



# A Public Water System Guide to Responding to a Backflow Incident

## Introduction

Although Texas law requires protection of public water systems from contamination through unprotected cross-connections, occasionally a backflow incident will occur in which the distribution system of a public water system becomes contaminated. A cross-connection is a physical connection between drinkable water and a liquid or gas that could make the water unsafe to drink (wherever there is a cross-connection, there is a potential threat to public health from the liquid or gas contaminants). A backflow incident is a confirmed case where a pollutant or contaminant enters the water supply as a result of back-siphonage or back-pressure. Changes in water quality, such as changes in pH, temperature, coliform count, and disinfectant residual, can result from a backflow incident. Many such incidents pass unreported due to the difficulty in identifying the cause of a change in water quality. The TCEQ offers this guide to help public water systems respond to a backflow incident.

## Who Should Read This Guide?

This guide is intended for those who work in a public water system (PWS) in Texas—for example, a water district, a water supply corporation, a city, or an investor-owned system. In this guide, “you” refers to the PWS and its staff members.

Members of the general public, who are the customers of PWSs, will also find answers in this guide to many questions about responding to backflow incidents.

This publication is for general guidance only. It does not take the place of the rules and regulations established to prevent backflow from occurring in the distribution systems of PWSs.

## Emergency-Response Protocol

When PWS personnel are first notified of a backflow incident, they should determine whether the cross-connection still exists. If so, staff members should begin at step 1 below. If the cross-connection has been eliminated, begin at step 3.

In the event of a backflow incident, public water system personnel should:

### 1. Prevent Further Contamination

Stop the pressure differential that caused backflow of the contaminant, if possible. For example, if the differential is the result of low pressure in the distribution system, check the status of the service pumps.

### 2. Identify and Isolate the Cross-Connection

For example, if the cross-connection is due to back-siphonage of chemicals through a garden hose left hanging into a chemical tank, disconnect the garden hose at the residence to create an air gap between the potable-water supply and the chemicals.

### 3. Document the Contaminant(s), if Known

Document the reported contaminant. If the contaminant is unknown, skip to step 8 (sampling) in order to determine the type of public health threat posed by the contaminant. Then return to step 4.

### 4. Notify the Public

In areas where human exposure to harmful contaminants is suspected, immediately notify affected consumers of restricted water usage and recommend that they do not drink the water. The public notice should explain the cause of the contamination and corrective actions that are under way, and should discuss health effects as appropriate.

The type of public notice depends on the type of contaminant. Issue a “boil water” notice if the contaminants are biological, and if boiling does not create other health problems through inhalation or skin contact with vapor. Issue a “do not drink” notice if the contaminants are chemical, and if vapor and skin contact do not pose risks. A “do not use” notice should be issued if the contaminant is unknown, treatment of the water is not possible, or the contaminant poses a health risk through inhalation of water vapor or skin contact with vapor. Because “do not use” and “do not

drink” notices place a great burden on critical facilities, such as hospitals, alternate water sources must be secured immediately.

## **5. Notify the TCEQ**

Coordination of response to backflow incidents is the responsibility of TCEQ central-office personnel, who will coordinate with the appropriate regional staff. During normal business hours, the Public Drinking Water section may be reached at 512-239-4691.

If the contamination poses an immediate threat to public health or the environment, also notify the TCEQ spill report line to dispatch a 24-hour, seven-days-a-week response team, at 800-832-8224.

## **6. Notify Additional Authorities**

As appropriate, it is recommended that the following individuals and organizations be notified:

- TCEQ Media Relations (if public or media interest is high).
- Other state and local authorities and facilities as appropriate, such as local government, state and local emergency management, the local wastewater facility, the health department and affected critical-care facilities including the fire department, which needs to know which hydrants can be used for firefighting.

If evidence of intentional contamination of the water system arises, notify the following agencies (available 24 hours a day, seven days a week):

- The Federal Bureau of Investigation (FBI) at 911
- The National Response Center (NRC) at 800-424-8802

## **7. Isolate the Contamination**

If the contaminated portion of the distribution system can be easily isolated, proceed to step 11. If the contamination is extensive and its extent is unknown, proceed to step 8.

## **8. Sample the Water to Determine the Type and Extent of Contamination**

Sample the water to determine the level of the reported contaminant. If your knowledge of the backflow incident is based on a customer complaint but the specific contaminant is unknown, take samples of water appropriate to the taste, odor, or appearance noted in the complaint. For example, if a customer complains of a gasoline odor in the water, perform a test for volatile organic compounds.

Always take bacteriological samples if the specific contaminant is unknown. If personnel from the public water system are unable to collect and send samples for analysis, the TCEQ staff should be notified.

Throughout the incident, continue to take appropriate samples within and outside of the suspected contaminated area to assess the extent of the contamination.

## **9. Make a Plan for Systematic Flushing**

Develop a plan for thorough cleaning or flushing of the system to minimize the risk of drawing contaminants into uncontaminated areas. The plan should indicate the amount of water and the length of time needed to completely flush the system. The direction of flow should follow the principles of unidirectional flushing, ensuring that clean water is drawn through the contaminated site and contaminated water is prevented from entering uncontaminated areas. Depending on the nature of the contamination, some wastes may be discharged into the sanitary sewer and some may need special handling or treatment. Inform the water customers of the remediation plans and whether they will need to flush their plumbing, including water heaters, ice makers, and other appliances.

## **10. Isolate the Contamination and Flush**

Isolate the contaminated portion of the distribution system and flush the system and, where necessary, clean the customer's private water-distribution facilities.

## **11. Sample after Flushing**

After flushing and any necessary cleaning, test the drinking water in affected areas to ensure the contamination has been removed. The type of samples that should be collected depends on the type of contamination that has been identified.

## **12. Eliminate Risk of Future Contamination**

Ensure that the source of contamination has been removed and that the risk of future contamination has been eliminated. If the backflow incident occurred at a residence or business (the customer side of the meter), perform a customer-service inspection at that location. If possible, develop a plan to lower the risk of this type of cross-connection recurring in the future. The plan should include contacting similar types of businesses with preventive guidance.

### **13. Restore Consumer Confidence in Water Quality**

Inform the public when the water is clean and safe to drink. Lift the public-health notice restricting water usage in the same manner it was issued.

### **14. Prepare a Written Summary of the Incident and Submit It to:**

TCEQ Technical Review and Oversight Team, MC 155  
PO Box 13087  
Austin TX 78711-3087

## **Where to Find More Information**

To contact the TCEQ:

**By phone:** Public Drinking Water Section  
512-239-4691

**By mail:** Public Drinking Water Section, MC 155  
TCEQ  
PO Box 13087  
Austin TX 78711-3087

**By e-mail:** Public Drinking Water Section  
<pdws@tceq.state.tx.us>

## ***Information about Cross-Connection Control***

### **TCEQ Publications on the Web:**

Go to <[www.tceq.state.tx.us/goto/publications](http://www.tceq.state.tx.us/goto/publications)>. Search for publication number 195 to find *Rules and Regulations for Public Water Systems*, RG-195. Or visit <[www.tceq.state.tx.us/rules](http://www.tceq.state.tx.us/rules)> and follow the links to 30 TAC Chapter 290, Subchapter D.

Go to <[www.tceq.state.tx.us/goto/pws\\_staff](http://www.tceq.state.tx.us/goto/pws_staff)> for links to the following documents:

*Chemical Contamination of a Public Drinking Water Source  
Response to an Alleged Waterborne Disease Outbreak*

## Other Sources

American Society of Sanitary Engineering  
ASSE International Office  
901 Canterbury, Suite A  
Westlake, OH 44145  
440-835-3040

American Water Works Association  
6666 West Quincy Ave.  
Denver, CO 80235-3098  
800-366-0107

Foundation for Cross-Connection Control and Hydraulic Research  
University of Southern California  
KAP-200 University Park MC-2531  
Los Angeles, CA 90089-2531  
866-545-6340

## ***Information on Responding to Contamination Threats to Drinking-Water Systems***

The entire list of the EPA's water-security publications can be found at [cfpub.epa.gov/safewater/watersecurity/publications.cfm?view=all](http://cfpub.epa.gov/safewater/watersecurity/publications.cfm?view=all).

The EPA's Response Protocol Toolbox, *Planning for and Responding to Contamination Threats to Drinking Water Systems*, assists with emergency-response preparedness and will be of value to drinking-water utilities. This toolbox is available as a series of PDF or Word files at [cfpub.epa.gov/safewater/watersecurity/publications.cfm?view=all](http://cfpub.epa.gov/safewater/watersecurity/publications.cfm?view=all).

The EPA publication *A Water Security Handbook: Planning for and Responding to Drinking Water Contamination Threats and Incidents* describes how to recognize water contamination incidents, what actions a utility should take in the event of an incident, possible roles of the water utility within the larger Incident Command framework, and how the National Incident Management System is organized. It also describes the utility's actions and decisions during site characterization, laboratory analysis, public health response, remediation, and recovery. It will also be helpful to utilities that are preparing or updating their emergency-response plans. The handbook is available at [cfpub.epa.gov/safewater/watersecurity/index.cfm](http://cfpub.epa.gov/safewater/watersecurity/index.cfm).

The EPA's publication *Drinking Water Security for Small Systems Serving 3,300 or Fewer Persons* presents basic information and steps you can take to improve security and emergency preparedness at small water systems. It is available at [www.epa.gov/safewater/watersecurity/pubs/very\\_small\\_systems\\_guide.pdf](http://www.epa.gov/safewater/watersecurity/pubs/very_small_systems_guide.pdf).

The EPA's publication *Emergency Response Plan Guidance for Small and Medium Systems* is intended for use by community water systems serving a population of 3,301 to 99,999 as they develop or revise their emergency-response plans. This publication can be found at <[www.epa.gov/safewater/watersecurity/pubs/small\\_medium\\_ERP\\_guidance040704.pdf](http://www.epa.gov/safewater/watersecurity/pubs/small_medium_ERP_guidance040704.pdf)>.

The EPA's publication *Sampling Guidance for Unknown Contaminants in Drinking Water* includes comprehensive guidance that integrates recommendations for pathogen, toxin, chemical, and radiochemical sample collection, preservation, and transport procedures to support multiple analytical approaches for the detection and identification of potential contaminants in drinking water. The guidance is intended to support sampling for routine and baseline monitoring to determine background concentrations of naturally occurring pathogens, sampling in response to a triggered event, and sampling in support of remediation or decontamination. This publication can be found at <[www.epa.gov/safewater/watersecurity/pubs/guide\\_watersecurity\\_samplingforunknown.pdf](http://www.epa.gov/safewater/watersecurity/pubs/guide_watersecurity_samplingforunknown.pdf)>.