

# Backflow Prevention For Your Public Water System

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OTCO Compliance Workshop

Oct. 12, 2022

9 a.m. – 9:45 a.m.

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This session will discuss the backflow prevention program requirements for public water systems in Ohio, the improvements made to the backflow prevention and cross connection control rules, and common issues found at public water systems.

# Backflow Prevention

## Components of a Program for Public Water Systems (PWS)

- Overview of backflow prevention and cross connection control concepts.
- Key components of a good backflow prevention program.
- Rule improvements overview.
- Common issues found.

# Backflow and Cross-Connection Control

## *Overview*

### **Cross- Connection**

- Any arrangement by which backflow can occur.

### **Backflow**

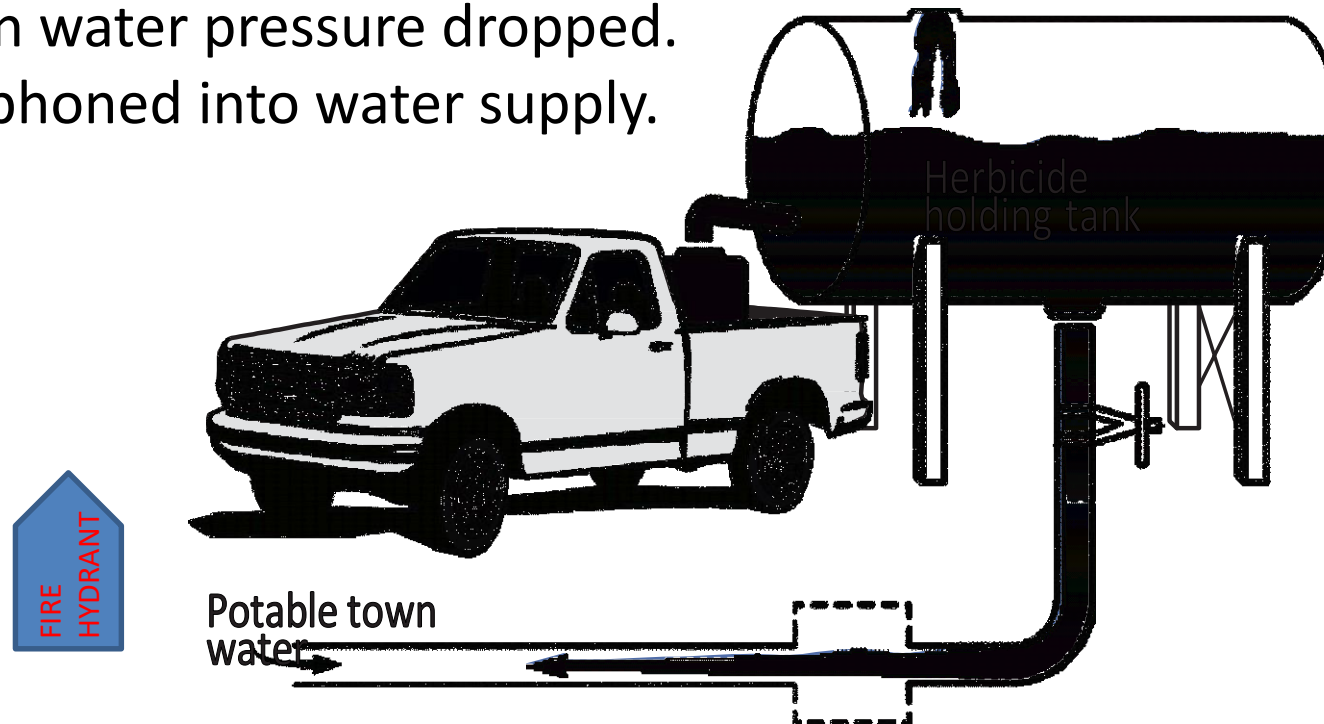
- Flow of water or other liquids, mixtures, or substances into the distributing pipes of a potable water supply from any source other than the intended source of the potable water supply.

### Two types

- Backsiphonage
- Backpressure

# Backsiphonage

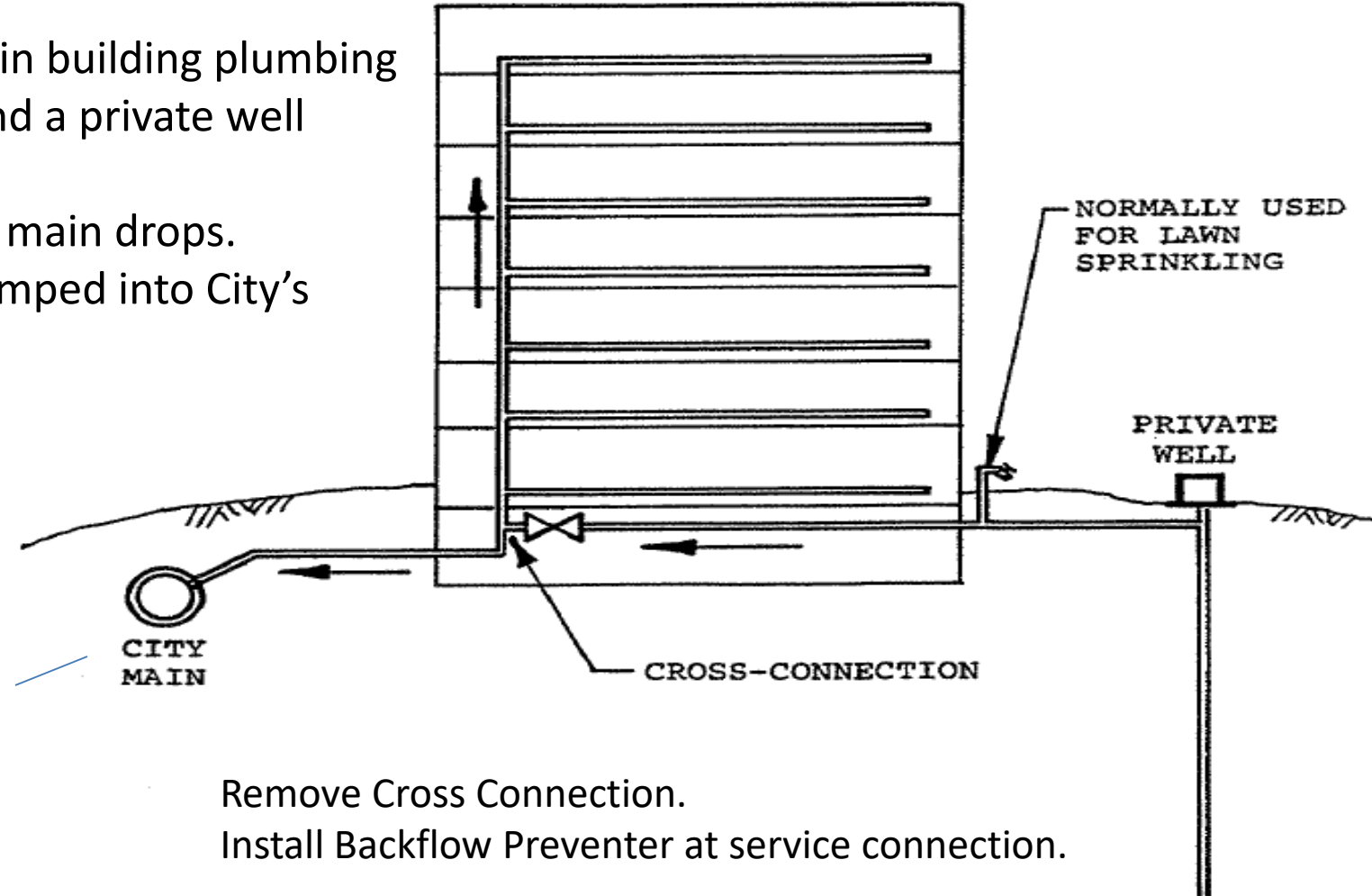
- Cross connection to fire hydrant.
- Potable town water pressure dropped.
- Herbicide siphoned into water supply.



Installation of backflow preventer necessary.

## Backpressure

- Cross connection within building plumbing between City water and a private well supply.
- Water pressure in city main drops.
- Private well supply pumped into City's water supply.



# Backflow and Cross-Connection Control

## *Overview*

### RESPONSE NEEDED:

- Comprehensive backflow prevention and cross-connection control program.
- Address backflow hazards associated with water use practices that result from cross-connections to contamination within plumbing systems and to/within public water supplies.
- Necessary in maintaining sanitary control and the overall quality of the public water supply for human consumption from source to tap.

### RESPONSIBILITY:

- Shared among regulatory agencies (Ohio EPA and plumbing authorities), supplier of water (i.e., municipal PWS or single property-PWS owner) and the consumer.

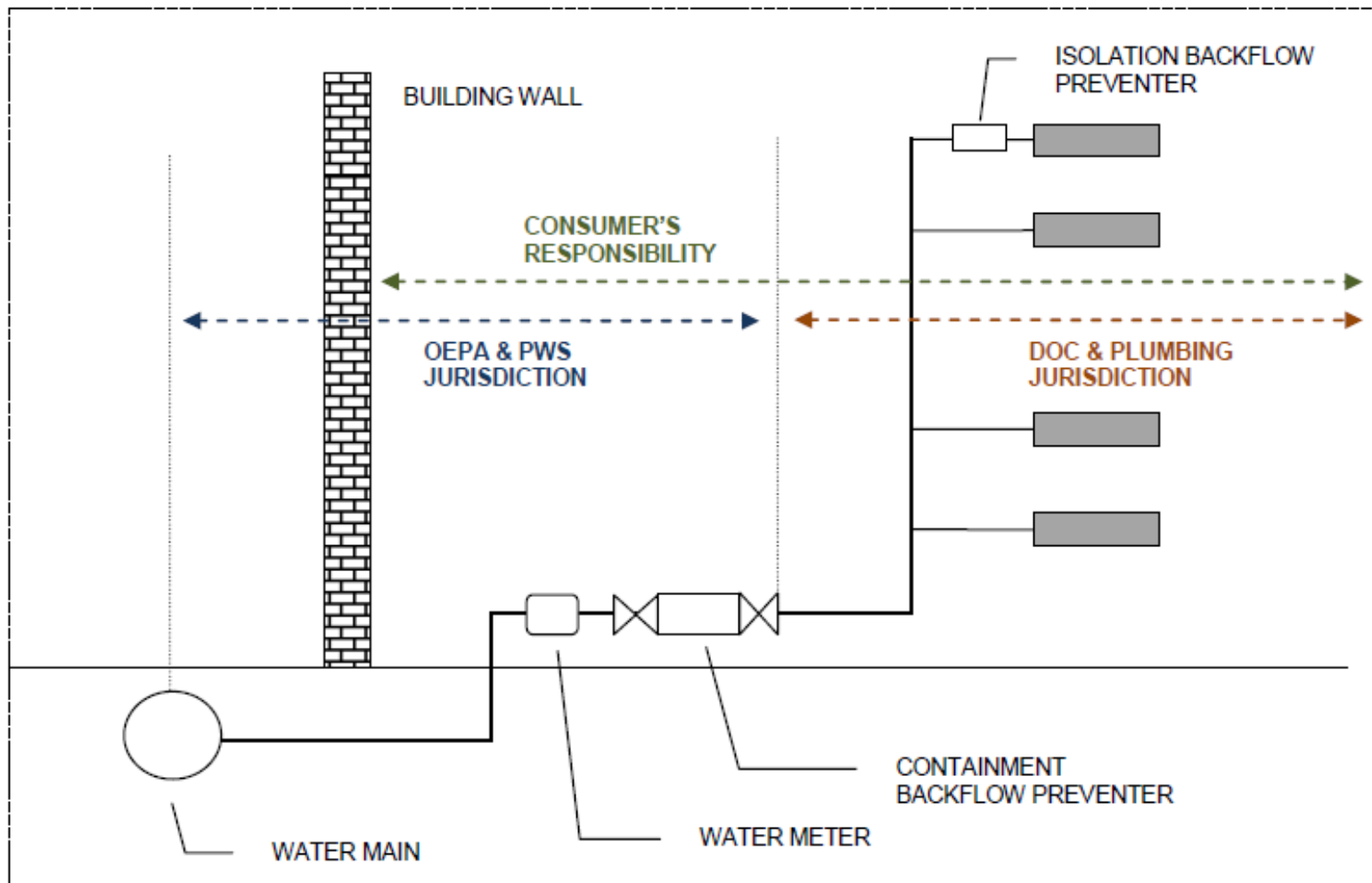
# Backflow Prevention and Cross-Connection Control *Overview*

## Containment principle

The installation of a backflow preventer (i.e., air gap or testable assembly) to protect contaminants from backflowing into the public water distribution system.

- Single property community PWS and Noncommunity PWS, backflow preventer installed at the cross connection.
- For all other community PWSs, backflow preventer installed at the service connection to the consumer's water system (unless otherwise specified in the rules).

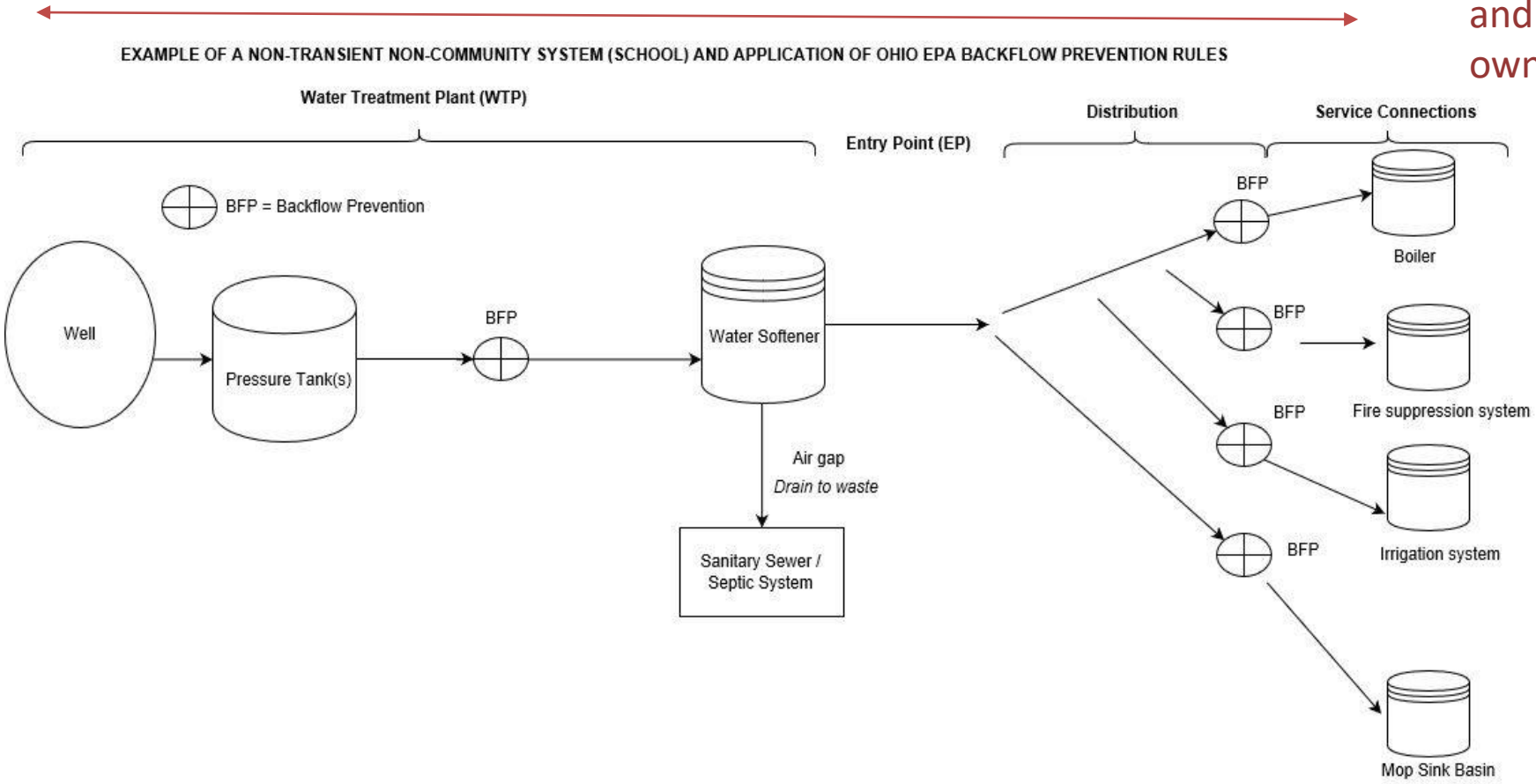
# Shared Responsibility: When you are the PWS selling to a customer





# Shared Responsibility: When you are a regulated PWS

Ohio EPA  
and PWS  
owner



Plumbing  
Authority



# Backflow Preventers

- **Air Gap**

- Air gap discharge.
- Bulk water loading station air gap device.

- **Assemblies**

- Reduced Pressure Principle Backflow Prevention Assembly.
- Reduced Pressure Detector Check Assembly.
- Double Check Assembly.
- Double Check Detector Check Assembly.

- **Devices**

- Dual Check.
- Hose Bibb Vacuum Breaker.
- Atmospheric Vacuum Breaker.
- Pressure Vacuum Breaker.

- **Specific Valving/  
Piping Configuration**

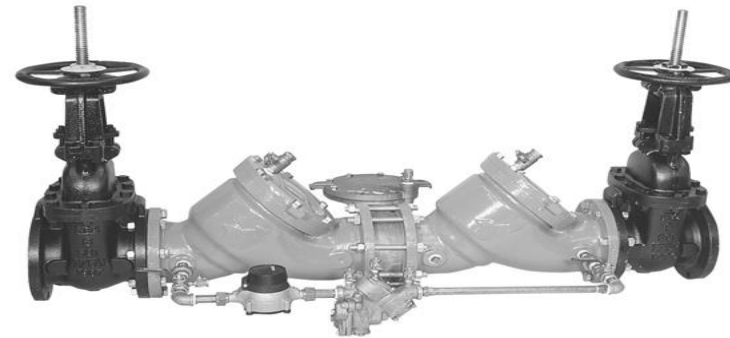
- Interchangeable Connection (four-way valve or swing connector).
- Barometric Loop.

# Backflow Preventers

Air gap/Water loading station device

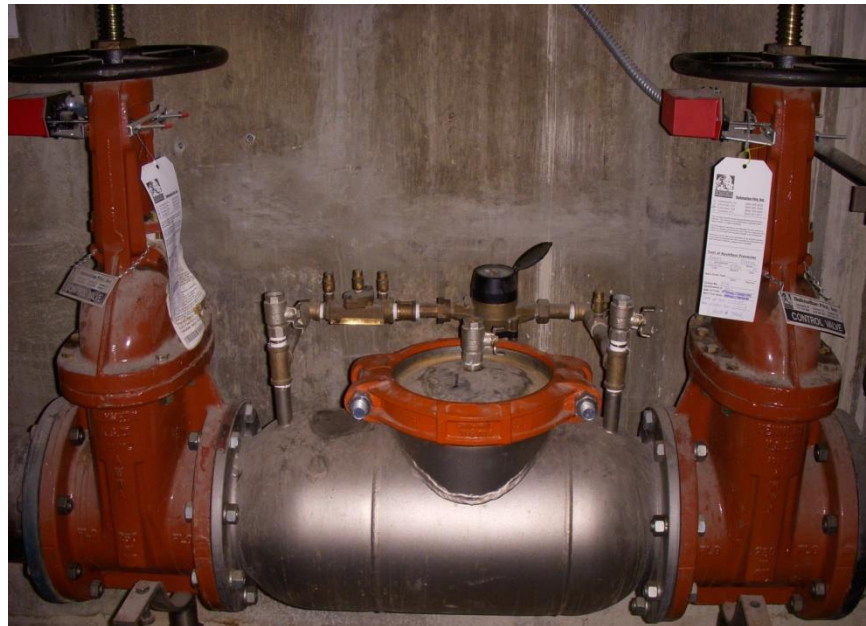


Reduced Pressure/Detector Assembly



# Backflow Preventers

Double Check/Detector Check Assembly



Isolation Only Devices





# Backflow Preventers

Antisiphon – hose connection  
vacuum breaker, ASSE 1011



Antisiphon – hose  
connection backflow  
preventer, ASSE 1052



# Components of an Adequate Backflow Prevention Program

## Checklist to determine adequacy of backflow prevention program

- Local ordinance or other legal mechanisms in place to control cross-connections.
- Written program outlining requirements for initial inspection and resurveys; installation, testing and inspection of backflow preventers; record keeping; residential education and reporting of backflow incidences (as applicable).
- Backflow preventer required is appropriate for degree of hazard.
- Backflow preventers are inspected/tested every 12 mos. by qualified individual (i.e., certified backflow tester).

# Components of an Adequate Backflow Prevention Program

Checklist to determine adequacy of backflow prevention program

- Discontinue (or remove from) service when backflow preventer not installed or properly maintained.
- Minimum pressure sustaining controls maintained for booster and fire pump installations drawing from public water supply.
- No connections with an auxiliary water systems. Must have physical separation. A reduced pressure backflow preventer required if a customer purchasing from PWS.

# Components of an Adequate Backflow Prevention Program

Checklist to determine adequacy of backflow prevention program

- Backflow prevention needs for all water connections have been identified and addressed.
- Mechanism in place to identify backflow prevention needs on new water connections.
- Periodic surveys and investigations, as outlined in rule, of all water connections to determine current water use practices and that adequate protection is in place.



# Components of an Adequate Backflow Prevention Program

Checklist to determine adequacy of backflow prevention program

- Backflow preventers at treatment plants and other facilities owned by water system/municipality tested every 12 months.
- Air gap provided at bulk water sale stations.
- PWS staff training provided on cross connection control.
- PWS owner and/or operator of record must provide oversight and be able to attest to the status of the backflow prevention program.

## Improvements to Ohio EPA's Backflow Prevention Rules

The following rule revisions within OAC Chapter 3745-95 are effective as of October 10, 2022.

<b>Rule #</b>	<b>Rule Title</b>	<b>Action</b>
3745-95-01	Backflow Prevention and Cross Connection Control Definitions	Amend
3745-95-02	Backflow Prevention and Cross Connection Control	Amend
3745-95-03	Investigations and Surveys	New/Rescind
3745-95-04	Where Protection is Required	New/Rescind
3745-95-05	Type of Protection Required	Amend
3745-95-06	Backflow Preventers	New/Rescind
3745-95-07	Booster Pumps	Amend
3745-95-08	Deny or Discontinue Water Service	Amend
3745-95-09	Requirements of Yard Hydrants	New/Rescind

## Improvements to Ohio EPA's Backflow Prevention Rules

### *3745-95-01- Backflow Prevention and Cross Connection Control Definitions*

Improvements include modifying and adding supporting language to the definitions to clarify the application of these rules to all PWS.

- "Single property community water system" means a community water system as defined in paragraph (P)(11)(a) of rule 3745-81-01 of the Administrative Code that is located on a single property or contiguous properties under the ownership or control of a single person.
- "Containment principle backflow preventer" was modified while a definition was added to define an "Isolation backflow prevention device" to assist with understanding provisions in rule 3745-95-06.
- Includes a comprehensive list of standards referenced in the chapter and the applicable edition in use. (i.e., AWWA, ANSI, CSA)

# Improvements to Ohio EPA's Backflow Prevention Rules

## *3745-95-02- Backflow Prevention and Cross Connection Control*

- No cross-connections to or within a public water system unless abated or controlled to the satisfaction of the supplier of water and in compliance with this chapter.
- No cross-connection between a public water system or consumer's water system and an auxiliary water system unless the auxiliary water system, the method of connection and the use of such system have been approved by the supplier of water and by the director.
- Public water systems must have a backflow prevention program consistent with these rules.
  - Applies to ALL public water systems.

Minor improvements to improve the clarity of the rule by simplifying the language.

## Improvements to Ohio EPA's Backflow Prevention Rules

Rule 3745-95-03 contains the requirements for investigations and surveys of water use practices on the premises which must be conducted to identify actual or potential hazards posed by cross connections.

The improvements to this rule include:

- Clarify expectations for supplier of water when conducting initial assessments and when conducting the periodic investigations and surveys.
- Indicate when an onsite inspection is necessary versus instead utilizing survey questionnaires and residential educational campaign.

# Improvements to Ohio EPA's Backflow Prevention Rules

## *3745-95-03- Surveys and Investigations*

Public water systems must conduct an initial assessment of all premises to determine degree of hazard and require appropriate backflow prevention.

- Need a record or evidence that an assessment was made
- Have a procedure for completing initial assessment for new service connections.
- Onsite inspection is expected. Exemptions to onsite inspection include:
  - Residential areas without a known hazard, if PWS uses an alternate means to help identify hazards (e.g., review of residential building plans; visiting service areas for visual; flagging new businesses in residential areas)
  - Use of a questionnaire to document water use practices if not a high hazard facility identified in rule (facility list in OAC Rule 3745-95-04(B)(5))

# Improvements to Ohio EPA's Backflow Prevention Rules

## *3745-95-03- Surveys and Investigations cont.*

Then must conduct periodic investigations or surveys at least every five years of all premises to identify any new or increased hazards.

- Have a written process or procedure and tracking mechanism, along with records.
- Onsite inspection is expected. Exemptions to onsite inspection include:
  - Residential premises unlikely to have hazards, when provide education on common residential backflow hazards, direct delivery annually, and provide a mechanism to report cross connections.
  - Use ongoing methodology (triggered events, collaboration with local permitting authorities, questionnaires and onsite inspection only when warranted for a suspected new or increased hazard).

# Improvements to Ohio EPA's Backflow Prevention Rules

## 3745-95-03- *Surveys and Investigations (cont.)*

- Supplier of water must have the right to enter at all reasonable times for the purpose of making surveys and investigations of water use practices on the premises.
- Supplier of water should also have provisions that require consumer provide information on water use practices.
  - Local ordinance, by-laws, rules, contracts, other legally enforceable mechanisms



## Improvements to Ohio EPA's Backflow Prevention Rules

Rule 3745-95-04, details where backflow preventers must be installed

- The rule now differentiates between requirements for larger community water systems (i.e., municipal systems) from those for noncommunity water systems and smaller community water systems (i.e., apartment buildings or manufactured home parks)
- Provides more specific direction for each type of PWS to comply with backflow prevention provisions and clarify expectations.

# Improvements to Ohio EPA's Backflow Prevention Rules

## *3745-95-04 – where protection is required*

Requires approved backflow preventer where pollution, system, health or severe health hazard to the PWS exists.

- For noncommunity and single property community water systems, required to be installed at the cross connection (i.e., on the building plumbing)
- For all other community water systems, required to be installed on the consumer's service line serving the premises

### *Specifically required for:*

- Hospitals, mortuaries, clinics, nursing homes, laboratories, docks and water-front facilities, sewage treatment plants and pumping stations, car washes, food processing or various industrial plants, and bulk water loading.

Also addresses requirements for auxiliary water systems.

- No connection to an auxiliary water system (physically separate)
  - Exception for fire protection purposes or approved alternate source, as outlined in rule.
- If a community water system sells through a service connection, require a reduced pressure backflow preventer on consumer's service line.

# Improvements to Ohio EPA's Backflow Prevention Rules

## *3745-95-05 – Type of protection required*

Designates the minimum level of backflow preventer necessary if a public water system can be contaminated with substances through a cross connection.

- Four degrees of hazards (backflow preventer)
  - Severe health hazard (air gap);
  - Health or system hazard (reduced pressure principal assembly);
  - Pollutational hazard (double check valve assembly).
  - *Residential exception*: Residential irrigation systems (with no pumps or additives) PWS may accept an approved pressure vacuum breaker to mitigate health hazard.

## Improvements

- Replace outdated language with more suitable terms and improve readability.
- In 3745-95-05(D), further defines an approved vacuum breaker as one that is plumbing code compliant.

# Improvements to Ohio EPA's Backflow Prevention Rules

Rule 3745-95-06, outlines what backflow preventers are acceptable for use within a PWS as containment backflow preventers.

## Improvements:

- Rewording and clarifying the exact standards that are to be referenced when selecting a backflow preventer for a specific purpose.
  - Added “air gap device” for building plumbing applications.
  - Standards were listed out in rule and remain complementary to standards referenced in plumbing code of Ohio Building Code.
- Added installation criteria for backflow preventers. These conditions are current policy and will provide additional clarity within the rule.
- Condition which allows for the director to accept certain backflow preventers, not referenced in rule, to satisfy containment backflow prevention.
  - Applies to single property community water systems and noncommunity water systems.
  - For building plumbing applications when backflow preventer installed is compliant with plumbing code (verified by professional if necessary)

## Type of Protection Required (95-05) & Acceptable Backflow Preventer (95-06)

<u>Hazard Level</u>	<u>Assembly</u>	<u>Certification Number</u>	<u>Protection Provided</u>
Severe Health	Approved Air-Gap Separation	ANSI 112.1.2	Backpressure Backsiphonage
Health System	Reduced Pressure Assembly	ASSE 1013    CSA B64.4 AWWA C511    USC - RP	Backpressure Backsiphonage
Health System <i>(Fire System Only)</i>	Reduced Pressure Detector Assembly	ASSE 1047    CSA B64.4.1 USC – RPDA	Backpressure Backsiphonage
Pollution	Double Check Valve Assembly	ASSE 1015    CSA B64.5 AWWA C510    USC – DCA	Backpressure Backsiphonage
Pollution <i>(Fire System Only)</i>	Double Check Detector Assembly	ASSE 1048    CSA B64.4.1 USC –DCDA	Backpressure Backsiphonage
Health <i>(Residential Irrigation with no pumps and no additives, only)</i>	Pressure Vacuum Breaker	ASSE 1020	Backsiphonage Only
Health, System, Pollutational <i>(no severe health or auxiliary water system)</i>	Director discretion for building PWS plumbing (single property community and noncommunity PWSs)	Per Board of Building Standards, Plumbing Code as an approved isolation backflow prevention device	To satisfy containment backflow preventer requirement

# Improvements to Ohio EPA's Backflow Prevention Rules

## 3745-95-06- *Backflow Preventers*

### Installation Requirements (new)

- Orientation per approval standard
- Readily accessible for inspection, testing and repair.
- Installed to prevent submergence.
- Protected from freezing. Heated enclosures meet ASSE 1060.
- RPs not installed within a pit or vault below ground.
- Relief ports have visible free discharge and floor drainage to handle the discharge.

### Testing Requirement for Containment Backflow Preventers

- Inspected and tested every 12 mos. *Now includes:*
  - Annual inspection that no connection to AWS exists.
  - Building PWS applications, isolation devices inspected for wear and tear at least every 12 mos.

### Records Maintained

- Annual tests and inspections of backflow preventers, for at least five years.
- Records of inventory of containment backflow preventer installation, initial assessments, surveys or investigations. Keep as long as relevant.
- *Now includes* inspection of AWS separation and regular inspection of backflow prevention devices.

# Improvements to Ohio EPA's Backflow Prevention Rules

## 3745-95-07- Booster Pumps

- Must have low pressure cutoff controller to maintain 10 psi minimum suction pressure.\*
  - \*Plumbing will require condition of obtaining a *certificate of occupancy*, based on notification to PWS of pump install and successful testing of the low pressure cutoff control.
- Fire protection system pumps
  - Low suction throttling valve on discharge side or variable speed suction limiting control to maintain minimum suction pressure
  - Low pressure cutoff control (only if existing before 2008)

Minor Improvements - eliminate unnecessary text and update reference.

# Improvements to Ohio EPA's Backflow Prevention Rules

## 3745-95-08- Deny or Discontinue Service

After reasonable notice, supplier of water must deny or discontinue the water service to any premises when:

- (1) A backflow preventer required is not installed, tested and maintained in an acceptable manner.
- (2) The backflow preventer has been removed or by-passed.
- (3) An unprotected cross-connection exists on the premises.
- (4) A required minimum pressure sustaining method on a booster or fire pump is not installed or maintained in working order.
- (5) Denied entry to determine compliance with OAC Chapter 3745-95.

### Minor Improvement

Change in title from “Violations” to “Deny or Discontinue water service”



# Improvements to Ohio EPA's Backflow Prevention Rules

## 3745-95-09- Yard Hydrants

Yard hydrants, with below ground weep holes:

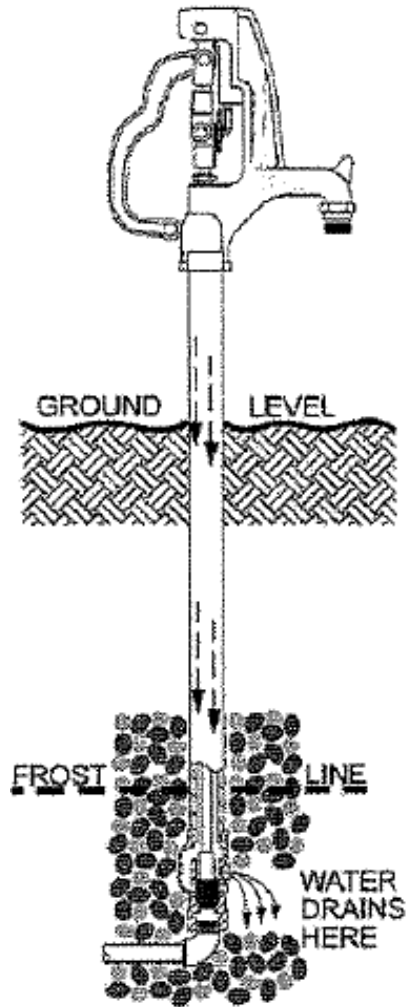
- Publicly owned/part of public water system, weep holes prohibited when intended for potable use (i.e., campgrounds, parks)
  - Must permanently seal weep hole with manufacturer's plug.
- Owned/part of public water system, and not for potable use, or on consumer's water system:
  - Must install reduced pressure principle backflow preventer.
  - Label not for human consumption or nonpotable.

### Improvement

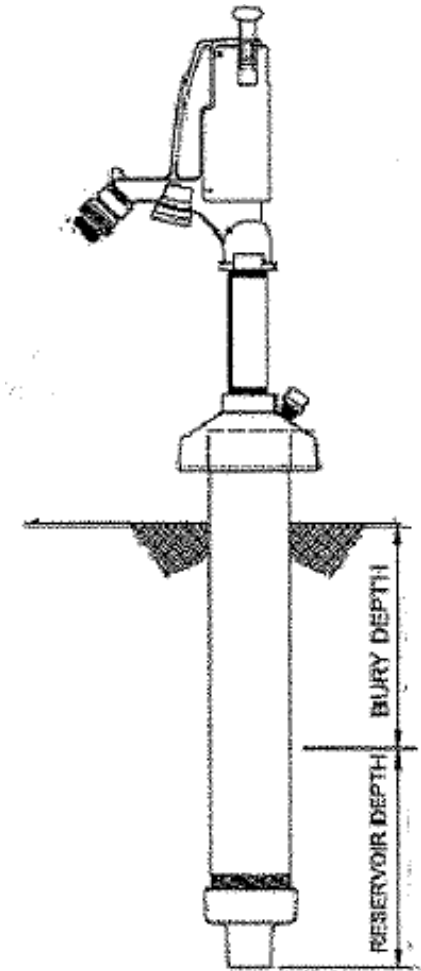
- New or replaced yard hydrants owned/part of PWS, intended for potable use, must be ASSE 1057 freeze resistant sanitary yard hydrant

# Yard Hydrants

- Non-freeze, Self-draining Type



- Non-freeze, Sanitary Type



# Common Issues

## Unprotected Cross-Connections

- Discharge lines fed into sewer drains (no air gap).
- Threaded hose connections with hoses left attached and submerged in containers.
- Water pressure used to educt in detergents, chemicals or fertilizers.
- Connecting an auxiliary water system (private well, cistern or pond with pump) to the building's water plumbing system.
- Booster pumps without minimum suction pressure control.

# Common Issues

## Backflow Prevention Program Deficiencies

- Lack of records for initial assessment of service connections to determine if a hazard is present.
- Improper backflow preventer installed for the degree of hazard.
- Backflow preventers not inspected and/or tested annually or they are bypassed or removed.
- Periodic surveys and investigation and/or onsite inspections of water system service connections are not being conducted.
- Lack of a written, enforceable backflow prevention program.

# Backflow Prevention: Contact and Additional Information

Maria Lucente, P.E.  
Engineering & Infrastructure Section  
CO-DDAGW  
614-728-1231 phone  
[maria.lucente@epa.ohio.gov](mailto:maria.lucente@epa.ohio.gov)

*Additional Backflow Prevention Resources:*

[epa.ohio.gov/divisions-and-offices/drinking-and-ground-waters/engineering-plan-approval](http://epa.ohio.gov/divisions-and-offices/drinking-and-ground-waters/engineering-plan-approval)

- Backflow Prevention and Cross Connection Control tab

# Questions?



*Thank you for your time*

FUN  
FACT

# How many public water systems (PWS) are there in Ohio?

There are 4,323  
active PWSs in  
Ohio.

About 90%  
of Ohio's  
population  
receives water  
from a PWS.

It takes more  
than 12,000  
certified  
operators to run  
Ohio's PWSs.



Scan to learn  
more about the  
regulation of  
PWS in Ohio