Carolina's Chapter American Backflow Prevention Association (ABPA)

Speakers: Nissa Pauley
Kathy Riley

What is backflow and how will SB166/SL 2024-49 impact NC public water systems?

Talking Points

- What are cross connections? Backflow? What causes it?
- The risks cross connections introduce
- How do we prevent backflow events?
- How will SB166/SL 2024-49 impact NC public water systems?
- Solutions
- Q&A

What Are Cross Connections?

A cross connection is the physical link or connection between drinking water (potable) and non-drinking water (non-potable).

Common Cross Connections:

- Lawn Irrigation, Swimming pools
- Chemical Stations
- Fire sprinklers
- Boilers, Chiller, any other HVAC Equipment
- Pedicure bowls
- Lab, Kitchen, Dental Equipment

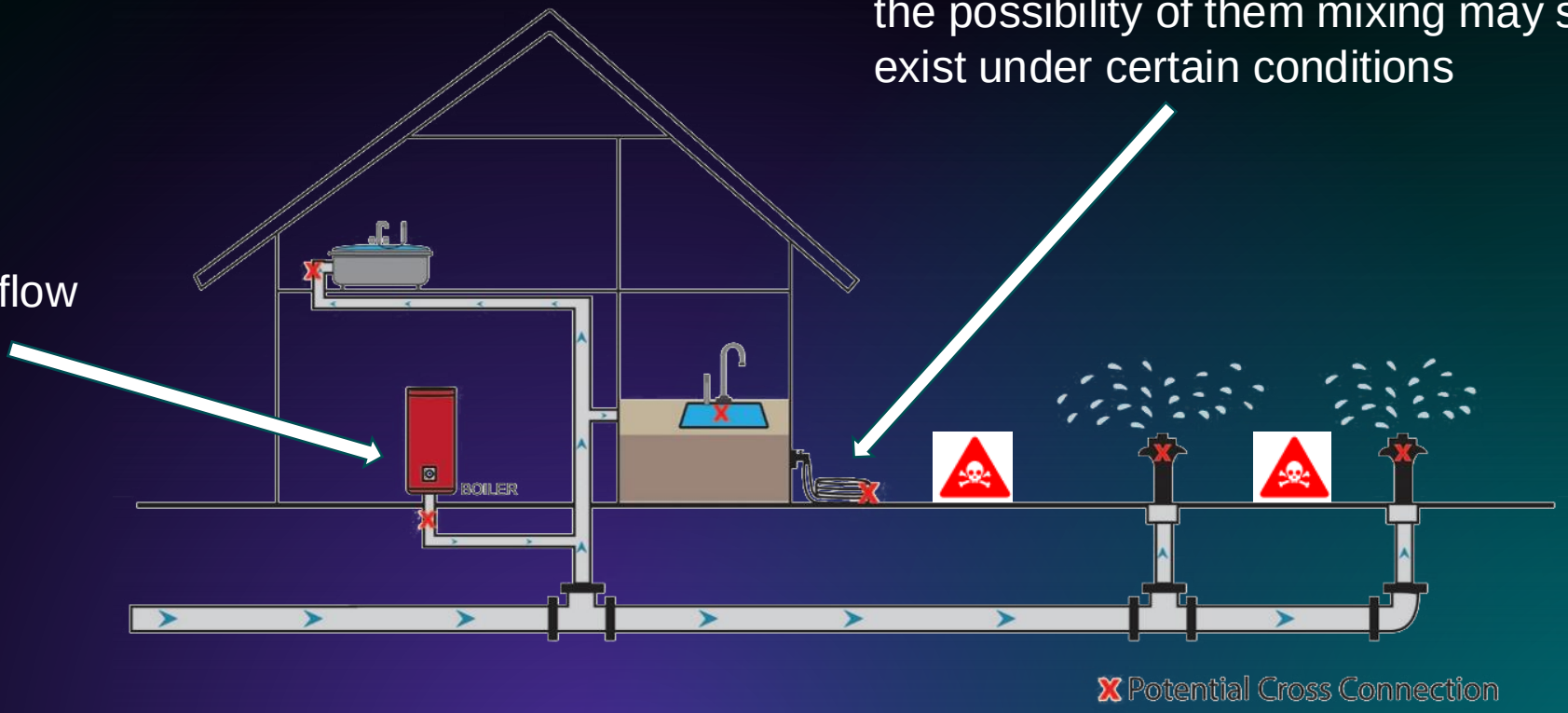
Types of Cross Connections

Indirect Cross Connection

When there's a separation or gap between the clean and dirty water, but the possibility of them mixing may still exist under certain conditions

Direct Cross Connection

When clean and dirty water are **directly connected** without backflow protection in between them



What is Backflow?

- **Backflow:** the reverse flow of water or other substance into a public water system from an unintended source.

What Causes Backflow?

Backflow events occur when water in a pipe flows in the opposite direction, which can cause contaminated water to mix with clean drinking water. Backflow occurs for one of two reasons:

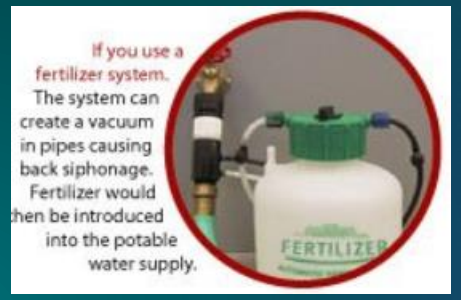
1. Backsiphonage – water is **siphoned** backwards in the wrong direction.

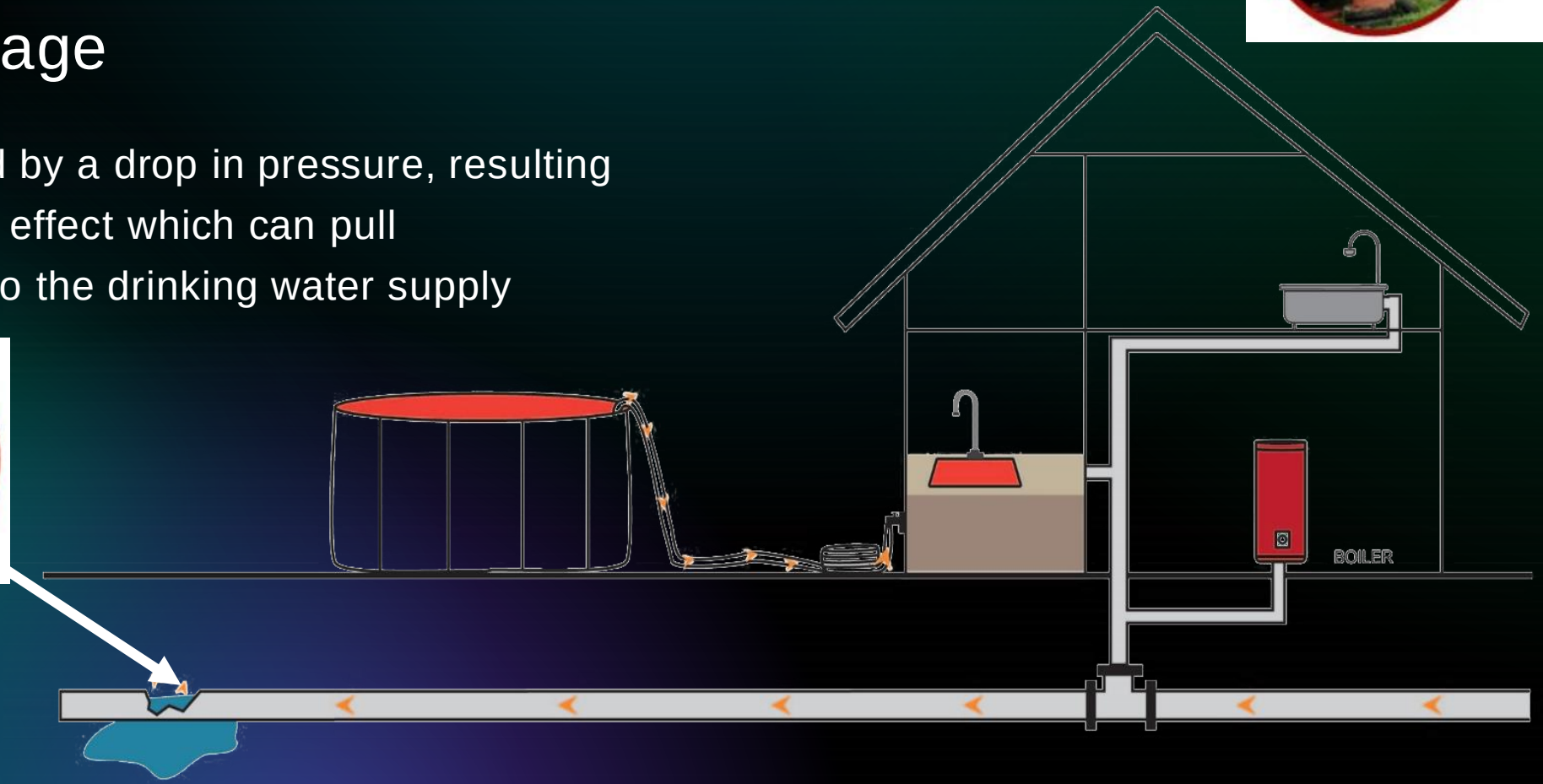
2. Backpressure – water is **pushed** backwards in the wrong direction.

What is Backsiphonage?

Backsiphonage

Backflow caused by a drop in pressure, resulting in a vacuum-like effect which can pull contaminants into the drinking water supply

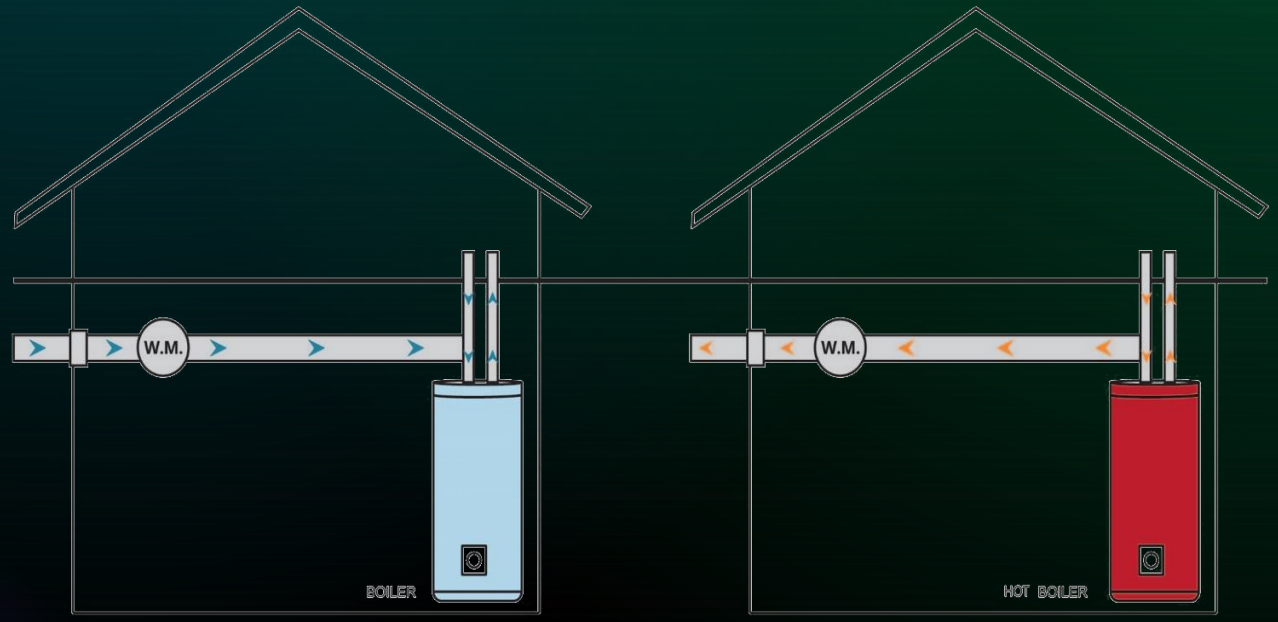




What is Backpressure?

Backpressure

Backflow caused when the customers plumbing side water pressure is HIGHER than the supply side. This usually occurs because of pumps, thermal expansion, or even lawn sprinkler systems on a sloped area.



How Do We Prevent Backflow Events?

What is a Backflow Preventer?

A device or assembly to prevent water from flowing backward and contaminating the clean potable water supply.

Backflow preventers ensure that water only flows in one direction—from the clean potable water supply system to the outlets, such as faucets, irrigation systems, or other water-using devices.

Mechanical equipment like backflow preventers need regular maintenance and repair just like our vehicles to ensure they are working properly.

What is a Cross Connection Control Program?

UNDER THE PROVISIONS OF THE SAFE DRINKING WATER ACT OF 1974, THE FEDERAL GOVERNMENT HAS ESTABLISHED THROUGH THE EPA, NATIONAL STANDARDS FOR SAFE DRINKING WATER. THE STATES ARE RESPONSIBLE FOR THE ENFORCEMENT OF THESE STANDARDS. WATER PURVEYORS ARE HELD RESPONSIBLE FOR THIS COMPLIANCE.

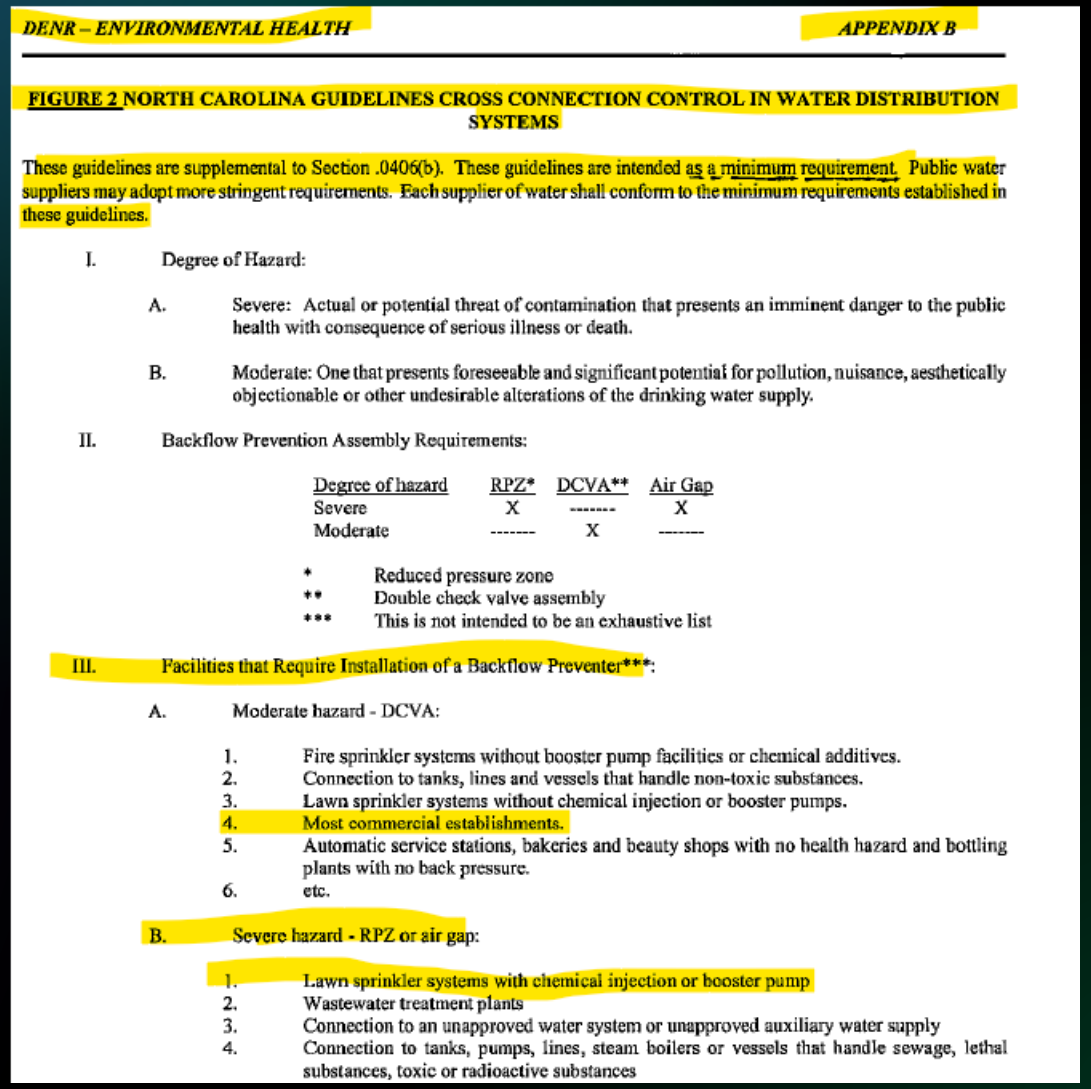
GOALS: PROTECT, REDUCE, CONTROL, AND COMPLY WITH ALL STATE & FEDERAL REQUIREMENTS

- **Containment** Program – this approach utilizes a **minimum** requirement and protects at the meter.
  - This approach protects the Water Purveyor but not the customers internal plumbing
- **Isolation** Program – this approach protects the customers internal plumbing. This is mostly covered by the NC Plumbing Code

What **did** NCAC Title 15A say?

OLD NCAC Title 15A, Subchapter 18C, Sections .0300 and .0406, and Appendix B, Figure 2

- KEY Verbiage, section .0709 "**Prevention** of Backflow and Back-siphonage"
- KEY Verbiage, **"Public water suppliers may adopt more stringent requirements."** This is because water purveyors are granted primacy in the Safe Drinking Water Act.
- KEY Verbiage, under "Facilities that require the installation of a backflow preventer, Most commercial establishments." This is a CONTAINMENT (at the meter) Program that 100% of water purveyors do.



DENR – ENVIRONMENTAL HEALTH *APPENDIX B*

FIGURE 2 NORTH CAROLINA GUIDELINES CROSS CONNECTION CONTROL IN WATER DISTRIBUTION SYSTEMS

These guidelines are supplemental to Section .0406(b). These guidelines are intended as a minimum requirement. Public water suppliers may adopt more stringent requirements. Each supplier of water shall conform to the minimum requirements established in these guidelines.

I. Degree of Hazard:

A. Severe: Actual or potential threat of contamination that presents an imminent danger to the public health with consequence of serious illness or death.

B. Moderate: One that presents foreseeable and significant potential for pollution, nuisance, aesthetically objectionable or other undesirable alterations of the drinking water supply.

II. Backflow Prevention Assembly Requirements:

Degree of hazard	RPZ*	DCVA**	Air Gap
Severe	X	-------	X
Moderate	-------	X	-------

* Reduced pressure zone
** Double check valve assembly
*** This is not intended to be an exhaustive list

III. Facilities that Require Installation of a Backflow Preventer***:

A. Moderate hazard - DCVA:

1. Fire sprinkler systems without booster pump facilities or chemical additives.
2. Connection to tanks, lines and vessels that handle non-toxic substances.
3. Lawn sprinkler systems without chemical injection or booster pumps.
4. Most commercial establishments.
5. Automatic service stations, bakeries and beauty shops with no health hazard and bottling plants with no back pressure.
6. etc.

B. Severe hazard - RPZ or air gap:

1. Lawn sprinkler systems with chemical injection or booster pump
2. Wastewater treatment plants
3. Connection to an unapproved water system or unapproved auxiliary water supply
4. Connection to tanks, pumps, lines, steam boilers or vessels that handle sewage, lethal substances, toxic or radioactive substances

What **does** NCAC Title 15A say now?

CURRENT NCAC Title 15A, Subchapter 18C, Sections .0300 and .0406, and Appendix B, Figure 2

- Revised Rules (Effective July 1, 2019)
- [15A NCAC 18C.0406 (a)] states that no person shall create an unprotected cross connection to the public water system.
- [15A NCAC 18C.0406 (a2)] "Where required, the supplier of water shall install or require to be installed an appropriate testable backflow prevention assembly prior to making the service connection." NC Plumbing Code does *not* define a containment backflow preventer. Plumbing code doesn't apply until 5 ft of the foundation wall and internal plumbing.

(b) Cross-Connections. No person shall construct, maintain, or operate a physical arrangement whereby a public water system has a cross-connection without the use of proper backflow protection.

(1) No person shall introduce any water into the distribution system of a public water supply through any means other than from a source of supply duly approved by the Department or its representatives or make any physical connection between an approved supply and unapproved supply unless authorized in an emergency by the Department or its representative.

(2) Service Connection Relation to Plumbing Code. No supplier of water shall provide a service connection to any plumbing system that does not comply with the North Carolina State Building Code, Volume II, and all applicable local plumbing codes. Where required, the supplier of water shall install or require to be installed an appropriate testable backflow prevention assembly prior to making the service connection. Design of backflow prevention assemblies for service connections shall not require Department review.

How will SB166/SL 2024-49 impact NC Public Water Systems?

The new Law makes Cross Connection Programs REACTIVE instead of Preventative.

This law directly impacts the water purveyors ability to perform their responsibilities in ***maintaining*** safe drinking water to each tap and undermines public health and safety. A water purveyor can monitor its source and provide treatment to ensure safe drinking water is provided, however we must also ensure that the water users do not affect water quality through unprotected cross connections. Without Backflow preventers, there's a heightened risk of contamination, endangering the health of consumers.

Solution to §130A-330(a)

"**§ 130A-330. Local authority to require backflow preventers; testing.**

(a) No public water system owned or operated by a local government unit, as that term is defined in G.S. 159G-20(13), shall require a customer to install a backflow preventer on an existing nonresidential or residential connection, including multifamily dwellings, not otherwise required by State or federal law except where the degree of hazard from the customer's connection is determined to be high by the Department.

- EDIT [15A NCAC 18C.0406 (a2)] to "Where required, the supplier of water shall ~~**install or**~~ require to be installed an appropriate testable backflow prevention assembly prior to making the service connection."
- EDIT [15A NCAC 18C] "Appendix B", "High Hazard Service Connections" # 5 to "Fire sprinkler systems with booster pump facilities, ~~or~~ chemical additives, or FDC connection."
- ADD [15A NCAC 18C] "Appendix B", "High Hazard Service Connections" list to include "All buildings connected to City water excluding single-family dwellings with no additional hazards."

Solution to §130A-330(d)

(d) The Department shall determine whether the degree of hazard for a service connection is high when the installation of a backflow preventer is not otherwise required by State or federal law. The Department shall provide notice of such determinations on its website.

- EDIT 15A NCAC 18C.0406 to include a **new** subsection to say “All water suppliers/water purveyors shall at a minimum follow the AWWA M-14 Backflow Prevention and Cross Connection Control.”
- EDIT 15A NCAC 18C.0406 to include a **new** subsection to say “All water suppliers/water purveyors shall at a minimum maintain a Containment Program as defined by the AWWA M-14.”
    - It currently says “where required”
- ADD [15A NCAC 18C] “Appendix B”, “High Hazard Service Connections” to include “All buildings connected to City water excluding single-family dwellings with no additional hazards.”

(f) No public water system owned or operated by a local government unit shall require periodic testing more frequently than once every three years for backflow preventers on residential irrigation systems that do not apply or dispose chemical feeds.

NC Plumbing Code

- ***608.1 General*** A potable water supply system shall be designed, installed and maintained in "such a manner so as to **PREVENT** contamination from nonpotable liquids, solids or gases being introduced into the potable water supply through cross connections or any other piping connections to the system."

- ***608.16.5 Connections to Lawn Irrigation Systems*** The potable water supply to lawn irrigation systems shall be protected against backflow by an AVB, a PVB or RP type backflow prevention assembly. Where chemicals are introduced into the system, the potable water supply shall be protected against backflow by a RP backflow prevention assembly.

****SIDE NOTE: AVB, PVB, and RP type backflows are designated to HIGH hazard ****

- ***301.7 Conflicts*** Where conflicts between this code and the conditions of the listing or the manufacturer's installation instructions occur, the provisions of this code apply.

  Exception: Where a code provision is less restrictive than the conditions of the listing of the equipment or appliance or the manufacturer's installation instructions, the conditions of the listing and manufacturer's installation instructions shall apply.

EPA & Manufacturer's installation, what do they say?

EPA says:

X. Periodic Testing

A. Reduced pressure principle backflow devices shall be tested and inspected at least semi-annually.

B. Periodic testing shall be performed by the Department's certified tester or his delegated representative. This testing will be done at the owner's expense.

C. The testing shall be conducted during the Department's regular business hours. Exceptions to this, when at the request of the owner, may require additional charges to cover the increased costs to the Department

Annual average irrigation failure rate is about 13-15% x 3 years = approx. 40%-45% failure rate. During the 3-year timeframe almost half of water customers would have compromised drinking water.

Manufacturer's says:

Application Designed for installation on water lines to protect against both backsiphonage and backpressure of contaminated water into the potable water supply. Assembly shall provide protection where a potential **health hazard** exists.

⚠ WARNING

Need for Periodic Inspection/Maintenance: This product must be tested periodically in compliance with local codes, but at least once per year or more as service conditions warrant. All products must be retested once maintenance has been performed. Corrosive water conditions and/or unauthorized adjustments or repair could render the product ineffective for the service intended. Regular checking and cleaning of the product's internal and external components helps assure maximum life and proper product function.

Solution to §130A-330(f)

(f) No public water system owned or operated by a local government unit shall require periodic testing more frequently than once every three years for backflow preventers on residential irrigation systems that do not apply or dispose chemical feeds.

- EDIT 15A NCAC 18C.0406 to include a **new** subsection to say “All water suppliers/water purveyors shall at a minimum maintain an annual testing of backflow preventer assemblies in accordance with AWWA M-14.”
- EDIT [15A NCAC 18C] “Appendix B”, “High Hazard Service Connections” to say “**All** Lawn sprinkler systems ~~with chemical injection or booster pump~~.

Real Life Examples

Example 1

Code official is called in because an *existing* dental office is complaining of pink water in their restrooms. The Code official finds that the vacuum system was installed ***after*** the certificate of occupancy was granted and the spittoons on the dental chairs are being recirculated through their internal plumbing and coming out in the sink in the restrooms. A backflow is required to isolate the dental spittoons from the drinking water in the suite.

<u>SB 166/SL 2024-49 would prohibit the water purveyor from making that water customer install a backflow. Legally, the water purveyor cannot perform the work because this is on private property.</u>

Real Life Examples

Example 2

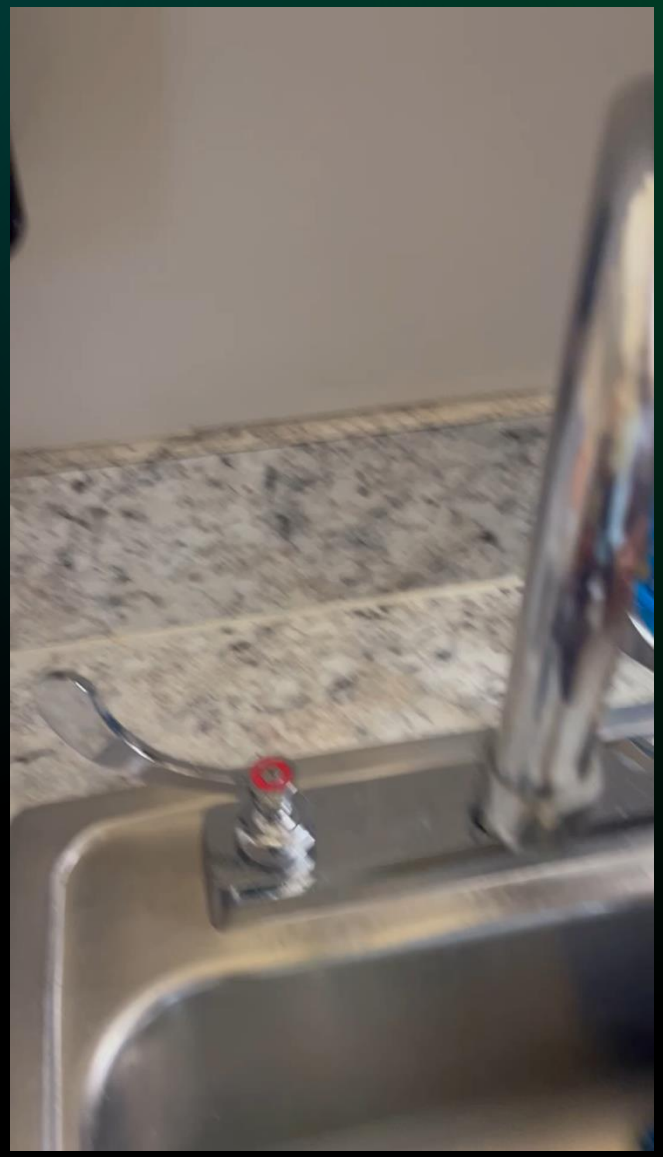
Code official is called in to an existing pizza restaurant because they have purple soapy bubble water coming out of the drink dispensers. The Code official determines that ***after*** the certificate of occupancy was granted a janitorial company came in and hooked up their soap and degreaser unit to the internal water line causing the soap to backflow and ultimately coming out from the drink dispensers.

<u>SB 166/SL 2024-49 would prohibit the water purveyor from making that water customer install a backflow. Legally, the water purveyor cannot perform the work because this is on private property.</u>

Real Life Examples

Example 3

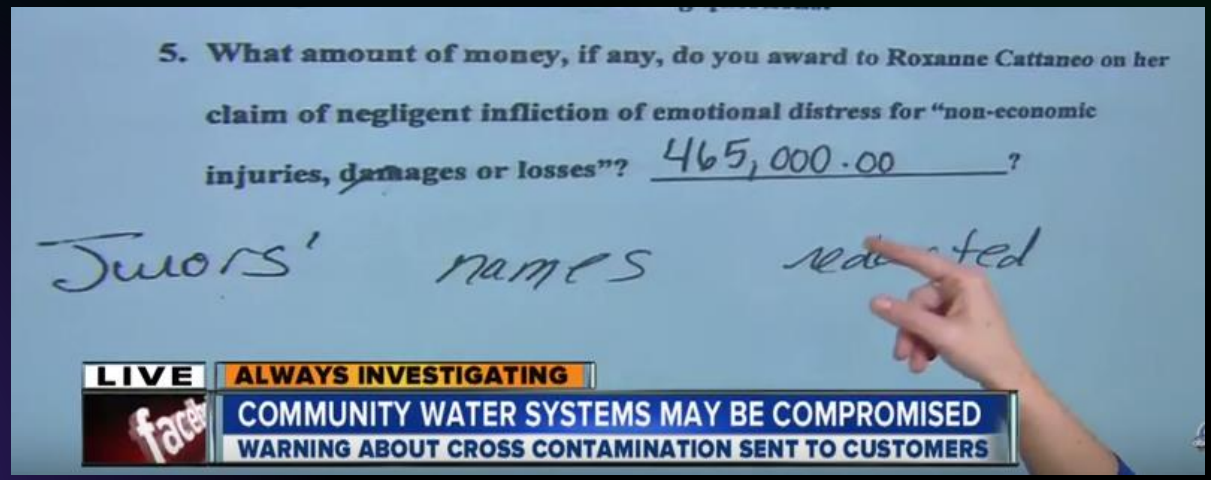
Code official is called to a manufacturing plant because they have sweet water in the coffee maker. The Code official determines that ***after*** the certificate of occupancy was granted, years later they replaced an existing cooling system. The issue was that they replaced the old cooling system using internal employees who are not licensed to perform the work to save money. The employees tied in to the closest water line they could find. That water line was on the other side of the wall from the break room where the coffee maker was connected. This allowed antifreeze to enter the coffee maker. Antifreeze is odorless, toxic, and can affect the central nervous system.



Financial Impact of Backflow Events

- Labor Costs – 494 hours to remediate an incident
- Millions and millions of dollars payouts from lawsuits

NO ONE THINKS TWICE ABOUT THE HEALTH HAZARD OF DRINKING TAP WATER. BUT WHEN WATER IS CONTAMINATED, NO ONE IS SAFE. OVER THE PAST 31 YEARS, DIRTY DRINKING WATER HAS BEEN BLAMED FOR MORE THAN 12,000 CASES OF ILLNESS. FEW, IF ANY, INSURERS HAVE POLICIES COVERING CONTAMINATED TAP WATER. OVER THE PAST FEW YEARS, INSURERS HAVE PAID MORE THAN $20 MILLION TO SETTLE WITH VICTIMS SICKENED BY BACKFLOW. BY KRISTINE SORENSEN GRIFFIN



CREATION OF A FULL-TIME CROSS CONNECTION MANAGER POSITION WITHIN NCDEQ

This new NCDEQ position would oversee backflow prevention efforts, managing a State-wide Testers certification, and training programs, setting qualifications for instructors, and developing course curriculum to ensure compliance and safety across the State. I have drafted an outline for such requirements, please email jeffrey.talbott@deq.nc.gov for a DRAFT copy.

This position would be like the one in South Carolina under the Bureau of Water. This would serve as a state-mandated program designed to protect public health and would maintain that all ORC's follow the same set of rules, requirements, etc.

Questions?

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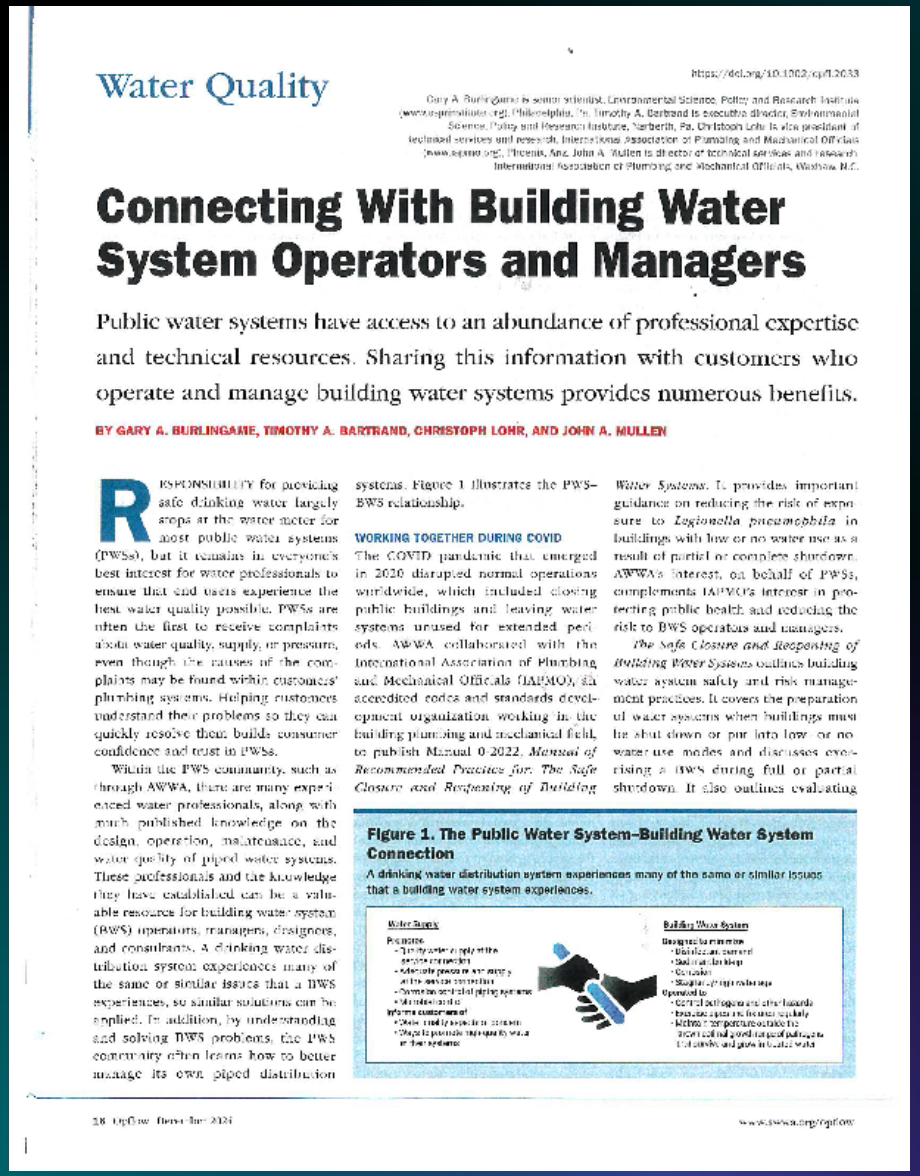
Supplemental Information



Water Quality

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Connecting With Building Water System Operators and Managers

Public water systems have access to an abundance of professional expertise and technical resources. Sharing this information with customers who operate and manage building water systems provides numerous benefits.

BY GARY A. BURLINGAME, TIMOTHY A. BARTRAND, CHRISTOPH LOHR, AND JOHN A. MULLEN

RESPONSIBILITY for providing safe drinking water largely stops at the water meter for most public water systems (PWSs), but it remains in everyone's best interest for water professionals to ensure that end users experience the best water quality possible. PWSs are often the first to receive complaints about water quality, supply, or pressure, even though the causes of the complaints may be found within customers' plumbing systems. Helping customers understand their problems so they can quickly resolve them builds consumer confidence and trust in PWSs.

Within the PWS community, such as through AWWA, there are many experienced water professionals, along with much published knowledge on the design, operation, maintenance, and water quality of piped water systems. These professionals and the knowledge they have established can be a valuable resource for building water system (BWS) operators, managers, designers, and consultants. A drinking water distribution system experiences many of the same or similar issues that a BWS experiences, so similar solutions can be applied. In addition, by understanding and solving BWS problems, the PWS community often learns how to better manage its own piped distribution systems. Figure 1 illustrates the PWS–BWS relationship.

WORKING TOGETHER DURING COVID

The COVID pandemic that emerged in 2020 disrupted normal operations worldwide, which included closing public buildings and leaving water systems unused for extended periods. AWWA collaborated with the International Association of Plumbing and Mechanical Officials (IAPMO), an accredited codes and standards development organization working in the building plumbing and mechanical field, to publish Manual 0 2022, *Manual of Recommended Practice for The Safe Closure and Reopening of Building Water Systems*. It provides important guidance on reducing the risk of exposure to *Legionella pneumophila* in buildings with low or no water use as a result of partial or complete shutdowns. AWWA's interest, on behalf of PWSs, complements IAPMO's interest in protecting public health and reducing the risk to BWS operators and managers.

The Safe Closure and Reopening of Building Water Systems outlines building water system safety and risk management practices. It covers the preparation of water systems when buildings must be shut down or put into low- or no-water use modes and discusses recognizing a BWS during full or partial shutdown. It also outlines evaluating

Figure 1. The Public Water System–Building Water System Connection

A drinking water distribution system experiences many of the same or similar issues that a building water system experiences.

www.epa.gov/sites/default/files/2015-09/documents/epa816r03002_0.pdf

https://www.epa.gov/system/files/documents/2021-12/ds-toolbox-fact-sheets_ccc.pdf

(d) The Department shall determine whether the degree of hazard for a service connection is high when the installation of a backflow preventer is not otherwise required by State or federal law. The Department shall provide notice of such determinations on its website.

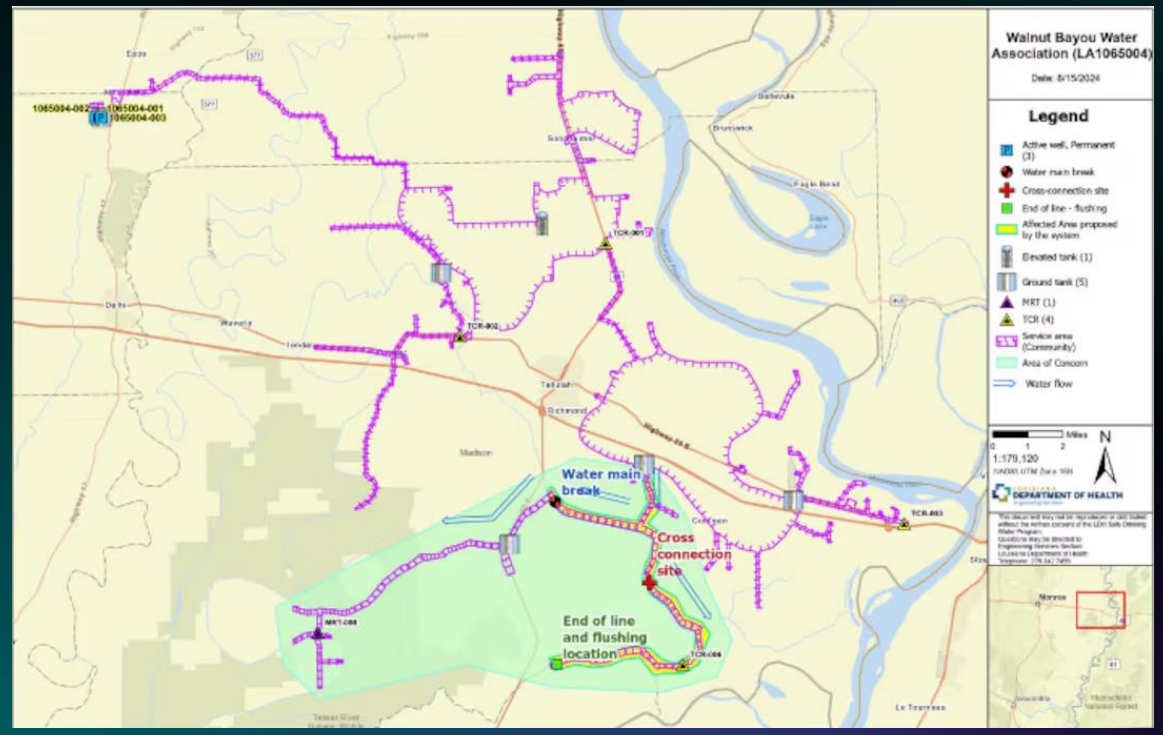
Federal Law	State Law
• SDWA of 1974 and the SDWA Amendments of 1986 states, individual states are responsible for enforcing the regulations and supervising public water systems (PWS). The water purveyor has the primary responsibility for **preventing the introduction** of pollutants or contaminants into the public drinking water distribution system, as outlined in the SDWA (United States Environmental Protection Agency [U.S. EPA] 816-F-04-030). To accomplish this, water purveyors must establish and implement a CCC program.	• NCDEQ documents, ***Rules Governing Public Water Systems***, which is comprised of the NCAC sections that are applicable to the management of PWSs. • The sections of the NCAC that apply to CCC are provided in Title 15A, Subchapter 18C, Sections .0300 and .0406, and **Appendix B, Figure 2** of the Rules Governing Public Water Systems provides CCC minimum requirements and guidance.
• The SDWA enables states to apply for and receive primacy for the enforcement and management of CCC. The State of North Carolina (NC) has applied for and received primacy based on the condition that the NC standards are at least as stringent as the SDWA and that these standards are enforced.	• The NCAC requires water purveyors to establish a CCC policy (T15A:18C.0307.c.5.A) and implement an operations and maintenance plan for backflow preventers (T15A:18C.0307.d.3)

Recent Backflow Incidents

Texas - September 2024

- “Foaming agent” found in water supply was a result of a fire being put out” in Grand Prairie.
- Approx. 60,000 people were impacted

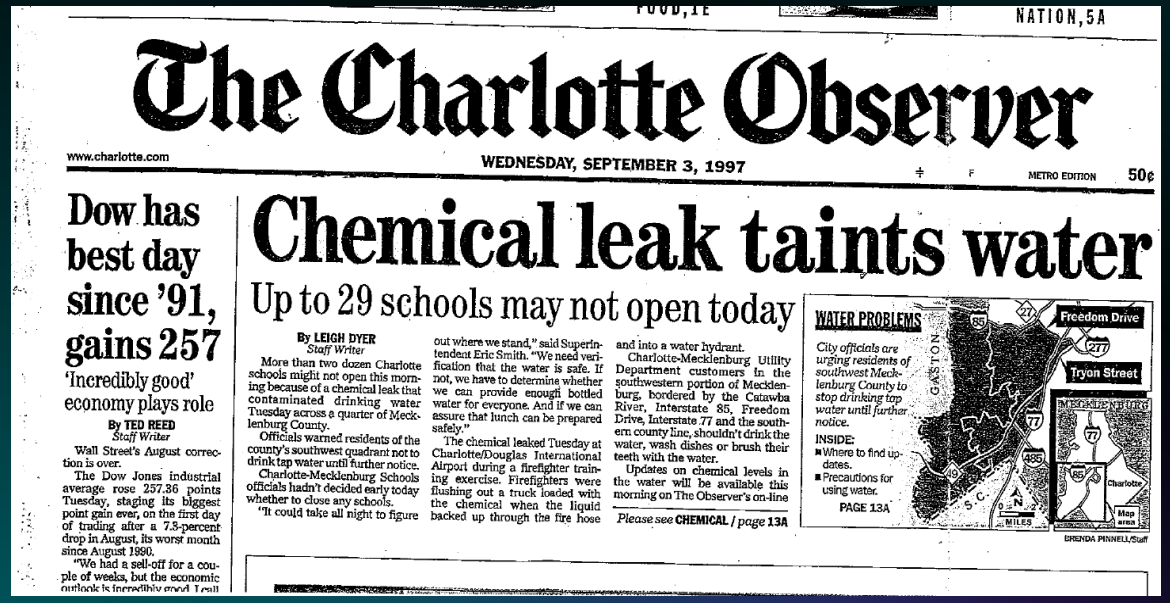
Recent Backflow Incidents



Louisiana - August 2024

- The Louisiana Department of Health issued a 'do not use' water advisory for Madison Parish residents
- The advisory was prompted by backflow of herbicide “Paraquat” into the water supply while a farmer was filling a tank. This is a toxic chemical that is widely used.

Backflow Incidents



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The Charlotte Observer

www.charlotte.com WEDNESDAY, SEPTEMBER 3, 1997 METRO EDITION 50¢

Dow has best day since '91, gains 257

'Incredibly good' economy plays role

By TED REED
Staff Writer

Wall Street's August correction is over.

The Dow Jones industrial average rose 257.36 points Tuesday, staging its biggest point gain ever, on the first day of trading after a 7.3-percent drop in August, its worst month since August 1990.

"We had a sell-off for a couple of weeks, but the economic outlook is incredibly good. I call

Chemical leak taints water

Up to 29 schools may not open today

By LEIGH DYER
Staff Writer

More than two dozen Charlotte schools might not open this morning because of a chemical leak that contaminated drinking water Tuesday across a quarter of Mecklenburg County.

Officials warned residents of the county's southwest quadrant not to drink tap water until further notice.

Charlotte-Mecklenburg Schools officials hadn't decided early today whether to close any schools.

"It could take all night to figure out where we stand," said Superintendent Eric Smith. "We need verification that the water is safe. If not, we have to determine whether we can provide enough bottled water for everyone. And if we can assure that lunch can be prepared safely."

The chemical leaked Tuesday at Charlotte/Douglas International Airport during a firefighter training exercise. Firefighters were flushing out a truck loaded with the chemical when the liquid backed up through the fire hose and into a water hydrant.

Charlotte-Mecklenburg Utility Department customers in the southwestern portion of Mecklenburg, bordered by the Catawba River, Interstate 85, Freedom Drive, Interstate 77 and the southern county line, shouldn't drink the water, wash dishes or brush their teeth with the water.

Updates on chemical levels in the water will be available this morning on The Observer's on-line

Please see CHEMICAL / page 13A

WATER PROBLEMS

City officials are urging residents of southwest Mecklenburg County to stop drinking tap water until further notice.

INSIDE:
- Where to find updates.
- Precautions for using water.

PAGE 13A

North Carolina – September 1997

- A chemical leak contaminated the drinking water in Mecklenburg County, North Carolina
- The incident occurred during a firefighting drill at Charlotte/Douglas International Airport, where a truck accidentally flushed a chemical into the water system
- 29 schools in the affected area faced closures due to the contamination. Residents were advised to avoid drinking the water until further notice.
- Over $10 million dollars spent to fix the contamination

**For additional backflow incidents, please go to https://www.durhamnc.gov/3089/Helpful-Links **