Cross-Connection Control and Backflow Prevention

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Overview

This presentation will discuss the basics & best practices of:

- Creating Local Authority
- Customer Service Inspections (CSIs)
- Backflow Prevention Assembly Testing (BPATs)
- Other Considerations

Goal: Learn about the basics and best practices of a cross-connection control program and use the tools available to build an effective program for your system.

Consider the Following

Why should we have a cross-connection control (backflow) program?

- Hydraulic pressure changes and water moves
- Everyone has a role to protect their system
- Actual and potential hazards are real, and controlling them is critical
- Our goal is to protect public health by reducing a backflow event's
  - Frequency
  - Duration
  - Severity

It's not a matter of "if", but "when"

Authority

What lets us run an effective program?

Source: Unsplash.com

Key Regulations
What do our regulations need?

- 30 TAC 290.46(i) Plumbing ordinance.
  - Public water systems must adopt an adequate *plumbing ordinance, regulations,* or *service agreement* with *provisions for proper enforcement* to ensure that *neither cross-connections nor other unacceptable plumbing practices are permitted* (See §290.47(b) of this title (relating to Appendices)).

Key Regulations
What do our regulations need? (con't)

- 30 TAC 290.46(i) Plumbing ordinance.
  - Should sanitary control of the distribution system not reside with the purveyor, *the entity retaining sanitary control shall be responsible for establishing and enforcing adequate regulations in this regard*.
- We need: regulations, enforcement clauses, and banning bad plumbing practices

Crafting Local Regulations
What avenues are available?

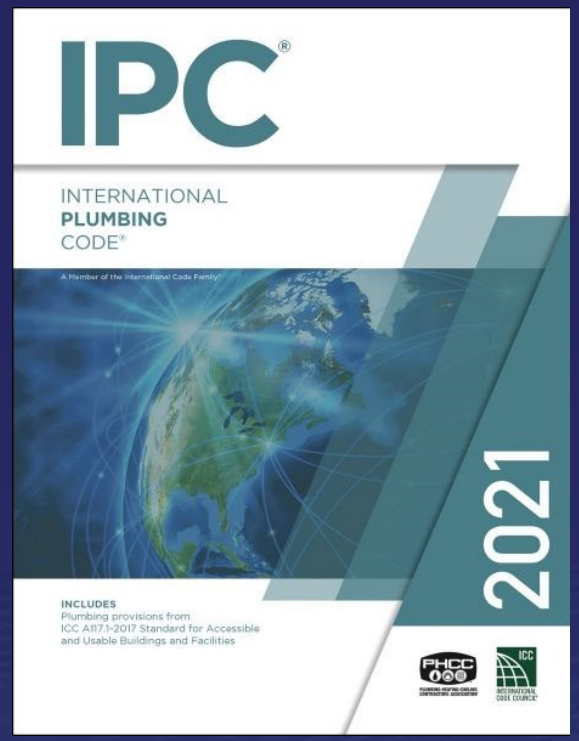
- Customer Service Agreements
  - Investor-owned utilities
  - New customers
- Plumbing Ordinance & Regulations
  - Plumbing Codes*
- Critical Elements
  - Right of entry
  - Lead ban
  - Enforcement

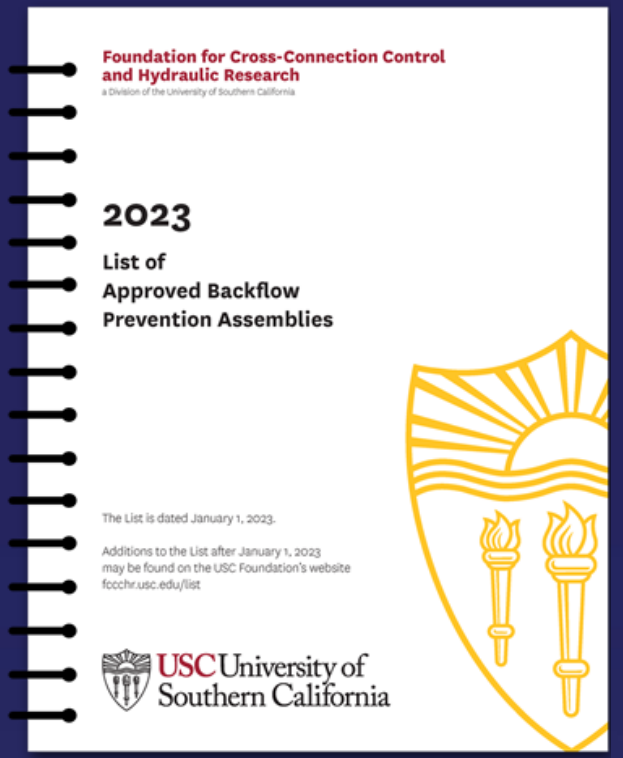
Reflection Questions:

1. What does your system have?
2. Does it have the required elements?
3. Are local rules up-to-date?
4. Who could help update them?

Crafting Local Regulations
What are some best practices?

- Adopting a Plumbing Code
  - Not enough on its own
  - No enforcement powers!
- Reference approved/tested assemblies in rules
  - USC, ASSE, IAPMO, etc.
- Where does it make sense to be more stringent?*



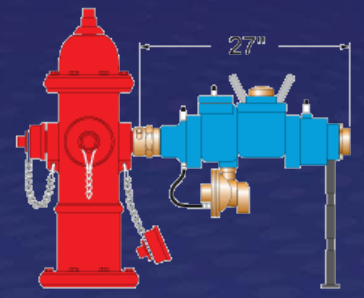


Source: USC FCCCHR, ICC

Crafting Local Regulations

Rules unique to a system

- Tailoring your regulations
- What unique challenges does your system face?
  - Stock tanks
  - Industrial facility or factory
  - Rampant construction
- How can your regulations best address and protect unique hazards?



Source: istockphoto, NNI Fire

Crafting Local Regulations

Resources and templates

30 TAC §290.47(b)

I. PURPOSE. The NAME OF WATER SYSTEM is responsible for protecting the drinking water supply from contamination or pollution which could result from improper system construction or configuration on the retail connection owner's side of the meter. The purpose of this service agreement is to notify each customer of the restrictions which are in place to provide this protection. The public water system enforces these restrictions to ensure the public health and welfare. Each retail customer must sign this agreement before the NAME OF WATER SYSTEM will begin service. In addition, when service to an existing retail connection has been suspended or terminated, the water system will not re-establish service unless it has a signed copy of this agreement.

II. RESTRICTIONS. The following unacceptable practices are prohibited by State regulations.

A. No direct connection between the public drinking water supply and a potential source of contamination is permitted. Potential sources of contamination shall be isolated from the public water system by an air-gap or an appropriate backflow prevention device.

B. No cross-connection between the public drinking water supply and a private water system is permitted. These potential threats to the public drinking water supply shall be eliminated at the service connection by the installation of an air-gap or a reduced pressure-zone backflow prevention device.

C. No connection which allows water to be returned to the public drinking water supply is permitted.

RG-478, Appendix I

ORDINANCE NO. _____

An ordinance of the city council of the City of _____, Texas, amending Chapter __ of the Code of Ordinances of _____, Texas, by adding a new section _____ to be entitled "Cross-Connection Control Program," providing a repeal clause and a severability clause, establishing penalties for the violation of these restrictions and provisions for their enforcement, and finding and determining that the meeting at which this ordinance is passed is open to the public as required by law.

BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF _____, TEXAS:

SECTION 1—That Chapter ____ of the Code of Ordinances of the City of _____, Texas, be amended to add a new section _____, such section to read as follows:

Section _____: Cross-Connection Control Program

a. **Definitions**

(1) **Manual M14:** The American Water Works Association's ***Recommended Practice for Backflow Prevention and Cross-Connection Control***, current edition.

(2) **TCEQ:** The Texas Commission on Environmental Quality.

(3) **290 Rules:** The TCEQ's rules and regulations for public water systems, which appear in Title 30, Texas Administrative Code, Chapter 290.

b. **General**

(1) No water-service connection shall be made to any establishment where a potential or actual contamination hazard exists unless the water supply is protected in accordance with the 290 Rules and this ordinance. The water purveyor shall discontinue water service if a required air gap or backflow prevention assembly is not installed, maintained, and tested in accordance with the 290 Rules and this ordinance.

(2) No backflow protection at the water service meter is required where an adequate internal cross-connection control program is in place.

Catching Up to Regulations
What about existing customers?

- PUC prohibits cut-offs for “refusal of a current customer to sign a service agreement”
  - 24.167(c)(8)
- Can request, but not require
  - Regulations protect both customer and supplier

Reflection Questions:

1. Do you have any customers without applied regulations?

Customer Service Inspections

How are we finding hazards out in our system to follow up on?

Key Regulations
How do we find hazards?

- 30 TAC 290.46(j) Customer Service Inspection
  - A customer service inspection (CSI) certificate shall be **completed** *prior to providing continuous service to new construction*, on any *existing service either when the water purveyor has reason to believe that cross-connections or other potential hazards exist*, or *after any material improvement, correction, or addition to the private water distribution facilities*.

Key Regulations
Who can do CSIs?

- 30 TAC 290.46(j)(1)(A)
  - Plumbing Inspectors and Water Supply Protection Specialists licensed by the Texas State Board of Plumbing Examiners (TSBPE).
- 30 TAC 290.46(j)(1)(B)
  - Customer service inspectors who have completed a commission-approved course, passed an examination administered by the executive director, and hold current professional license as a customer service inspector

Key Regulations
The CSI found a hazard – now what?

- 30 TAC 290.46(j)(2)
  - As potential contaminant hazards are discovered, they shall be promptly eliminated to prevent possible contamination of the water supplied by the public water system. The existence of a health hazard, as identified in §290.47(i) of this title, shall be considered sufficient grounds for immediate termination of water service. *Service can be restored only when the health hazard no longer exists, or until the health hazard has been isolated from the public water system* in accordance with §290.44(h) of this title (relating to Water Distribution)

Key Regulations
Summary

- 3 reasons:
  - New Construction
  - Plumbing expansion/correction
  - Suspected hazard
- Why do we do CSIs?
  - To provide/deny water service
- What do they look at?
  - Illegal lead materials, hazards, and cross connections
  - This includes a lead swabbing!

Source: istockphoto

Key Regulations
Summary (con't)

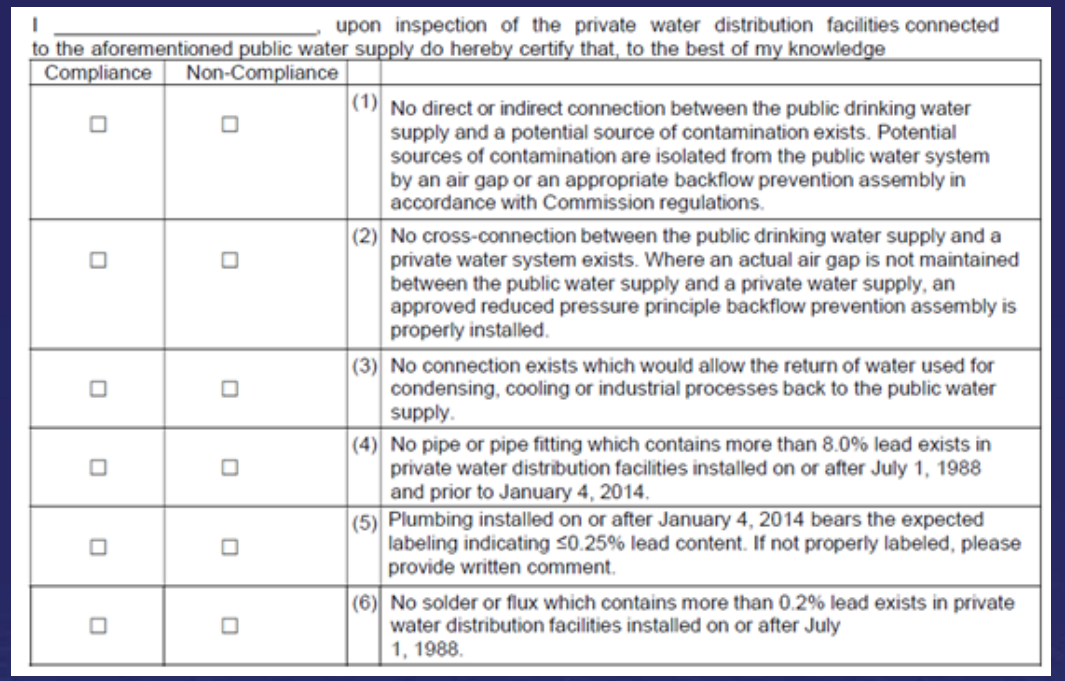
- 3 Licenses can do CSIs
  - TCEQ licensed CSIs
  - Plumbing Inspectors
  - Plumbers with Water Supply Protection Specialist endorsements
- Record Retention
  - *At least* 10 years
- This is not a plumbing inspection
  - They can be done at the same time
  - *Can a CSI inspect their own work?*

Reflection Questions:

1. Where are your CSIs located?
2. Where are some locations you think may need CSIs?

Customer Service Inspections
Best Practices Reviewing forms

- **Review them before filing away**
- Familiarize yourself with the form
  - What do these questions mean?
  - Does a “no” constitute a failure?
  - Are there any remarks?
  - Is it a current version of the form?
  - *What does the identified hazard need?*
- What is the appropriate follow-up?
  - Another CSI? Install a backflow assembly?

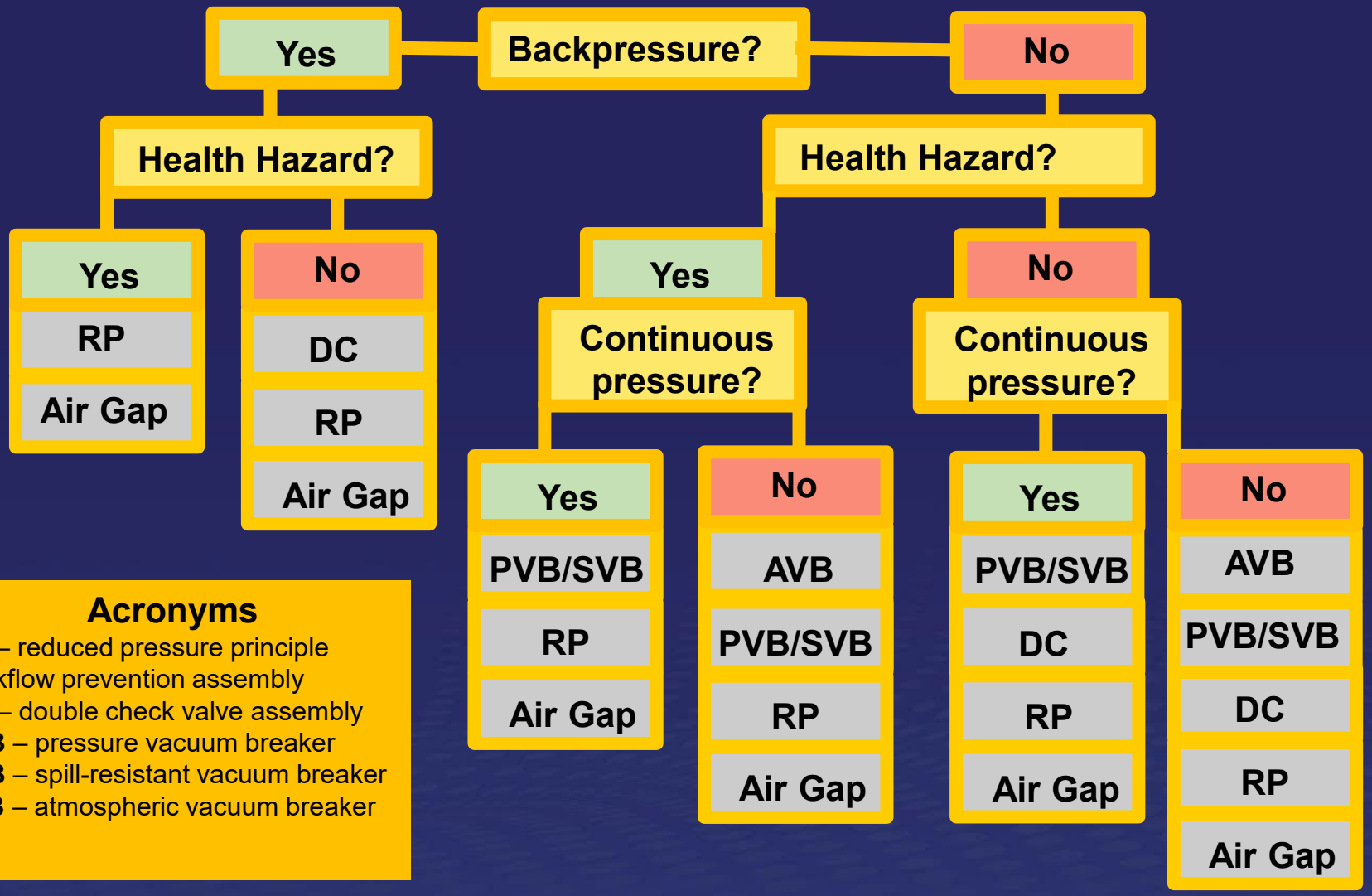


I _____, upon inspection of the private water distribution facilities connected to the aforementioned public water supply do hereby certify that, to the best of my knowledge

Compliance	Non-Compliance		
☐	☐	(1)	No direct or indirect connection between the public drinking water supply and a potential source of contamination exists. Potential sources of contamination are isolated from the public water system by an air gap or an appropriate backflow prevention assembly in accordance with Commission regulations.
☐	☐	(2)	No cross-connection between the public drinking water supply and a private water system exists. Where an actual air gap is not maintained between the public water supply and a private water supply, an approved reduced pressure principle backflow prevention assembly is properly installed.
☐	☐	(3)	No connection exists which would allow the return of water used for condensing, cooling or industrial processes back to the public water supply.
☐	☐	(4)	No pipe or pipe fitting which contains more than 8.0% lead exists in private water distribution facilities installed on or after July 1, 1988 and prior to January 4, 2014.
☐	☐	(5)	Plumbing installed on or after January 4, 2014 bears the expected labeling indicating ≤0.25% lead content. If not properly labeled, please provide written comment.
☐	☐	(6)	No solder or flux which contains more than 0.2% lead exists in private water distribution facilities installed on or after July 1, 1988.

What do I install?
Three Questions

- Does this experience **backpressure**?
- What is the type of **hazard**?
- Is it under **continuous pressure**?



Acronyms

RP – reduced pressure principle backflow prevention assembly
DC – double check valve assembly
PVB – pressure vacuum breaker
SVB – spill-resistant vacuum breaker
AVB – atmospheric vacuum breaker

Customer Service Inspections
But I don't have any CSIs - where do I start?

- **There's no better time to start than now!**
  - Continue requiring on New Construction
  - Approach "suspected hazards"
- Approach like a triage
  - Most urgent, dangerous facilities
  - Uncommon and common commercial facilities
  - Residences with few complex hazards

Reflection Questions:

1. What hazards are in your system?
2. How can you go about finding suspected hazards?
3. What facilities would you want inspected first thing tomorrow?

Customer Service Inspections
Best Practices for Records

- Record Retention
  - Maintain CSI forms for as long as the facility is in service
  - Perform periodic CSIs if necessary
  - Require Periodic CSIs to see how facility changes over time
- Registration
  - Consider requiring CSIs register and submit their license information
  - Review License with TCEQ or TSBPE

Backflow Testing

How do we keep our system protected?

TEXAS COMMISSION ON
ENVIRONMENTAL QUALITY

Key Regulations
When do we test backflow preventers?

- 30 TAC 290.44(h)(4)
  - ***All*** *backflow prevention assemblies* that are required according to this section and associated table located in §290.47(f) of this title *shall be tested upon* ***installation*** *by a recognized backflow prevention assembly tester* and certified to be operating within specifications.

Key Regulations
What about on health hazards?

- 30 TAC 290.44(h)(4) (continued)
  - Backflow prevention assemblies which are installed to provide protection against *health hazards must also be tested and certified to be operating within specifications* ***at least annually*** by a recognized backflow prevention assembly tester.

Key Regulations
Who is doing these tests?

- 30 TAC 290.44(h)(4)(A)
  - *Recognized backflow prevention assembly testers* shall have completed an executive director approved course on cross-connection control and backflow prevention assembly testing, pass an examination administered by the executive director, and hold a current license as a backflow prevention assembly tester.

Key Regulations
What can backflow assembly testers work on?

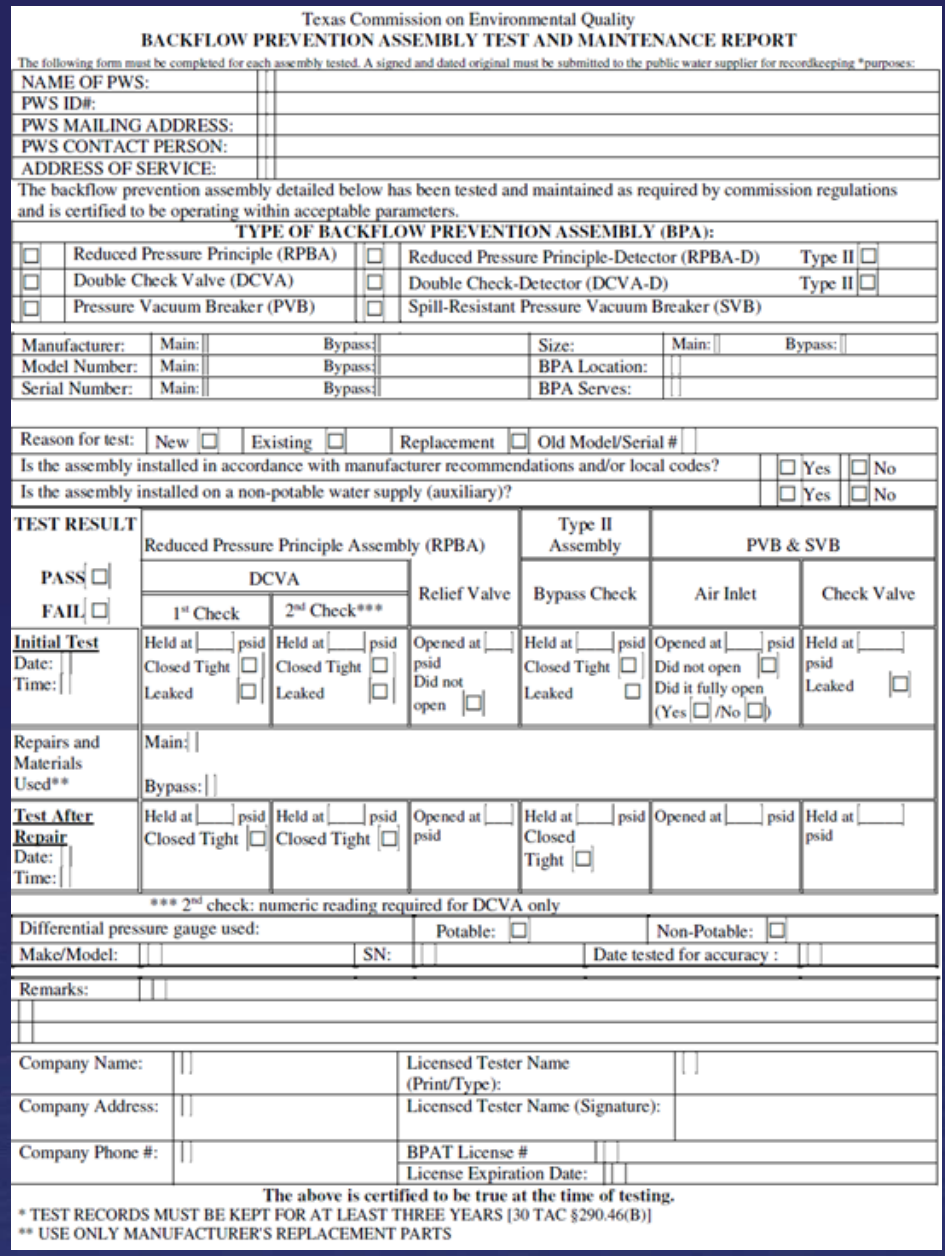
- 290.44(h)(4)(A)(i)
  - Backflow prevention assembly testers are qualified to test and repair assemblies on *any domestic, commercial, industrial, or irrigation service*.
- 290.44(h)(4)(A)(ii)
  - Backflow prevention assembly *testers may test and repair assemblies on firelines only if they are permanently employed by an Approved Fireline Contractor.* The State Fire Marshal's office requires that any person performing maintenance on firelines must be employed by an Approved Fireline Contractor.

Key Regulations
What are we looking at?

- 290.44(h)(4)(B)
  - *Gauges used in the testing of backflow prevention assemblies shall be tested for accuracy annually* in accordance with the University of Southern California's Manual of Cross-Connection Control or the American Water Works Association Recommended Practice for Backflow Prevention and Cross-Connection Control (Manual M14). *Public water systems shall require testers to include test gauge serial numbers on "Test and Maintenance" report forms* and ensure testers have gauges tested for accuracy.

Backflow Testing
What do we need at a glance?

- What do we need to see before accepting test reports?
  - Is this the right form?
  - Hazard classification
    - Is the right assembly installed for the job?
  - Test results – did it pass?
  - Was it filled out completely?
  - Was it installed correctly?
  - Is their license/gauge information current?



Texas Commission on Environmental Quality

BACKFLOW PREVENTION ASSEMBLY TEST AND MAINTENANCE REPORT

The following form must be completed for each assembly tested. A signed and dated original must be submitted to the public water supplier for recordkeeping *purposes:

NAME OF PWS:	
PWS ID#:	
PWS MAILING ADDRESS:	
PWS CONTACT PERSON:	
ADDRESS OF SERVICE:	

The backflow prevention assembly detailed below has been tested and maintained as required by commission regulations and is certified to be operating within acceptable parameters.

TYPE OF BACKFLOW PREVENTION ASSEMBLY (BPA):

☐	Reduced Pressure Principle (RPBA)	☐	Reduced Pressure Principle-Detector (RPBA-D)	Type II ☐
☐	Double Check Valve (DCVA)	☐	Double Check-Detector (DCVA-D)	Type II ☐
☐	Pressure Vacuum Breaker (PVB)	☐	Spill-Resistant Pressure Vacuum Breaker (SVB)	

Manufacturer:	Main:	Bypass:		Size:	Main:	Bypass:
Model Number:	Main:	Bypass:		BPA Location:		
Serial Number:	Main:	Bypass:		BPA Serves:		

Reason for test:	New ☐	Existing ☐	Replacement ☐	Old Model/Serial #			
Is the assembly installed in accordance with manufacturer recommendations and/or local codes?					☐ Yes	☐ No	
Is the assembly installed on a non-potable water supply (auxiliary)?					☐ Yes	☐ No	

TEST RESULT PASS ☐ FAIL ☐	Reduced Pressure Principle Assembly (RPBA)			Type II Assembly	PVB & SVB	
	DCVA		Relief Valve	Bypass Check	Air Inlet	Check Valve
	1st Check	2nd Check***				
Initial Test Date: Time:	Held at ___ psid Closed Tight ☐ Leaked ☐	Held at ___ psid Closed Tight ☐ Leaked ☐	Opened at ___ psid Did not open ☐	Held at ___ psid Closed Tight ☐ Leaked ☐	Opened at ___ psid Did not open ☐ Did it fully open (Yes ☐ /No ☐)	Held at ___ psid Leaked ☐
Repairs and Materials Used**	Main: Bypass:					
Test After Repair Date: Time:	Held at ___ psid Closed Tight ☐	Held at ___ psid Closed Tight ☐	Opened at ___ psid	Held at ___ psid Closed Tight ☐	Opened at ___ psid	Held at ___ psid

*** 2nd check: numeric reading required for DCVA only

Differential pressure gauge used:		Potable: ☐	Non-Potable: ☐
Make/Model:	SN:		Date tested for accuracy :

Remarks:

Company Name:		Licensed Tester Name (Print/Type):	
Company Address:		Licensed Tester Name (Signature):	
Company Phone #:		BPAT License #	
		License Expiration Date:	

The above is certified to be true at the time of testing.

* TEST RECORDS MUST BE KEPT FOR AT LEAST THREE YEARS [30 TAC §290.46(B)]

** USE ONLY MANUFACTURER'S REPLACEMENT PARTS

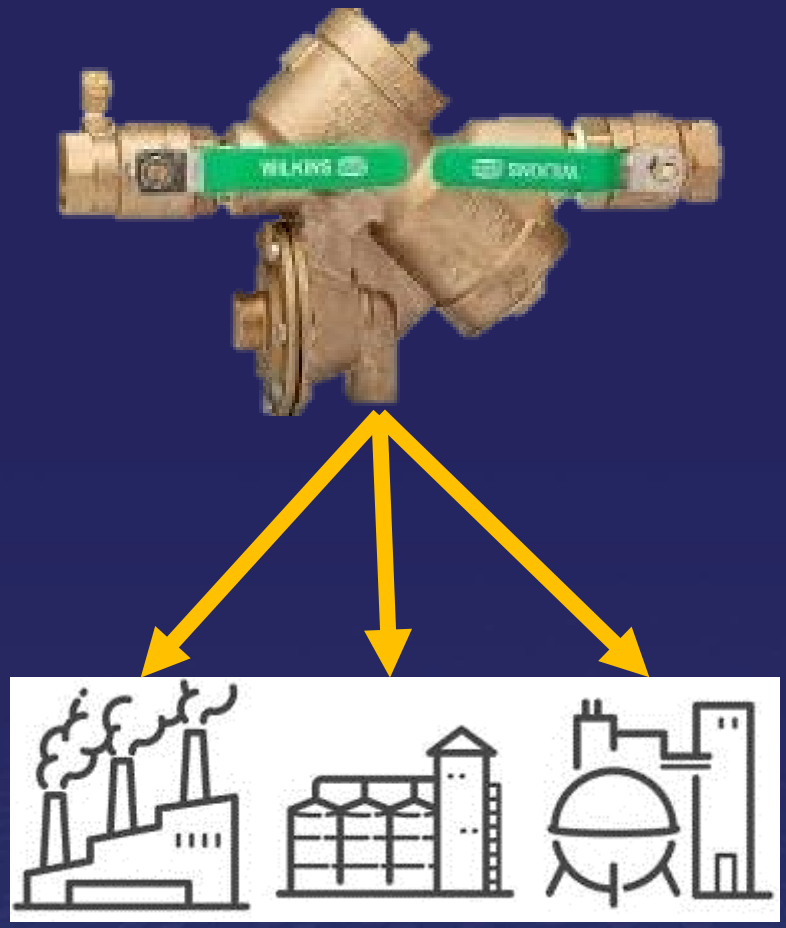
Backflow Testing
Know your system

- Track vital information on assemblies in the system, such as:
  - Type, make, or model
  - Serial number
  - Hazard Classification/hazard type
  - Due date for next test
- 3rd Party recordkeeping software companies exist
  - Needs approval from TCEQ
  - Can automate some of these features

Source: istockphoto

Backflow Testing
Best practices

- **Review the form before filing them away**
  - What do the remarks or results tell you?
  - Do they match previous test information?
- Keep for as long as the BPA is in-service
  - *Must be kept for at least 3 years*
- Consider taking a 32/40 Hour Backflow Training
  - Know what testers do!
  - Understand the results



Backflow Testing
Best practices with testers

- Consider requiring testers to register
  - Record this in your Authority document!
  - License, gauge, and company information
- QAQC those testers in your system
  - Shadow a backflow tester to a test
  - Tag a backflow, require it be submitted with the test
  - You are the first line of defense to kick out bad players in your system!

Reflection Questions:

1. Where are your test forms located?
2. Are they easily searchable?
3. What assemblies are in your system? Do you have a list?
4. Have you ever seen strange results or discrepancies in your test reports? What would you do if you saw them again?

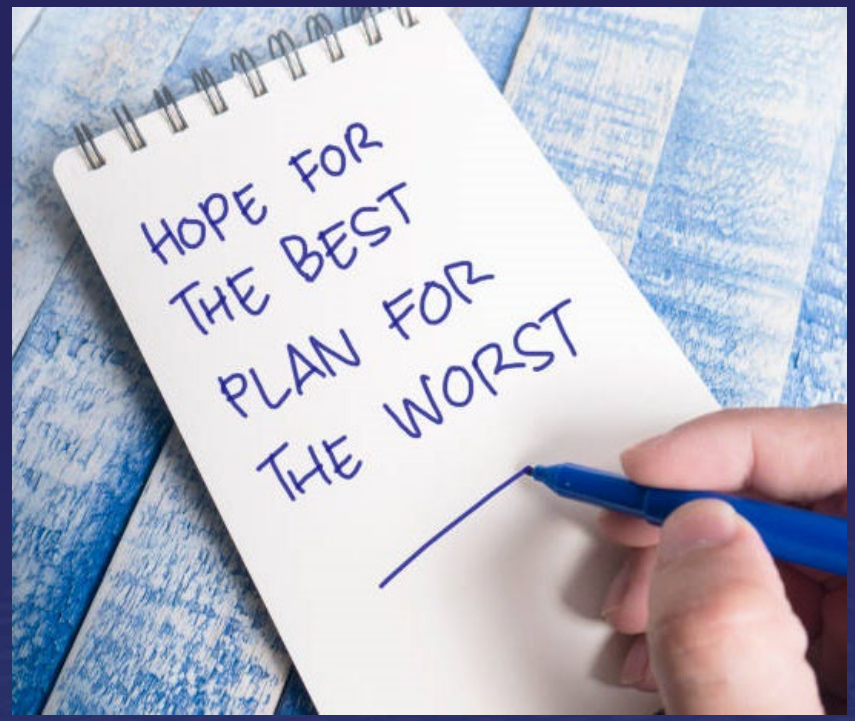
Other Considerations

What else can we include to get our program up and running?

Source: Wall Street Journal

Consider the Following
What do I do in an Emergency?

- Preparing for and Responding to Emergency Backflow Events are their own in-depth topics
  - RG-476
  - RG-477
- Knowing what is in your system is critical
  - Where are your lines?
  - Where are our isolating valves?
  - What hazards have you identified?



Source: istockphoto

Consider the Following
What can we do to help run the program?

- Interdepartmental Communication, Coordination, and Cooperation
  - Plumbing department
  - Permits department
  - City, utility, and district managers
  - Fire department/Fire Marshall
  - Water department personnel
  - Front desk staff
- Who would benefit from backflow training?

Reflection Questions:

1. Who at your system already have a stake in backflow?
2. How would these departments be involved?

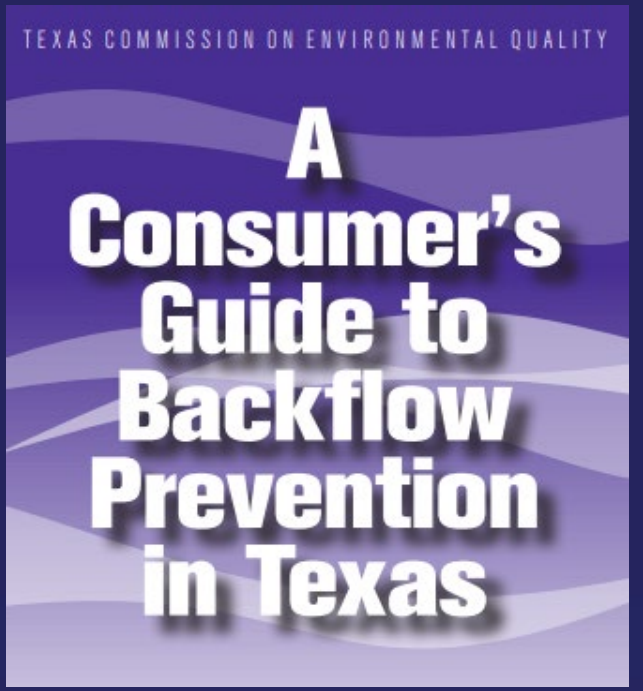
Consider the Following
Develop a Backflow Committee

- Meet and discuss backflow issues through several backgrounds
  - The Program Administrator
  - Water Department Manager
  - Plumbing Inspector or Local Plumber
  - Fire Marshal
  - Management and Council/Board Member
  - Local Irrigator

Source: Kingdoms of Camelot

Coordinate and Cooperate
Customer Service

- Public Outreach and Education
  - People don't always understand backflow
- Public health is our goal
  - Who gets exposed to a backflow event first?
  - Hazardous consumer products are not concerned with backflow



Source: HEB, Lowe's

Resources

What else is available to help shape a backflow program?

Resources

Internal Publications

- **RG-478** "Establishing and Managing an Effective Cross Connection Control Program"
- GI-411 "A Consumer's Guide to Backflow Prevention in Texas"
- RG-345 "Backflow Protection on Fire Prevention Systems"
- RG-476 "A Public Water System Guide to Responding to a Backflow Incident"
- RG-477 "A Public Water System Guide to Preparing a Backflow-Incident Emergency-Response Plan"
- RG-493 "Accuracy Testing of Gauges Used for Testing Backflow-Prevention Assemblies"

Resources
External Publications

- Manual of Cross-Connection Control, 10e
  - fccchr.usc.edu/tools.html#TenthEdition
- Recommended Practices for Backflow Prevention and Cross-Connection Control (AWWA)
  - https://store.awwa.org/M14-Backflow-Prevention-and-Cross-Connection-Control-Recommended-Practices-Fifth-Edition-PDF
- List of Approved Backflow Prevention Assemblies
  - fccchr.usc.edu/_downloads/List/list.pdf

Resources
Free help through the TCEQ

- TCEQ's Small Business and Local Government Assistance Program
  - Free and confidential assistance
  - Available in all TCEQ Regions
  - Also assists with non-PWS issues
- TexasEnviroHelp.org

- TCEQ's Financial, Managerial, and Technical (FMT) Assistance Program
  - Free, one-on-one and on-site assistance
  - Can assist with a variety of PWS and wastewater issues
- tceq.texas.gov/drinkingwater/fmt

Resources
Quarterly Meetings on Backflow

- The Cross-Connection Control (CCC) Subcommittee
  - Meeting of industry professionals, training providers, PWS staff, regulators, and others
  - Discuss backflow and cross connection issues
  - Quarterly meeting held remotely and in-person at TCEQ Central Office

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