)

Effectiveness of containment options

- Complete contaminant isolation
- Unknown
- Reduction in spread of contaminant
- Other _____

Is containment expected to provide adequate public health protection?

- Yes
- No
- Unknown

Timeline for implementation of containment options

Containment procedures to begin: _____ **immediate / now**

Containment procedures to end: _____ **when get good samples results**

EVALUATION OF PUBLIC NOTIFICATION OPTIONS

Is public notification necessary? Yes No

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

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

Type of notification (Follow steps shown)

- Is the contaminant known? Yes No **may not be contaminant, lacks disinfection only**
- If no, issue a "Do Not Use" notice.*
- If yes, is boiling effective and advisable? 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 _____
- Ingestion exposure Inhalation exposure Dermal exposure
- Exposure symptoms **water without disinfection may have bacteria**
- Medical treatments _____
- Transmission mode (if biological) _____
- Duration of restriction **boil order until all samples good per EPA requirements**
- Alternate water supply **Bond Madison - High service pumps on**
- Additional instructions to consumers **watch for boil order release**
- Other information about the incident _____
- Other _____

Notification to customers with special needs

- Critical Care Facilities
 - Hospitals
 - Nursing Homes
 - Other N/A
- Clinics
- Dialysis Centers

- Schools
- Businesses
 - Food and Beverage Manufacturers
 - Restaurants
 - Power Generation Facilities
 - Other N/A
- Commercial Ice Manufacturers
- Agricultural Operations

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

- Yes
- No
- Unknown

Describe _____

Notification to consecutive system.

- Yes
- No
- Not Applicable

Method of dissemination

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

Notification/restriction timeline

Notification/restriction to begin: boil order immediate – upon no disinfection (boil order on all affected)

Notification/restriction to end: after good samples, hand deliver boil order release

ALTERNATE WATER SUPPLY NEEDS

Is an alternate water supply needed? **No**

- Drinking water
- Fire fighting
- Other _____

Where can customers obtain the alternate water supply? **N/A**

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

N/A

Schools

Businesses

- Food and Beverage Manufacturers
- Restaurants
- Power Generation Facilities
- Other _____

- Commercial Ice Manufacturers
- Agricultural Operations

N/A

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 and then injects them with two (2) small PD pumps into your distribution system.

Biological contaminants in the system are:

- a. pseudomonas bacteria
- b. fecal coliform bacteria

He then leaves the farm house.

Several days later, a number of people on the same line get ill.

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

Action Needed / Taken (Completed by Water System Manager)

- 1. Listen seriously to comments of water customers regarding this problem. It will not be resolved without public assistance.**
- 2. From cases of illness and geographical data, probable direction of flow etc. Assume a problem area and make calls within that area to see if other people are sick who have not heard from.**
- 3. At this point we feel there is a problem, since we cannot be sure if the problem is chemical or biological. We would shut down the suspect main and provide bottled water to homeowners. We would also issue a “Do Not Drink Order”.**
- 4. Take tests for bacteria from several locations along main line (will have to charge line to take samples). Issue a “Do Not Drink Order” first. After proper samples are taken we would flush the main lines thoroughly.**
- 5. If isolated bacteria problems reoccur after repeated flushing, narrow area of problem until contamination can be found. We also discovered meter set tampering.**
- 6. Call police and have perpetrator arrested. Have EPA and Department of Public Health give guidance on safety lines within household.**
- 7. Flush lines until good samples are received, then issue a “Safe To Drink” notice.**

3.3.1 Initiating the ERP for Scenario #2
(Transcribed from forms completed by the System Operator)

3.3.1 Initiating the ERP for Scenario #2
(Transcribed from forms completed by the System Operator)

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

- Contamination of the Drinking Water
- 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? **Yes**

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

Indicate which first responders would be notified:

- Local
 - Local 911
 - Police
 - Fire
 - Local Emergency Planning Committee (LEPC)
 - Elected Officials
 - Power Utility
 - Hazardous Materials (HAZMAT) personnel
- State
 - Drinking Water Primacy Agency
 - 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/>)

Water System Contamination

Indicate any special actions and notifications to be taken:

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

Indicate water sampling and monitoring issues to be considered:

- Identify proper sampling procedures for types of contaminants
- Obtain sample containers
- Determine the quantity of required samples
- Identify who is responsible for taking samples
- Identify who is responsible for transporting samples (in time sensitive situations)
- Confirm laboratory capabilities and certifications; and
- Interpreting monitoring or laboratory results

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
- Coordinate alternative water supply, as needed, or consider alternate (interim) treatment schemes
- Issue public notice and issue follow-up media press releases
- Repair damaged facilities
- Assess need for additional protection/security measures

Remediation and Recovery

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

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

- 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: **Yes**

- Current equipment (e.g., pumps);
- Repair parts;
- Chemical supplies for normal maintenance and operations; and
- 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: Tuesday 3/7/06

Name of person who discovered security incident: Joe Smo

Mode of discovery:

- | | | |
|---|--|---|
| <input type="checkbox"/> Alarm (building) | <input type="checkbox"/> Alarm (gate/fence) | <input type="checkbox"/> Alarm (access hatch) |
| <input type="checkbox"/> Video surveillance | <input type="checkbox"/> Utility staff discovery | <input checked="" type="checkbox"/> Citizen discovery |
| <input type="checkbox"/> Suspect confession | <input type="checkbox"/> Law enforcement discovery | |
| <input checked="" type="checkbox"/> Other | <u>strange illness reported</u> | |

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

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

SITE DESCRIPTION

Site Name: six inch water main into Turkey Alley and Buzzard Lane

Type of facility

- | | | |
|---|--|---|
| <input type="checkbox"/> Source water | <input type="checkbox"/> Treatment plant | <input type="checkbox"/> Pump station |
| <input type="checkbox"/> Ground storage tank | <input type="checkbox"/> Elevated storage tank | <input type="checkbox"/> Finished water reservoir |
| <input checked="" type="checkbox"/> Distribution main | <input type="checkbox"/> Hydrant | <input type="checkbox"/> Service connection |
| <input type="checkbox"/> Other | <u></u> | |

Address: 101 Buzzard Lane

Additional Site Information: Contaminant injected through service line at 101 Buzzard Lane

BACKGROUND INFORMATION

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

- | | |
|--|--|
| <input type="checkbox"/> Alarms with known and harmless causes | <input type="checkbox"/> Utility staff inspections |
| <input type="checkbox"/> Routine water quality sampling | <input type="checkbox"/> Construction or maintenance |
| <input type="checkbox"/> Contractor activity | <input type="checkbox"/> Other <u>N/A</u> |

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

Date and time of previous visit: March 1/06

Name of individual who visited the site: Tom Reader

Additional Information: reading water meters

Has *this location* been the site of previous security incidents? Yes 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 No
If "Yes," complete additional 'Security Incident Reports' (Appendix 8.3) for each site

Name of 1st additional site: None

Name of 2nd additional site: _____

Name of 3rd additional site: _____

SECURITY INCIDENT DETAILS

Was there an alarm(s) associated with the security incident? Yes 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): N/A

Describe alarm(s): _____

Is video surveillance available from the site of the security incident? Yes 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:

- | | |
|--|---|
| <input type="checkbox"/> Discarded PPE (e.g., gloves, masks) | <input checked="" type="checkbox"/> Empty containers (e.g., bottles, drums) |
| <input type="checkbox"/> Tools (e.g., wrenches, bolt cutters) | <input checked="" type="checkbox"/> Hardware (e.g., valves, pipe) |
| <input type="checkbox"/> Lab equipment (e.g., beakers, tubing) | <input checked="" type="checkbox"/> Pumps or hoses |
| <input type="checkbox"/> None | <input type="checkbox"/> Other _____ |

Describe equipment: 2 drums, 2 PD feed pumps—running dry and setting on two empty drums
Residual drums – biological agent
Pseudomonas – fecal bacteria

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

- | | | |
|--|---|--|
| <input type="checkbox"/> Car/sedan | <input type="checkbox"/> SUV | <input type="checkbox"/> Pickup truck |
| <input type="checkbox"/> Flatbed truck | <input type="checkbox"/> Construction vehicle | <input checked="" type="checkbox"/> None |
| <input type="checkbox"/> Other _____ | | |

Describe vehicles (including make/model/year/color, license plate #, and logos or markings): No one at old farmstead

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

- | | |
|--|--|
| <input type="checkbox"/> Cut locks/fences | <input type="checkbox"/> Open/damaged gates, doors, or windows |
| <input type="checkbox"/> Open/damaged access hatches | <input type="checkbox"/> Missing/damaged equipment |
| <input type="checkbox"/> Facility in disarray | <input type="checkbox"/> None |
| <input checked="" type="checkbox"/> Other <u>meter set tampering / backflow device removed</u> | |

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

Describe signs of tampering: N/A

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

- | | |
|--|---|
| <input type="checkbox"/> Unexplained or unusual odors | <input type="checkbox"/> Unexplained dead animals |
| <input type="checkbox"/> Unexplained dead or stressed vegetation | <input type="checkbox"/> Unexplained liquids |
| <input type="checkbox"/> Unexplained clouds or vapors | <input type="checkbox"/> None |
| <input checked="" type="checkbox"/> Other <u>drums and pumps</u> | |

Describe signs of hazard: _____

SIGNOFF

Name of person responsible for documenting the security incident:

Print name _____

Signature _____

Date/Time: _____

3.3.3 Site Characterization Report Form for Scenario #2
(Transcribed from forms completed by the System Operator)

3.3.3 Site Characterization Report Form for Scenario #2

INSTRUCTIONS

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

GENERAL INFORMATION

Date: 3/7/06

Time arrived investigation at site: 10:05 a.m.

Name of Site Characterization Team Leader: _____

Phone No.: _____

Fax No.: _____

LOCATION OF INVESTIGATION SITE

Site Name: #1 Main Street

Type of facility:

- | | | |
|---|--|--|
| <input type="checkbox"/> Source water | <input type="checkbox"/> Treatment plant | <input type="checkbox"/> Pump station |
| <input type="checkbox"/> Finished water reservoir | <input type="checkbox"/> Elevated storage tank | <input type="checkbox"/> Ground storage tank |
| <input checked="" type="checkbox"/> Distribution main | <input type="checkbox"/> Hydrant | <input type="checkbox"/> Service connection |
| <input type="checkbox"/> Other _____ | | |

Address: 101 Buzzard lane

Weather Conditions at Site: Sunny 21 degrees F

Additional Site Information: Rural area

APPROACH TO SITE

Time of Approach to Site: 10:05 a.m.

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

- None
- HAZCAT
- Other _____
- Radiation
- Chemical weapons
- Volatile chemicals
- Biological agents

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)
- 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? Yes No

SITE INVESTIGATION

Time of Entry to Site: 10:00 a.m.

Repeat Field Safety Screening

- None
- HAZCAT
- Other _____
- Radiation
- Chemical weapons
- Volatile chemicals
- Biological agents

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 or stressed vegetation
- Unexplained liquids
- Unexplained dead animals
- Unexplained clouds or vapors
- Other _____

Describe signs of hazard: _____

Unexplained or Unusual Odors:

- | | | |
|--|---------------------------------------|--|
| <input checked="" type="checkbox"/> None | <input type="checkbox"/> Pungent | <input type="checkbox"/> Irritating |
| <input type="checkbox"/> Sulfur | <input type="checkbox"/> Skunky | <input type="checkbox"/> Bitter almond |
| <input type="checkbox"/> Sweet/Fruity | <input type="checkbox"/> New mown hay | <input type="checkbox"/> Other _____ |

Describe unusual odor: _____

Unusual Vehicles Found at the Site:

- | | | |
|--|---|---------------------------------------|
| <input type="checkbox"/> Car/sedan | <input type="checkbox"/> SUV | <input type="checkbox"/> Pickup truck |
| <input type="checkbox"/> Flatbed truck | <input type="checkbox"/> Construction vehicle | <input type="checkbox"/> None |
| <input type="checkbox"/> Other _____ | N/A | |

Describe vehicles (including make/model/year/color, license plate #, and logos or markings): **no one home**

Signs of Tampering:

- | | |
|--|--|
| <input type="checkbox"/> None | <input type="checkbox"/> Cut locks/fences |
| <input type="checkbox"/> Open/damaged gates, doors, or windows | <input type="checkbox"/> Open/damaged access hatches |
| <input type="checkbox"/> Missing/damaged equipment | <input type="checkbox"/> Facility in disarray |
| <input checked="" type="checkbox"/> Other _____ | meter box |

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

Describe signs of tampering: _____

Unusual Equipment:

- | | |
|--|---|
| <input type="checkbox"/> None | <input type="checkbox"/> Discarded PPE (e.g., gloves, masks) |
| <input type="checkbox"/> Tools (e.g., wrenches, bolt cutters) | <input checked="" type="checkbox"/> Hardware (e.g., valves, pipe) |
| <input type="checkbox"/> Lab equipment (e.g., beakers, tubing) | <input checked="" type="checkbox"/> Pumping equipment |
| <input type="checkbox"/> Other _____ | |

Describe equipment: _____

Unusual Containers:

Type of container:

- | | | |
|--------------------------------------|---|---|
| <input type="checkbox"/> None | <input checked="" type="checkbox"/> Drum/Barrel | <input type="checkbox"/> Bottle/Jar |
| <input type="checkbox"/> Plastic bag | <input type="checkbox"/> Box/Bin | <input type="checkbox"/> Pressurized cylinder |
| <input type="checkbox"/> Test Tube | <input type="checkbox"/> Bulk container | <input type="checkbox"/> Other _____ |

Condition of container:

- | | | |
|--|------------------------------|--|
| <input checked="" type="checkbox"/> Opened | <input type="checkbox"/> New | <input type="checkbox"/> Damaged/leaking |
| <input type="checkbox"/> Unopened | <input type="checkbox"/> Old | <input type="checkbox"/> Intact/dry |

Size of container: _____ approx. 50 gallons _____

Describe labeling on container: no markings _____

Describe visible contents of container: both nearly empty _____
(Police took sample remainder) _____

Rapid Field Testing of the Water

- | | | |
|--|--|--|
| <input checked="" type="checkbox"/> None | <input type="checkbox"/> Residual disinfectant | <input type="checkbox"/> pH / conductivity |
| <input type="checkbox"/> Cyanide | <input type="checkbox"/> Radiation | <input type="checkbox"/> VOCs and SVOCs |
| <input type="checkbox"/> Pesticides | <input type="checkbox"/> Biotoxins | <input type="checkbox"/> General toxicity |
| <input type="checkbox"/> 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: 3/7/06 / 3/9/06

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

- | | |
|--|---|
| <input type="checkbox"/> Low hazard | <input type="checkbox"/> Chemical hazard |
| <input type="checkbox"/> Radiological hazard | <input checked="" type="checkbox"/> Biological hazard |

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

Safety Checklist:

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

General Sampling Guidelines:

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

EXITING THE SITE

Time of Site Exit: 12:10 a.m.

Site Exit Checklist

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

SIGNOFF

Site Characterization Team Leader:

Print name _____

Signature _____

Date/Time: _____

3.3.4 Public Health 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 Suspected Known Unknown
Describe Pseudomonas and Fecal bacteria

Contaminant properties (if known):
Toxic or infectious dose (LD₅₀/ID₅₀): N/A
Route of exposure:
 Ingestion Inhalation Dermal Contact
 Other _____
Symptoms of exposure to high dose: vomiting and diarrhea
Symptoms of exposure to low dose: flu like symptoms
Other: _____

EVALUATION OF CONTAINMENT OPTIONS

Describe the location and extent of the contaminated area. Approx. 1500 feet north and south
Intersection at Buzzard Lane and Turkey Alley

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

Critical equipment within contaminated area
 System equipment Zones Pump stations
 Hydrants (2) Other _____

Customers with special needs within contaminated area
 Critical Care Facilities
 Hospitals Clinics
 Nursing Homes Dialysis Centers
 Other N/A
 Schools
 Businesses
 Food and Beverage Manufacturers Commercial Ice Manufacturers
 Restaurants Agricultural Operations
 Power Generation Facilities
 Other N/A

Effectiveness of containment options

- Complete contaminant isolation
- Reduction in spread of contaminant
- Unknown
- Other maybe complete, yet boil order issued outside suspect area

Is containment expected to provide adequate public health protection?

- Yes
- No
- Unknown

Timeline for implementation of containment options

Containment procedures to begin: procedures begun today / flushing and sampling
 Containment procedures to end: receive 2 good samples results every 1000 feet of water main (further in conversation with Department of Public Health, IEPA)

EVALUATION OF PUBLIC NOTIFICATION OPTIONS

Is public notification necessary? Yes No

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

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

Type of notification (Follow steps shown)

- Is the contaminant known? Yes No
If no, issue a "Do Not Use" notice.
- If yes, is boiling effective and advisable? 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 Pseudomonas and fecal bacteria
- Characteristics of the contaminant biological agent
- Restrictions on use N/A
- Ingestion exposure Inhalation exposure Dermal exposure
- Exposure symptoms vomiting and diarrhea
- Medical treatments _____
- Transmission mode (if biological) water borne
- Duration of restriction _____
- Alternate water supply yes, purchase supply---not needed in this case
- Additional instructions to consumers N/A
- Other information about the incident violator apprehended, says working alone
- Other all health departments notified if similar problem occurs

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

Critical Care Facilities

Hospitals

Clinics

Nursing Homes

Dialysis Centers

Other _____ **N/A**

Schools

Businesses

Food and Beverage Manufacturers

Commercial Ice Manufacturers

Restaurants

Agricultural Operations

Power Generation Facilities

Other _____ **N/A**

SIGNOFF

Name of person completing form

Print name _____

Signature _____

Date/Time: _____

Section 4

SUMMARY, RECOMMENDATIONS, and CONCLUSIONS

4.1 Summary

Three ERTC personnel performed the evaluation of the VA and ERP at “Plant C” 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:

Auxiliary Power Source	(45)
Funeral Home Connection	(36)
Interconnect Vault Protection	(36)
Well Security	(30)
Plant Security	(30)
Protection from Critical Customers	(18-24)
Meters	(18)

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

1. The water system does not have a backup power supply to operate its plant, wells, or booster pumps, creating a risk value of 45. This value is relatively high because without electrical power the wells cannot deliver water to the plant, and consequently to the distribution system. A loss of power also prevents the booster pumps from pushing the purchased water into the distribution system.
2. Having a funeral home connected to the potable water system without the protection of an RPZ device creates a risk of 36. The value is high due to the potential risk of a cross connection event causing biological or chemical contamination of the potable water supply.

3. The vault housing the interconnection point and master meter from the bulk supplier is not locked or physically secured, creating a risk value of 36. The value is relatively high because any vandalism or sabotage of the interconnect would greatly interfere with the delivery of safe drinking water throughout the water system.
4. The security of the wells has a risk value of 30. The value is relatively high because there are no well houses, lighting, or fencing to protect the well. The risk value would be higher if the water system did not have the ability to purchase all the water it needs from a bulk supplier. If vandals or sabotage disabled the wells, the system could rely on the bulk water supplier until the wells were placed back into service.
5. The security of the plant has a risk value of 30. The value is relatively high because the plant does not have a fence around its perimeter, a security system, or police patrols. There is also a 12-inch diameter drainpipe that exits through the floor of the plant. The pipe is not screened, and large enough to be an avenue for animals to enter and exit the plant at-will.
6. The critical customers (restaurants, school, and multi-family dwellings) have a risk value ranging from 18 to 24. The value is relatively high because of the possibility of cross connection events contaminating the public water supply. The school has a risk value of 18 because it has a dual check valve device and not an RPZ backflow prevention assembly. The restaurants and the multifamily dwellings do not have any type of backflow prevention.
7. 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.

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 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.

Auxiliary Power Supply:

The installation of an auxiliary power supply is recommended to ensure an uninterrupted supply of safe, reliable drinking water.

Backflow Prevention:

It is highly recommended that the water system require the installation of an RPZ backflow prevention assembly at the funeral home. A Funeral homes is a high hazard customer because of the potential biological and chemical contamination of the water supply. The water system should ensure that the school has proper backflow prevention.

Interconnect Vault Security:

The vault that houses the interconnect and master meter with the bulk water supplier is not locked. It is recommended that the water system install some type of lock on the door to the vault. The installation of some type of intruder alarm in the vault would also be beneficial.

Security for the Wells:

The well field is only protected by the watchful eye the farmer who owns the access road. It is recommended that the water system build well houses over each well and install fences around each well house or around the entire well field. The installation of intruder alarms at each well house would be an added security benefit.

Security for the Water Plant:

The water plant is in a locked building, but it is not fenced. It is recommended the system fence the perimeter of the plant, install an intruder alarm, and place a screen in the large diameter drainpipe the extends through the wall of the plant. Lights should also be installed at the entry point of the plant.

Dual Check Valves:

As a part of the Cross Connection Control Program, Plant C 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.

Security Patrols:

The water system is located in a community that does not have a police department relying on the County Sheriff Department for police protection. It is very possible that the sheriff's deputies do not know the location of the water plant. It is recommended that the manager of Plant C contact the Sheriff Department and ask to show them the location of the plant and request regular nightly and weekend patrols of the plant.

Warning Signs:

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

Intruder Alert:

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

Regrouting of Well:

During the interviews with the Plant C staff, it was stated that the base of one of the wells needed to be regROUTED. It is recommended that the well be regROUTED as soon as possible to ensure that contamination of the well by surface water intrusion does not occur.

Backflow Device Inspection:

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

Backflow Device Inspection

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

List of Registered Contractors:

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

Lawn Irrigation System:

The water system should continue to ensure that all customers with lawn irrigation systems install and maintain a properly functioning RPZ back flow assembly, as required by IDPH regulations.

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.

Vehicle Labeling:

It is recommended that all vehicles used by Plant C be visible marked with the system name on the door or fender.

Map Upgrades:

The maps of the Plant C water system should be upgraded on an annual or semi-annual basis.

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 customer of possible unintentional system contamination through cross connection violations. Spring is an opportune time of year, since people are active out of doors filling swimming pools and using hand held chemical spray bottles.

Computer Software:

Computer Software might be considered for the system's annual backflow prevention assembly testing. 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 C" is a very well managed water distribution system. It has two sources of water; its wells and the bulk purchase supply that could be used if the wells or plant are out of service.

The water system has done a very good job of using its limited manpower (two 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. However, ERTC recommends upgrades to security such as fencing the water plant and building well houses, fencing the well field, locking the interconnect with the bulk supplier, and installing intruder alarms at the plant and booster pump house. Also recommended, is the acquisition of an auxiliary power supply to operate the booster pump station, water plant and wells during the inevitable electrical outage.

It is our conclusion that "Plant C" is a very well managed water distribution system. It has two sources of water, its wells and the bulk purchase supply. If the wells or the plant are out of service, the water system would be able to use the bulk supplier to provide safe drinking water for the community.

Because of the size of the water system, it was not required to perform a VA. However, the manager took it upon himself to complete the VA because he believed that it would be beneficial to the plant and his customers. His VA and ERP are hand written, which are a testament to the manager's determination to do a good job, even with limited resources. The manager stated that he attempts to make updates to the ERP as often as he can. The VA and ERP were adequate and met or exceeded all the requirements.

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](#)