Vulnerability Assessment

for the Water System of Farmington, MO

submitted

June, 2004

City of FARMINGTON, MISSOURI
Tradition & Progress

H₂O'C ENGINEERING

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Vulnerability Assessment

The 2002 Bioterrorism Act requires that many public water supplies conduct a vulnerability assessment (VA). A vulnerability assessment is the identification of weaknesses in water system security, focusing on defined threats that could compromise its ability to meet its various service missions—such as providing adequate drinking water, water for firefighting, and/or water for various commercial and industrial purposes.

This vulnerability assessment is based upon standards and recommendations developed by the Association of State Drinking Water Administrators and National Rural Water Association.

This is a working document. Its purpose is to start your process of security vulnerability assessment and security enhancements. Security is not an end point, but a goal that can be achieved only through continued efforts to assess and upgrade your system. This is a sensitive document. It should be stored separately in a secure place at your water system. A duplicate copy should also be retained at a secure off-site location. Access to this document should be limited to key water system personnel and local officials as well as the state drinking water primacy agency and others on a need-to-know basis.

Security is everyone's responsibility. This document should help you to increase the awareness of all your employees, governing officials, and customers about security issues.

System Data

City of Farmington

110 West Columbia

Farmington, MO 63640

phone: 573-756-1701

fax: 573-756-0611

email: gbeavers@mail.ci.farmington.mo.us (Gregory Beavers, City Administrator)

Population: 13,924

County: St. Francois

Water System ID: MO4010270

Water & Wastewater Superintendent: Eddie Hull

    573-756-7698 shop; 573-701-4149 cell

Source of Supply: 100% ground water from 14 wells

    well depth: 500 to 1,000 feet

Treatment: Fluoridation at each well

Distribution: Approximately 100 miles, primarily PVC

4,800 service connections

supply capacity: 2.9 MGD

avg. daily consumption: 1.9 MGD

peak month: 72 MG

pressure zones: 3

interconnects: prison facility, 6" main

major customers: Segal Roberts, Little Tykes (Rubbermaid), prison

critical customers: 2 hospitals

Inventory of Water System Critical Components

Component	Number & Location	Description	Critical Asset or Single Point of Failure (H/M/L)
Source Water Type			
Ground Water (100%)	14 wells	see appendix	H
Surface Water (0%)			
Purchased (0%)			
Treatment Plant	n/a		
Treatment Chemicals and Storage	at each wellhouse		
Storage (3.95 MG)			
Elevated Storage Tanks	San Jewel	1,000,000 gal	H
	Progress Drive	400,000 gal	H
	Tower Drive	300,000 gal	H
	Boyce	250,000 gal	H
Ground Storage Tanks	Industrial Drive	1,000,000 gal	H
	Maple Hill	1,000,000 gal	H
Power			
Primary Power			
Auxiliary Power			
Distribution System			
Pumps			
Pipes			
Valves			
Appurtenances (e.g., flush hydrants, backflow preventers, meters)			
Other Vulnerable Points			
Offices			
Buildings			
Computers			
Files			
Transportation/Work Vehicles			
Personnel			
Communications			
Telephone			
Cell Phone			
Radio			
Computer Control Systems (SCADA)			
Critical Facilities Served			
Power Plant Facilities			
Hospitals	2		
Schools			
Waste Water Treatment Plants			
Food/Beverage Processing Plants			
Nursing Homes			
Prisons/Other Institutions	1		

General

Emergency Response Plan

Presently,

Under the provisions of the Public Health Security and Bioterrorism Preparedness and Response Act of 2002, water systems are required to develop and/or update an ERP within six months after completing their vulnerability assessment. Sample ERP's are available from the Missouri Department of Natural Resources.

A plan is vital in case there is an incident that requires immediate response. The plan should be reviewed at least annually (or more frequently if necessary) to ensure it is up-to-date and addresses security emergencies including ready access to laboratories capable of analyzing water samples.

You should designate someone to be contacted in case of emergency regardless of the day of the week or time of day. This contact information should be kept up-to-date and made available to all water system personnel and local officials (if applicable).

Share this ERP with police, emergency personnel, and your state primacy agency. Posting contact information is a good idea only if authorized personnel are the only ones seeing the information. These signs could pose a security risk if posted for public viewing since it gives people information that could be used against the system.

EPA's Baseline Threat Document

Water system personnel should become familiar with the U.S. EPA baseline threat document, which is available through the Water Information Sharing and Analysis Center at www.waterisac.org. It is important that you use this document to determine potential threats to your system and to obtain additional security related information. U.S. EPA should have provided a certified letter to your system that provided instructions on obtaining the threat document.

Critical Component Access

Access to the critical components of Farmington's water system is restricted to authorized personnel only.

Water system photo identification cards for employees, and require them to be displayed within restricted areas at all times. Post signs restricting entry to authorized personnel and ensure that assigned staff escort people without proper ID

Fencing

Most water system facilities are fenced, and gates are kept locked.   Several wellhouses are not fenced, but they are kept locked. Ideally, all facilities should have a security fence around the perimeter. The fence perimeters should be walked periodically to check for breaches and maintenance needs. All gates should be locked with chains and a tamper-proof padlock that at a minimum protects the shank. Other barriers such as concrete "jersey" barriers should be considered to guard certain critical components from accidental or intentional vehicle intrusion.

Locks

All critical doors, windows, and other points of entry such as tank and roof hatches and vents are kept closed and locked.

A daily check of critical system components enhances security and ensures that an unauthorized entry has not taken place.

Doors and hinges to critical facilities should be constructed of heavy-duty reinforced material. Hinges on all outside doors should be located on the inside.

To limit access to water systems, all windows should be locked and reinforced with wire mesh or iron bars, and bolted on the inside. Systems should ensure that this type of security meets with the requirements of any fire codes. Alarms can also be installed on windows, doors, and other points of entry.

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

Adequate lighting of the exterior of water systems' critical components is a good deterrent to unauthorized access and may result in the detection or deterrence of trespassers. Motion detectors that activate switches that turn lights on or trigger alarms also enhance security.

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

Warning signs are an effective means to deter unauthorized access.

"Warning - Tampering with this facility is a federal offense" should be posted on all water facilities. These are available from your state rural water association.

"Authorized Personnel Only," "Unauthorized Access Prohibited," and "Employees Only" are examples of other signs that may be useful.

8.   Do you patrol and inspect all source intake, buildings, storage tanks, equipment, and other critical components?

Frequent and random patrolling of the water system by utility staff may discourage potential tampering. It may also help identify problems that may have arisen since the previous patrol.

All systems are encouraged to initiate personal contact with the local law enforcement to show them the drinking water facility.   The tour should include the identification of all critical components with an explanation of why they are important.   Systems are encouraged to review, with local law enforcement, the NRWA/ASDWA Guide for Security Decisions or similar state document to clarify respective roles and

responsibilities in the event of an incident. Also consider asking the local law enforcement to conduct periodic patrols of your water system.

9.   Is the area around all the critical components of your water system free of objects that may be used for breaking and entering?When assessing the area around your water system's critical components, look for objects that could be used to gain entry (e.g., large rocks, cement blocks, pieces of wood, ladders, valve keys, and other tools).

10. Are the entry points to all of your water system easily seen?

You should clear fence lines of all vegetation. Overhanging or nearby trees may also provide easy access. Avoid landscaping that will permit trespassers to hide or conduct unnoticed suspicious activities. Trim trees and shrubs to enhance the visibility of your water system's critical components.
If possible, park vehicles and equipment in places where they do not block the view of your water system's critical components.

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

Consider installing an alarm system that notifies the proper authorities or your water system's designated contact for emergencies when there has been a breach of security. Inexpensive systems are available. An alarm system should be considered whenever possible for tanks, pump houses, and treatment facilities.

You should also have an audible alarm at the site as a deterrent and to notify neighbors of a potential threat.
12. Do you have a key control and accountability policy?

Keep a record of locks and associated keys, and to whom the keys have been assigned. This record will facilitate lock replacement and key management (e.g., after employee turnover or loss of keys). Vehicle and building keys should be kept in a lockbox when not in use.
You should have all keys stamped (engraved) "DO NOT DUPLICATE."

13.   Are entry codes and keys limited to water system personnel only?

Suppliers and personnel from co-located organizations (e.g., organizations using your facility for telecommunications) should be denied access to codes and/or keys.   Codes should be changed

frequently if possible. Entry into any building should always be under the direct control of water system personnel.

14. Do you have an updated operations and maintenance manual that includes evaluations of security systems?

Operation and maintenance plans are critical in assuring the on-going provision of safe and reliable water service. These plans should be updated to incorporate security considerations and the on-going reliability of security provisions – including security procedures and security related equipment.

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

Watchful neighbors can be very helpful to a security program. Make sure they know whom to call in the event of an emergency or suspicious activity.

Water Sources

16.   Are your wellheads sealed properly?

A properly sealed wellhead decreases the opportunity for the introduction of contaminants. If you are not sure whether your wellhead is properly sealed, contact your well drilling/maintenance company, your state drinking water primacy agency, your state rural water association, or other technical assistance providers.

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

Properly installed vents and caps can help prevent the introduction of a contaminant into the water supply.

Ensure that vents and caps serve their purpose, and cannot be easily breached or removed.

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

All observation/test and abandoned wells should be properly capped or secured to prevent the introduction of contaminants into the aquifer or water supply. Abandoned wells should be either removed or filled with concrete.

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

Surface water supplies present the greatest challenge to secure. Often, they encompass large land areas. Where areas cannot be secured, steps should be taken to initiate or increase patrols by water utility personnel and law enforcement agents.

Treatment Plant and Suppliers

20. Are deliveries of chemicals and other supplies made in the presence of water system personnel?

Establish a policy that an authorized person, designated by the water system, must accompany all deliveries. Verify the credentials of all drivers. This prevents unauthorized personnel from having access to the water system.

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

Verify that your suppliers take precautions to ensure that their products are not contaminated. Chain of custody procedures for delivery of chemicals should be reviewed. You should inspect chemicals and other supplies at the time of delivery to verify they are sealed and in unopened containers. Match all delivered goods with purchase orders to ensure that they were, in fact, ordered by your water system.

You should keep a log or journal of deliveries. It should include the driver's name (taken from the driver's photo I.D.), date, time, material delivered, and the supplier's name.

22. Are chemicals, particularly those that are potentially hazardous (e.g. chlorine gas) or flammable, properly stored in a secure area?

All chemicals should be stored in an area designated for their storage only, and the area should be secure and access to the area restricted. Access to chemical storage should be available only to authorized employees. Pay special attention to the storage, handling, and security of chlorine gas because of its potential hazard.

You should have tools and equipment on site (such as a fire extinguisher, drysweep, etc.) to take immediate actions when responding to an emergency.

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

Monitoring of raw and treated water can establish a baseline that may allow you to know if there has been a contamination incident.

Some parameters for raw water include pH, turbidity, total and fecal coliform, total organic carbon, specific conductivity, ultraviolet adsorption, color, and odor.

Routine parameters for finished water and distribution systems include free and total chlorine residual, heterotrophic plate count (HPC), total and fecal coliform, pH, specific conductivity, color, taste, odor, and system pressure.

Chlorine demand patterns can help you identify potential problems with your water. A sudden change in demand may be a good indicator of contamination in your system.

For those systems that use chlorine, absence of chlorine residual may indicate possible contamination. Chlorine residuals provide protection against bacterial and viral contamination that may enter the water supply.

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

The use of tamper-proof padlocks at entry points (hatches, vents, and ladder enclosures) will reduce the potential for of unauthorized entry.

If you have towers, consider putting physical barriers on the legs to prevent unauthorized climbing.

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

Air vents and overflow pipes are direct conduits to the finished water in storage facilities. Secure all vents and overflow pipes with heavy-duty screens and/or grates.

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

A water system should be able to take its storage tank(s) out of operation or drain its storage tank(s) if there is a contamination problem or structural damage. Install shut-off or bypass valves to allow you to isolate the storage tank in the case of a contamination problem or structural damage.

Consider installing a sampling tap on the storage tank outlet to test water in the tank for possible contamination.

Distribution

27. Do you control the use of hydrants and valves?

Your water system should have a policy that regulates the authorized use of hydrants for purposes other than fire protection. Require authorization and backflow devices if a hydrant is used for any purpose other than fire fighting.

Consider designating specific hydrants for use as filling station(s) with proper backflow prevention (e.g., to meet the needs of construction firms). Then, notify local law enforcement officials and the public that these are the only sites designated for this use.

Flush hydrants should be kept locked to prevent contaminants from being introduced into the distribution system, and to prevent improper use.

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

Positive pressure is essential for fire fighting and for preventing backsiphonage that may contaminate finished water in the distribution system. Refer to your state primacy agency for minimum drinking water pressure requirements.

29. Has your system implemented a backflow prevention program?

In addition to maintaining positive pressure, backflow prevention programs provide an added margin of safety by helping to prevent the intentional introduction of contaminants. If you need information on backflow prevention programs, contact your state drinking water primacy agency.

30. When hiring personnel, do you request that local police perform a criminal background check, and do you verify employment eligibility (as required by the Immigration and Naturalization Service, Form I-9)?

It is good practice to have all job candidates fill out an employment application. You should verify professional references. Background checks conducted during the hiring process may prevent potential employee-related security issues.

If you use contract personnel, check on the personnel practices of all providers to ensure that their hiring practices are consistent with good security practices.

31. Are your personnel issued photo-identification cards?

For positive identification, all personnel should be issued water system photo-identification cards and be required to display them at all times.

Photo identification will also facilitate identification of authorized water system personnel in the event of an emergency.

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

Former or disgruntled employees have knowledge about the operation of your water system, and could have both the intent and physical capability to harm your system. Requiring employees who will no longer be working at your water system to turn in their IDs, keys, and access codes helps limit these types of security breaches.

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

Requiring personnel to wear uniforms, and requiring that all vehicles prominently display the water system name, helps inform the public when water system staff is working on the system. Any observed activity by personnel without uniforms should be regarded as suspicious. The public should be encouraged to report suspicious activity to law enforcement authorities.

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

Your personnel should be trained and knowledgeable about security issues at your facility, what to look for, and how to report any suspicious events or activity.

Periodic meetings of authorized personnel should be held to discuss security issues.

35. Do your personnel have a checklist to use for threats or suspicious calls or to report suspicious activity?

To properly document suspicious or threatening phone calls or reports of suspicious activity, a simple checklist can be used to record and report all pertinent information. Calls should be reported immediately to appropriate law enforcement officials.   Checklists should be available at every telephone.   Sample checklists are included in Attachment 3.

Also consider installing caller ID on your telephone system to keep a record of incoming calls.

Information/Storage/Computers/Controls/Maps

36. Is computer access "password protected?" Is virus protection installed and software upgraded regularly and are your virus definitions updated at least daily? Do you have Internet firewall software installed on your computer? Do you have a plan to back up your computers?

All computer access should be password protected. Passwords should be changed every 90 days and (as needed) following employee turnover. When possible, each individual should have a unique password that they do not share with others. If you have Internet access, a firewall protection program should be installed on your side of the computer and reviewed and updated periodically.

Also consider contacting a virus protection company and subscribing to a virus update program to protect your records.

Backing up computers regularly will help prevent the loss of data in the event that your computer is damaged or breaks. Backup copies of computer data should be made routinely and stored at a secure off-site location.

37. Is there information on the Web that can be used to disrupt your system or contaminate your water?

Posting detailed information about your water system on a Web site may make the system more vulnerable to attack. Web sites should be examined to determine whether they contain critical information that should be removed.

You should do a Web search (using a search engine such as Google, Yahoo!, or Lycos) using key words related to your water supply to find any published data on the Web that is easily accessible by someone who may want to damage your water supply.

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

Records, maps, and other information should be stored in a secure location when not in use. Access should be limited to authorized personnel only.

You should make back-up copies of all data and sensitive documents. These should be stored in a secure off-site location on a regular basis.

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

Sensitive documents (e.g., schematics, maps, and plans and specifications) distributed for construction projects or other uses should be recorded and recovered after use. You should discuss measures to safeguard your documents with bidders for new projects.

40.   Are vehicles locked and secured at all times?

Vehicles are essential to any water system. They typically contain maps and other information about the operation of the water system. Water system personnel should exercise caution to ensure that this information is secure.

Water system vehicles should be locked when they are not in use or left unattended.

Remove any critical information about the system before parking vehicles for the night.

Vehicles also usually contain tools (e.g., valve wrenches) and keys that could be used to access critical components of your water system. These should be secured and accounted for daily.

Public Relations

41. Do you have a program to educate and encourage the public to be vigilant and report suspicious activity to assist in the security protection of your water system?

Advise your customers and the public that your system has increased preventive security measures to protect the water supply from vandalism. Ask for their help. Provide customers with your telephone number and the telephone number of the local law enforcement authority so that they can report suspicious activities. The telephone number can be made available through direct mail, billing inserts, notices on community bulletin boards, flyers, and consumer confidence reports.

42. Does your water system have a procedure to deal with public information requests, and to restrict distribution of sensitive information?

You should have a procedure for personnel to follow when you receive an inquiry about the water system or its operation from the press, customers, or the general public.

Your personnel should be advised not to speak to the media on behalf of the water system. Only one person should be designated as the spokesperson for the water system. Only that person should respond to media inquiries. You should establish a process for responding to inquiries from your customers and the general public.

43. Do you have a procedure in place to receive notification of a suspected outbreak of a disease immediately after discovery by local health agencies?

It is critical to be able to receive information about suspected problems with the water at any time and respond to them quickly. Written procedures should be developed in advance with your state drinking water primacy agency, local health agencies, and your local emergency planning committee and reviewed periodically.

44. Do you have a procedure in place to advise the community of contamination immediately after discovery?

As soon as possible after a disease outbreak, you should notify testing personnel and your laboratory of the incident. In outbreaks caused by microbial contaminants, it is critical to discover the type of contaminant and its method of transport (water, food, etc.). Active testing of your water supply will enable your laboratory, working in conjunction with public health officials, to determine if there are any unique (and possibly lethal) disease organisms in your water supply.

It is critical to be able to get the word out to your customers as soon as possible after discovering a health hazard in your water supply. In addition to your responsibility to protect public health, you must also comply with the requirements of the Public Notification Rule. Some simple methods include announcements via radio or television, door-to-door notification, a phone tree, and posting notices in public places. The announcement should include accepted uses for the water and advice on where to obtain safe drinking water. Call large facilities that have large populations of people who might be particularly threatened by the outbreak: hospitals, nursing homes, the school district, jails, large public buildings, and large companies. Enlist the support of local emergency response personnel to assist in the effort.

45. Do you have a procedure in place to respond immediately to a customer complaint about a new taste, odor, color, or other physical change (oily, filmy, burns on contact with skin)?

It is critical to be able to respond to and quickly identify potential water quality problems reported by customers. Procedures should be developed in advance to investigate and identify the cause of the problem, as well as to alert local health agencies, your state drinking water primacy agency, and your local emergency planning committee if you discover a problem.

Attachment 1. Prioritization of Needed Actions

Once you have completed the "Security Vulnerability Self-Assessment Guide for Small Drinking Water Systems Serving Populations Between 3,300 and 10,000," review the actions you need to take to improve your system's security. Note the questions to which you answered "no" on this worksheet. You can use it to summarize the areas where your system has vulnerability concerns. It can also help you prioritize the actions you should take to protect your system from vulnerabilities.   You can rank your priorities in numerical order or based on the categories of high, medium, and low.

Use the following information and the information you have generated by completing this assessment to prioritize and rank the most important security vulnerabilities to your system:

1. Any information from local law enforcement office about the likelihood of a terrorist attack or other threats.
2. The U.S. EPA "Baseline Threat Document" to determine the most likely types of threats to protect against.
3. The primary mission of your system (i.e. serve potable water, sufficient water for fire protection, etc.).
4. Single points of failure (i.e. disabling pump) that severely limit your capability to conduct your primary mission.
5. Critical customers – such as hospitals, power plants, schools or waste water treatment facilities.
6. The vulnerabilities identified by completing this assessment.

Question NumberNeeded Action Scheduled Completion   Priority/ Ranking

Attachment 2. Emergency Contact List

All community water systems serving populations greater than 3,300 and less than 10,000 must adopt an emergency response plan (ERP) based on their vulnerability assessment. Emergency response plans are action steps to follow if a primary source of drinking water becomes contaminated or if the flow of water is disrupted. You can obtain sample ERPs from your state drinking water administrator, or from your state primacy agency.

This sample document is an "Emergency Contact List." Although, it can be an essential part of your ERP, **this will not satisfy the Bioterrorism Act requirement to develop or update your emergency response plan based on your vulnerability assessment.** It contains the names and telephone numbers of people you might need to call in the event of an emergency. This is a critical document to have at your disposal at all times. It gives you a quick reference to all names and telephone numbers that you need for support in the case of an emergency.

Filling out this Emergency Contact List reminds you to think about all of the people you might need to contact in an emergency. You should also talk with these people about what you and they would do if an emergency were to occur.

Section 1. System Identification

Public Water System (PWS) ID Number
System Name
Town/City

Telephone Numbers

    System Telephone Evening/Weekend Telephone
Other Contact InformationSystem Fax   Email
Population Served and Number of Service Connections   People Served   Connections
System Owner (The owner must be listed as a person's name)
Name, title, and telephone number of person responsible for maintaining this emergency contact list
Name and title   Telephone

Section 2. Notification/Contact Information – Update regularly and display clearly next to telephones

Responders

ORGANIZATIONCONTACT NAME/TITLE PHONE (DAY)   PHONE (NIGHT)   E-MAIL

Fire Department
Police Department
FBI Field Office (for terrorism or sabotage)
Emergency Medical Service
Local Health Department

National Spill Response Center24 Hour Hotline **1 (800) 424-8802**
State Spill Hotline24 Hour Hotline
Local Hazmat Team (if any)
Local/Regional Laboratory
Water System Operators

Local Notification List

ORGANIZATION CONTACT NAME/TITLE PHONE (DAY)   PHONE (NIGHT)   E-MAIL

Government Officials

Emergency Planning Committee
Hospitals

Pharmacy
Nursing Homes

Schools

Prisons

Neighboring Water Systems

Critical Industrial/Commercial Water Users

Others

Service/Repair Notification List

ORGANIZATIONCONTACT NAME/TITLE PHONE (DAY)   PHONE (NIGHT)   E-MAIL

Electrician

Electric Utility Company

Gas Utility Company

Sewer Utility Company

Telephone Utility Company

Plumber

Pump Specialist

"Dig Safe" or local equivalent

Soil Excavator/Backhoe Operator

Equipment Rental (Power Generators)

Equipment Rental (Chlorinators)

Equipment Rental (Portable Fencing)

Equipment Repairman

Equipment Repairman (Chlorinator)

Radio/Telemetry Repair Service

Bottled Water Source

Bulk Water Hauler

Pump Supplier

Well Drillers

Pipe Supplier

Chemical Supplier

State Notification List

ORGANIZATIONCONTACT NAME/TITLE PHONE (DAY)   PHONE (NIGHT)   E-MAIL

Drinking Water Primacy Agency

Department of Environmental Protection (or state equivalent)

Department of Health

Emergency Management Agency

Hazmat Hotline

Media Notification List

ORGANIZATIONCONTACT NAME/TITLE PHONE (DAY)   PHONE (NIGHT)   E-MAIL

Designated Water System Spokesperson

Newspaper - Local

Newspaper – Regional/State

Radio

Television