
MTS
Maintenance
Training Systems Inc
Water Utility Operator Training Centre

Cross Connection Control & Small Water Systems

Multi-Barrier Approach

- Source protection
- Treatment & disinfection
- Storage
- Distribution System
- **Cross Connection Control**
- Testing and Sampling
- Operator Certification
- Emergency planning

HAIR IS COMINING OUT OF MY TAPS!

Just Flush It

Is that Hair? ? ? ? ? ? ? ?

OMG!

Smells Awful!

That's Gross!

Soaking Hides & a Hose

BACKFLOW BASICS

1. What is a cross connection?

2. What causes backflow?

Definition of Cross-Connection

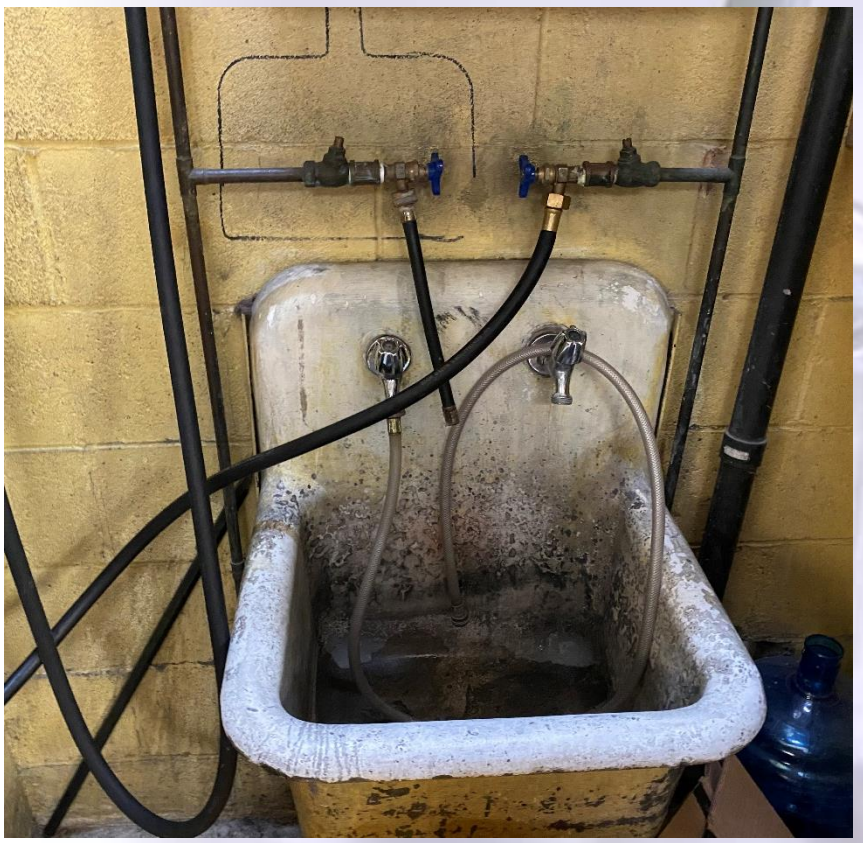
Any actual or potential physical connection between a potable water system and any non-potable substances in a manner which, under any circumstances, could enter the potable water system.

Hose Connections

Commercial Sinks

Salon

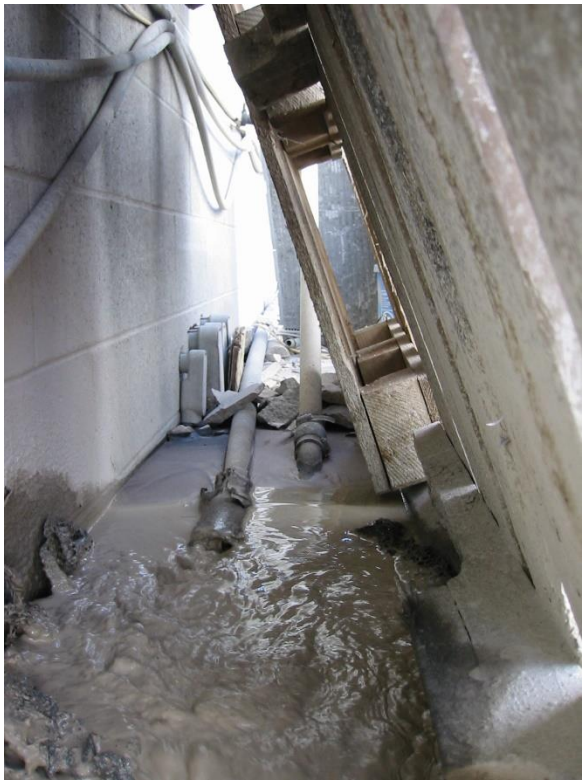
Janitor



Soap Dispensers

Trap Primers

Submerged outlets



Livestock watering


H2O
FRESH
EFFLUENT

BACKFLOW

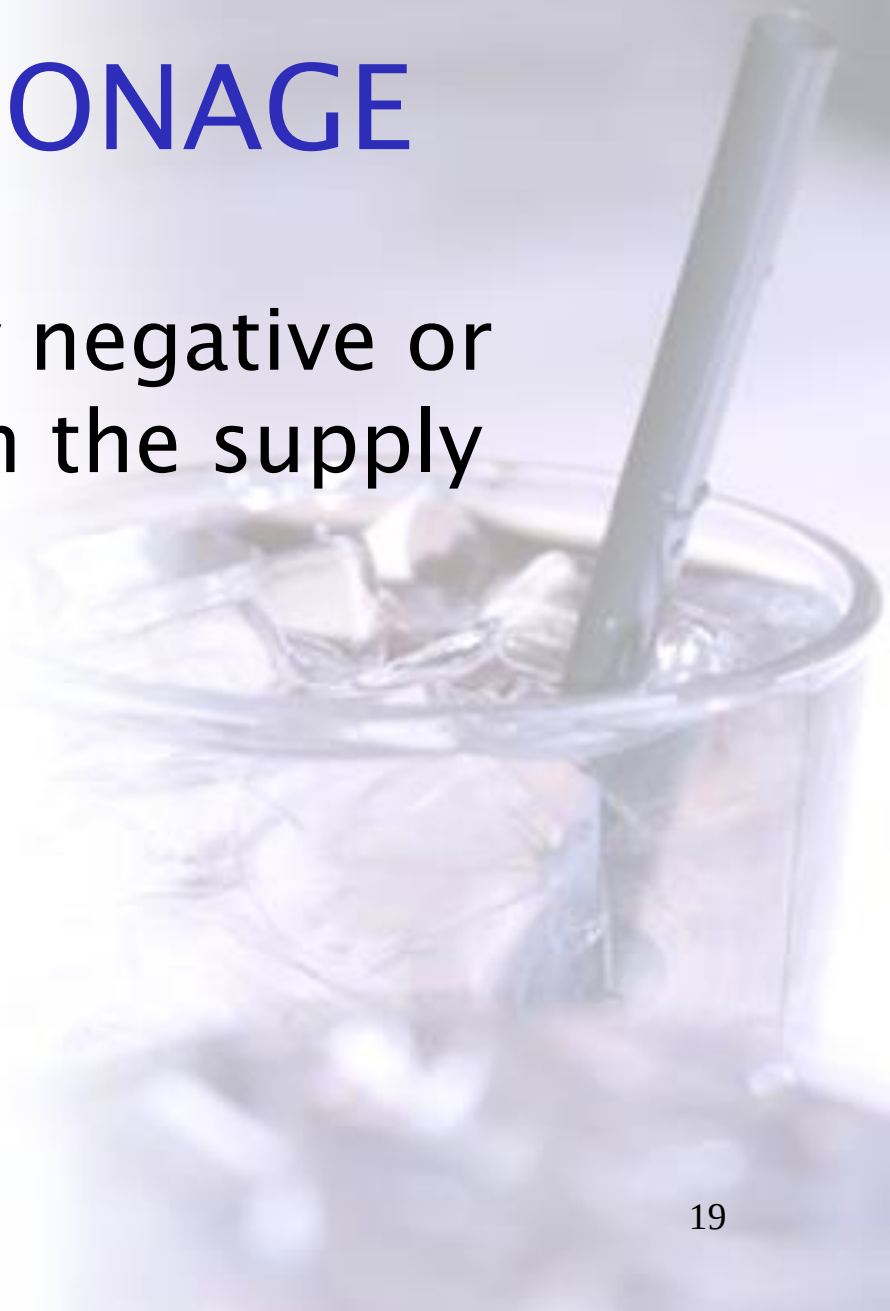
Is flow in Reverse.

Caused by:

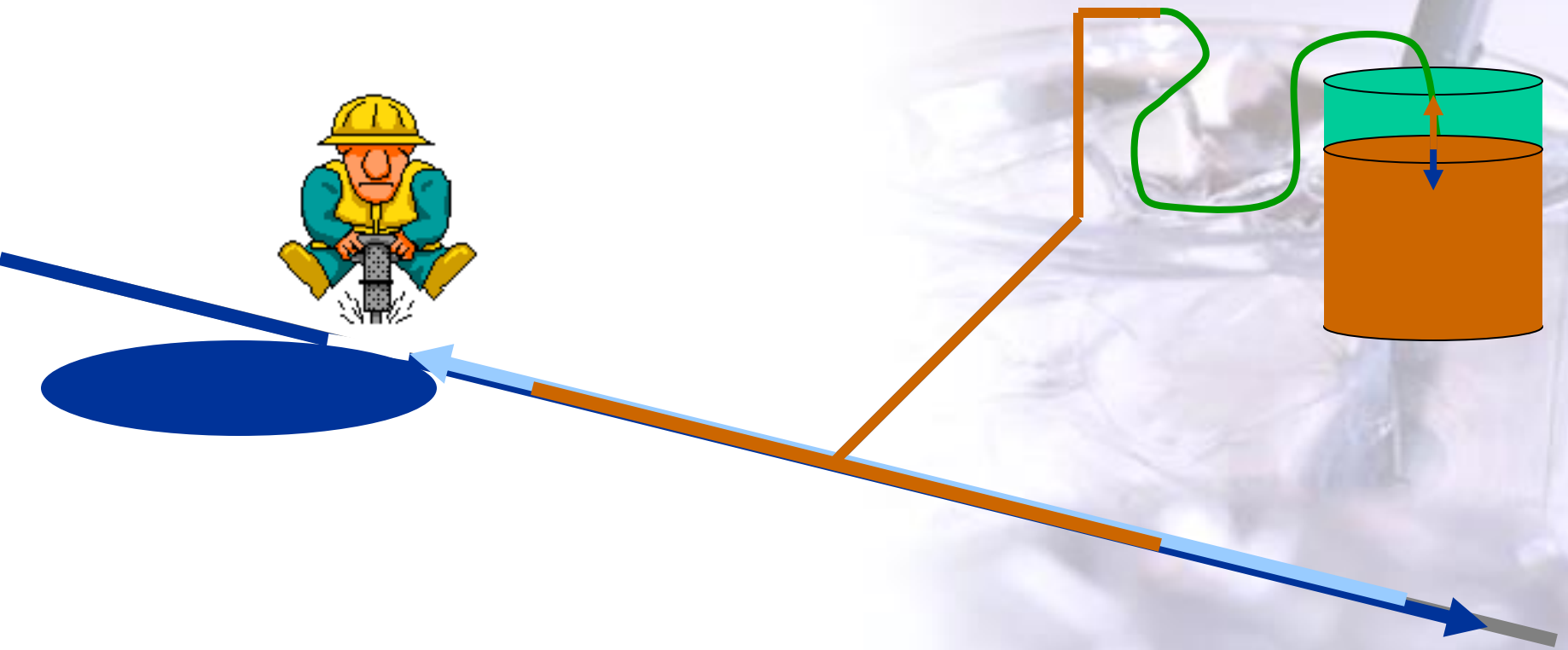
- Back-siphonage or
- Backpressure

BACKSIPHONAGE

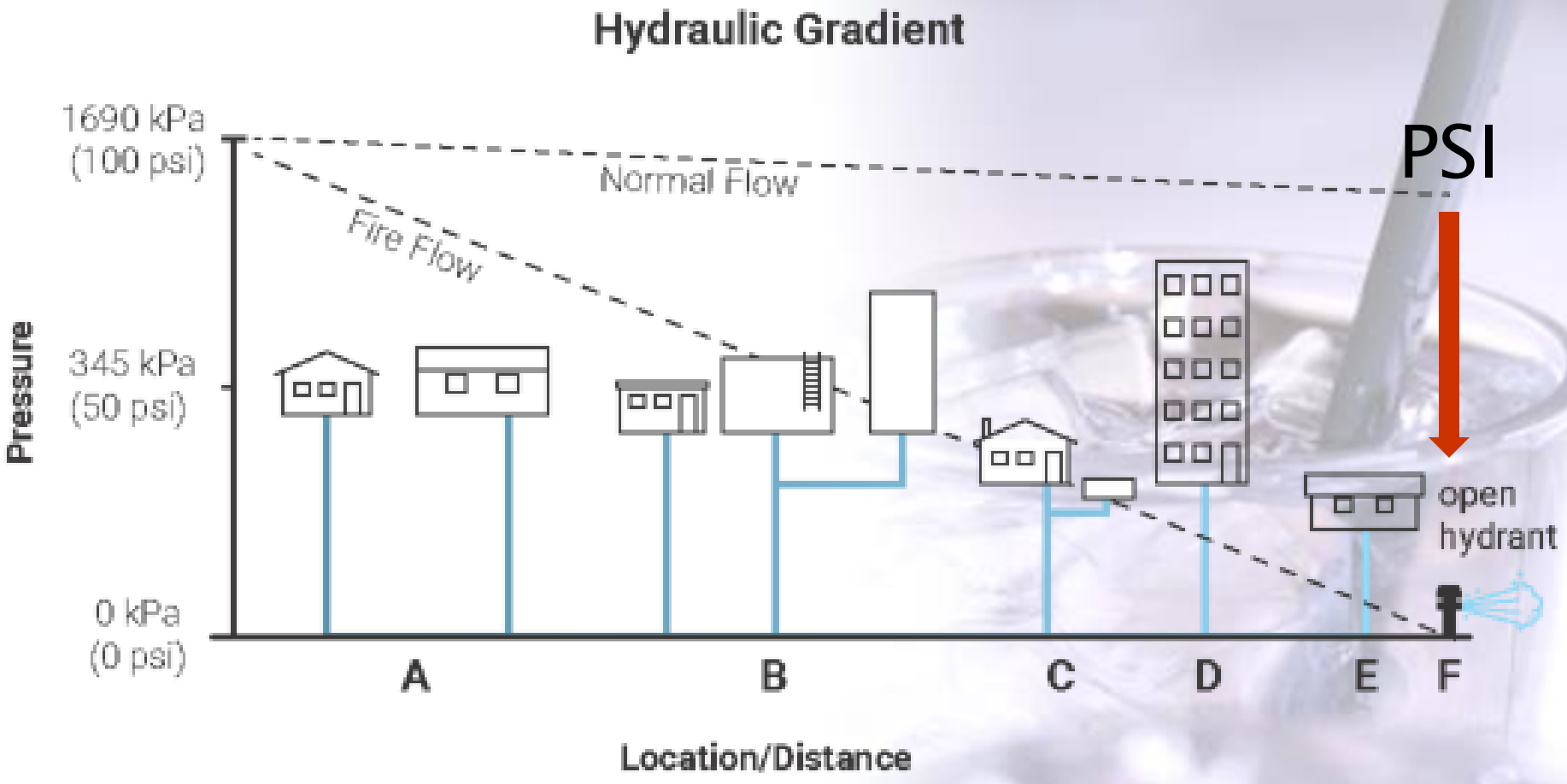
Backflow caused by negative or reduced pressure in the supply piping.

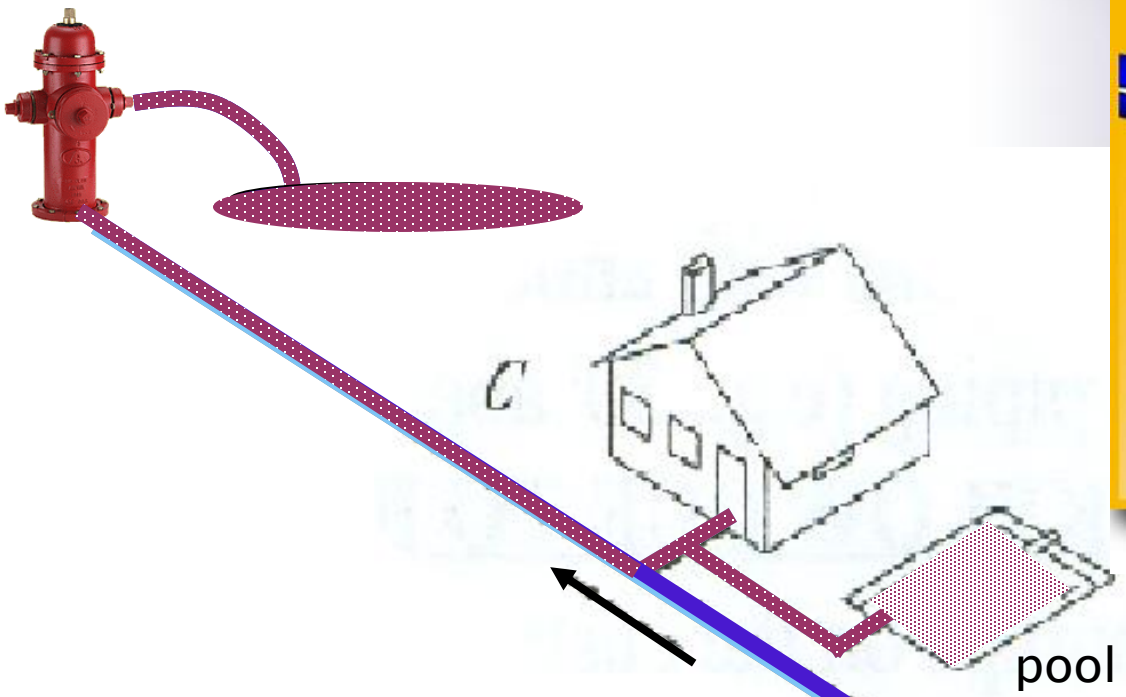


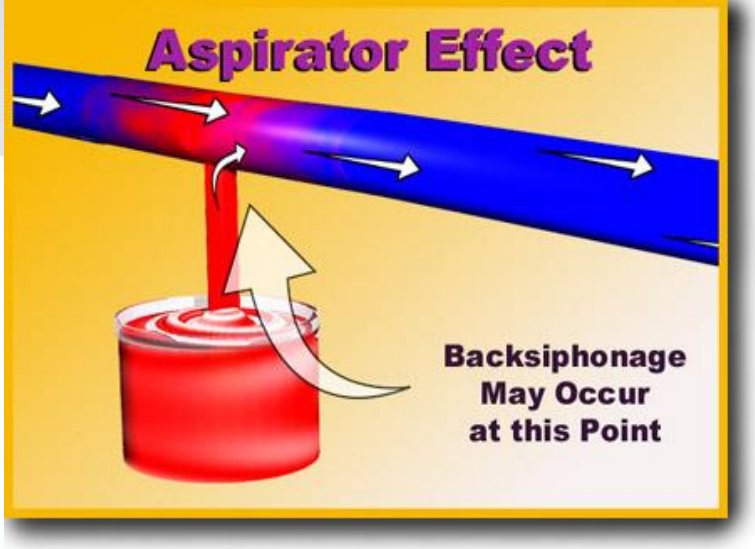
Back-siphonage due to loss of water supply



Back-siphonage due to high velocity flows


Hydraulic Gradient
1690 kPa
(100 psi)
345 kPa
(50 psi)
0 kPa
(0 psi)
Pressure
Normal Flow
Fire Flow
PSI
open
hydrant
A
B
C
D
E
F
Location/Distance





Normal flow

High velocity flow

Contaminant

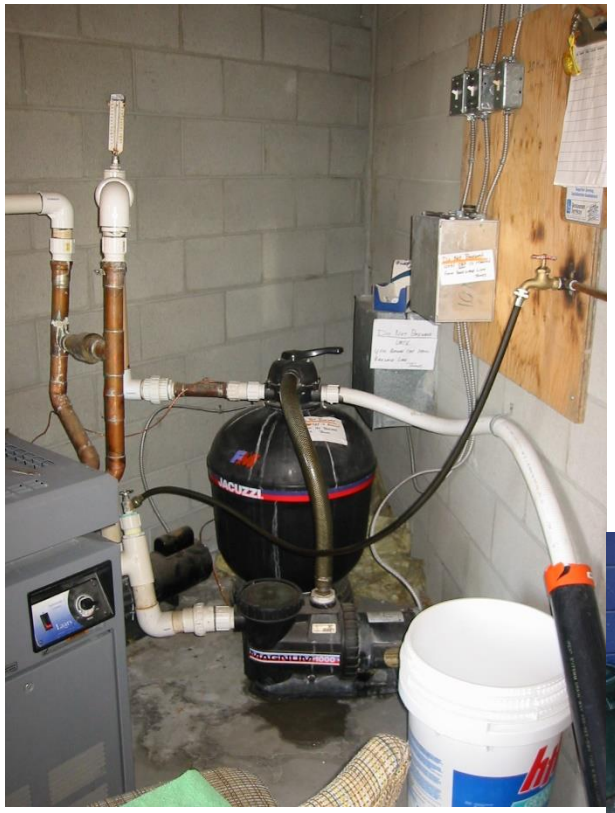
Pressure loss due to High velocity occurrences.

BACKPRESSURE

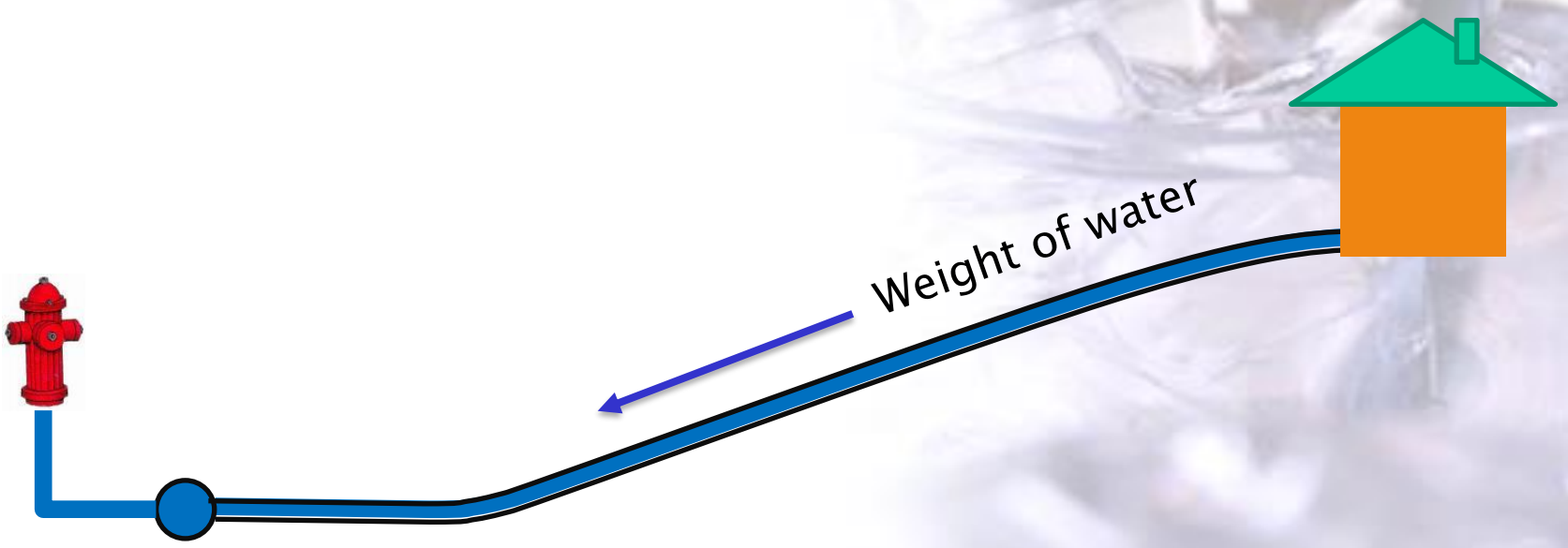
When a potable water system is connected to a non-potable supply operating at a higher pressure by means of pump, boiler, etc.

BACK PRESSURE

Sources of backpressure



ELEVATED PIPIING



Methods of Backflow Control

1. Hazard classification

2. Isolate or control cross connections

Degrees of Hazard Classifications

- Minor
- Moderate
- Severe

MINOR

MODERATE

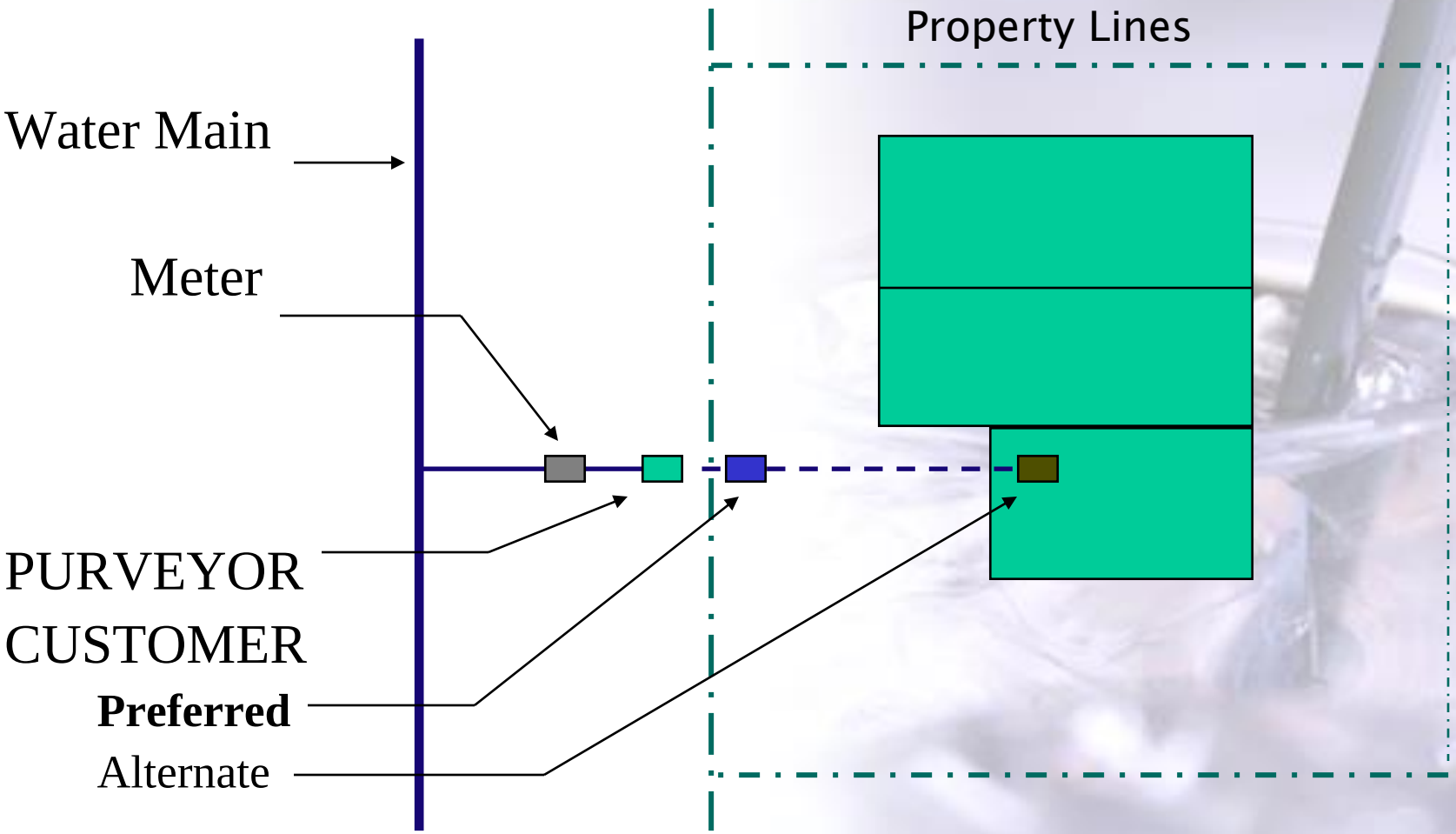
SEVERE

2. Methods of Backflow Protection

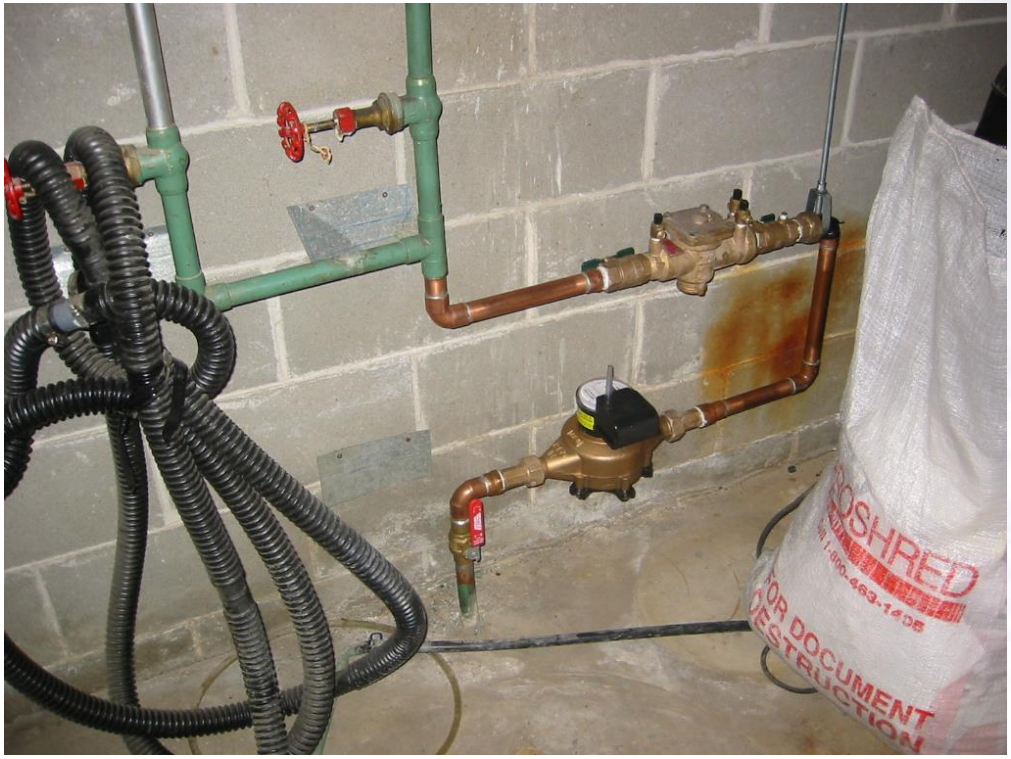
- Internal Protection
  - Backflow preventers installed to protect building occupants at the point of use
- Premise Protection
  - Main water service containment

Point of use Protection

PREMISE ISOLATION



PREMISE ISOLATION



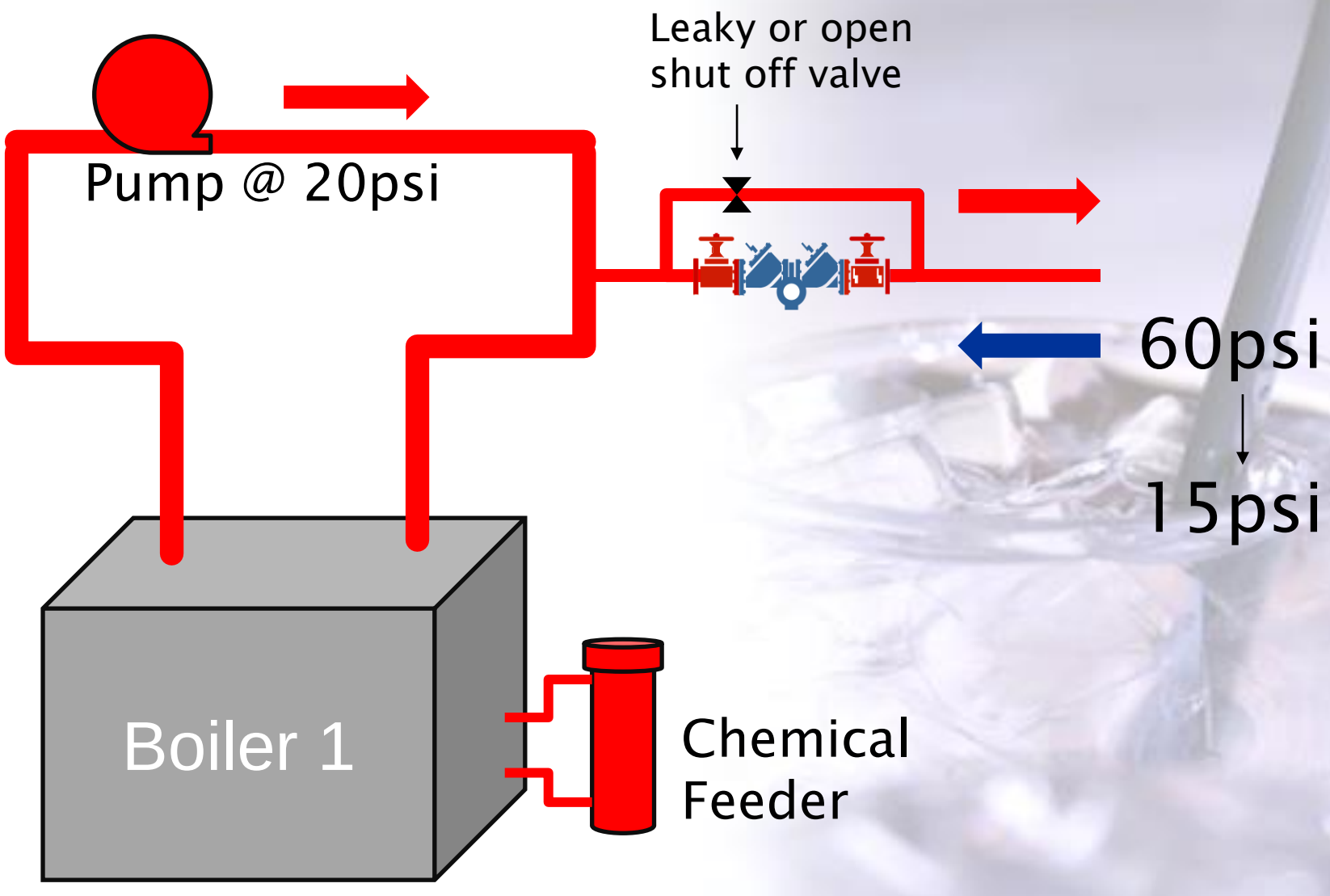
Mandatory for Severe Hazard Facilities

INSTALLATION

Notes of Importance!

Bypass arrangements

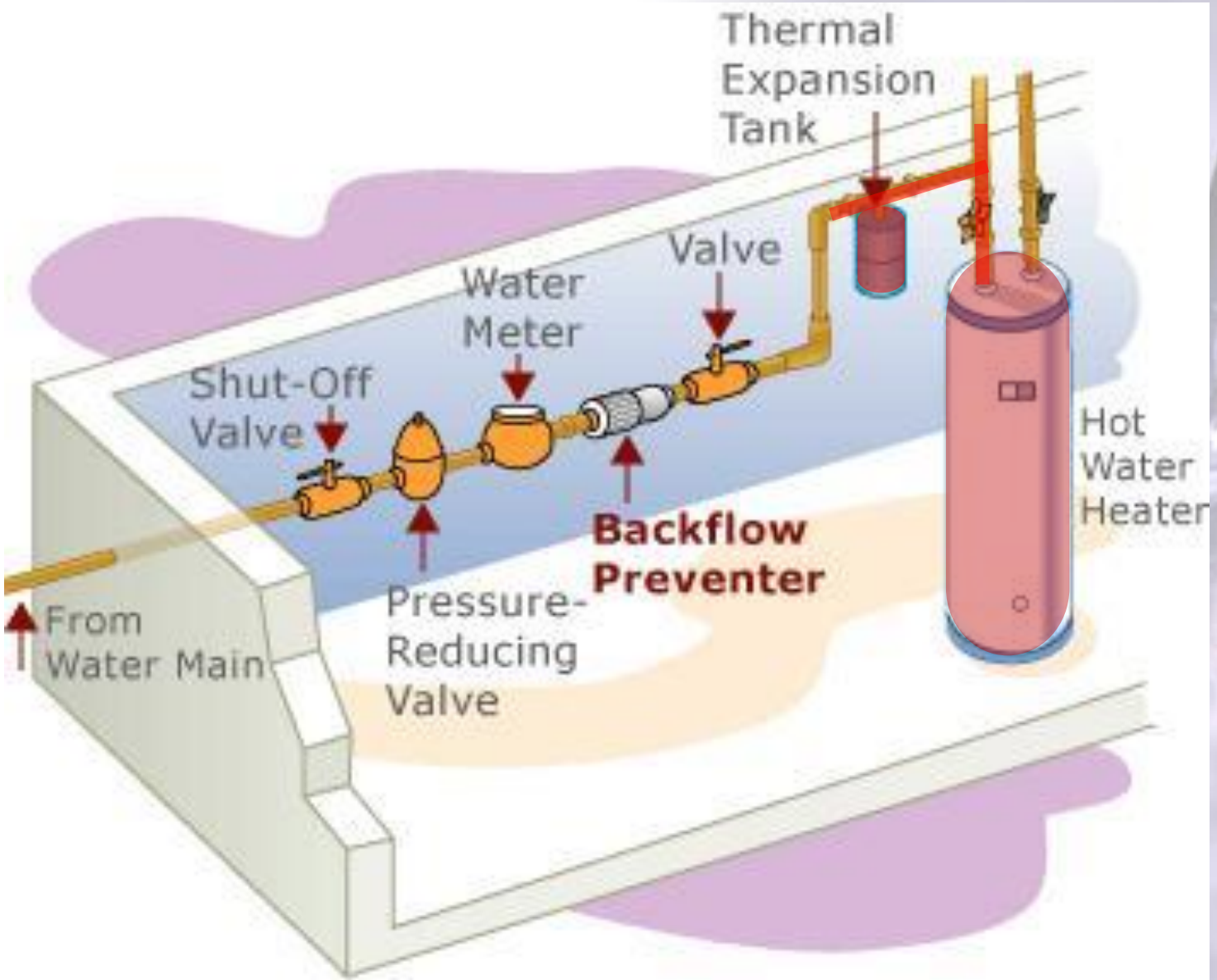
No bypass arrangements are permitted around backflow preventers unless also protected.


Leaky or open
shut off valve
Pump @ 20psi
60psi
15psi
Boiler 1
Chemical
Feeder

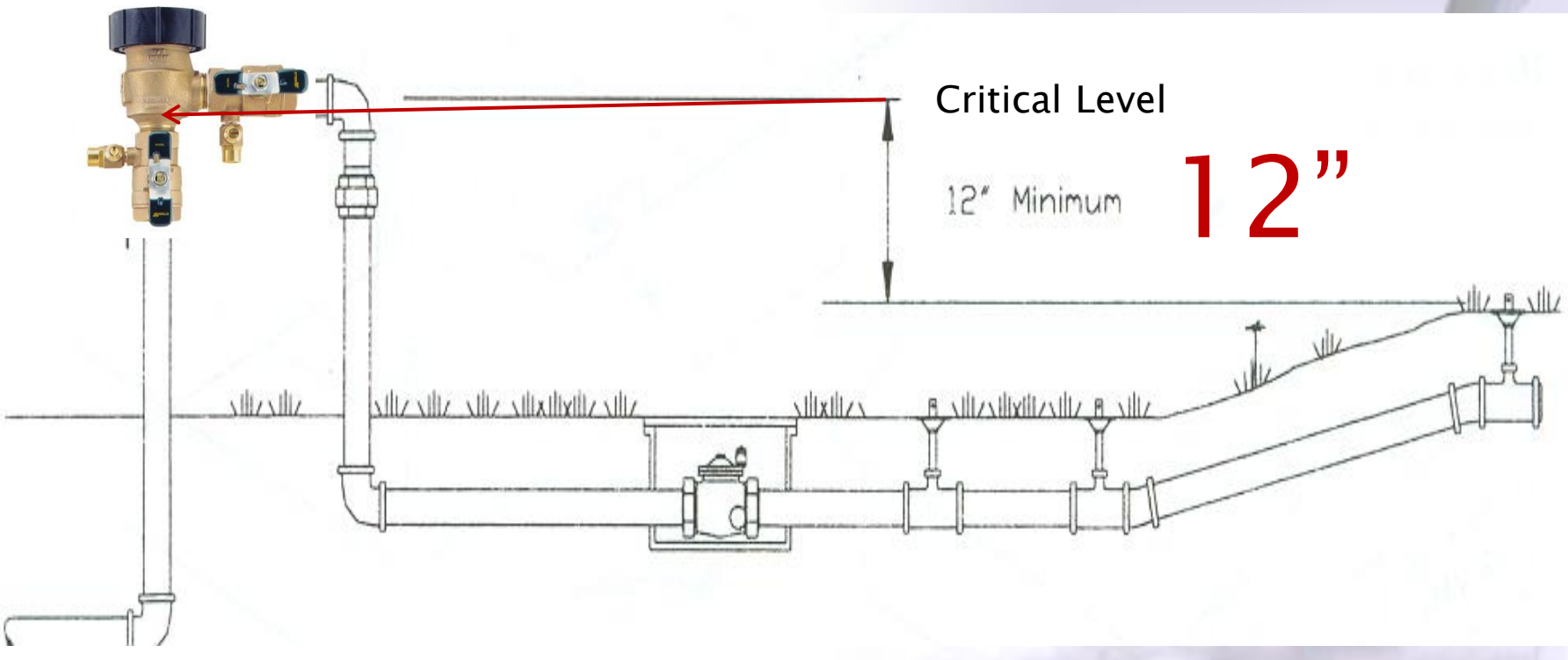
RP's cannot be installed in a Pit

Discharge from RP relief valves

Closed Systems & Thermal Expansion



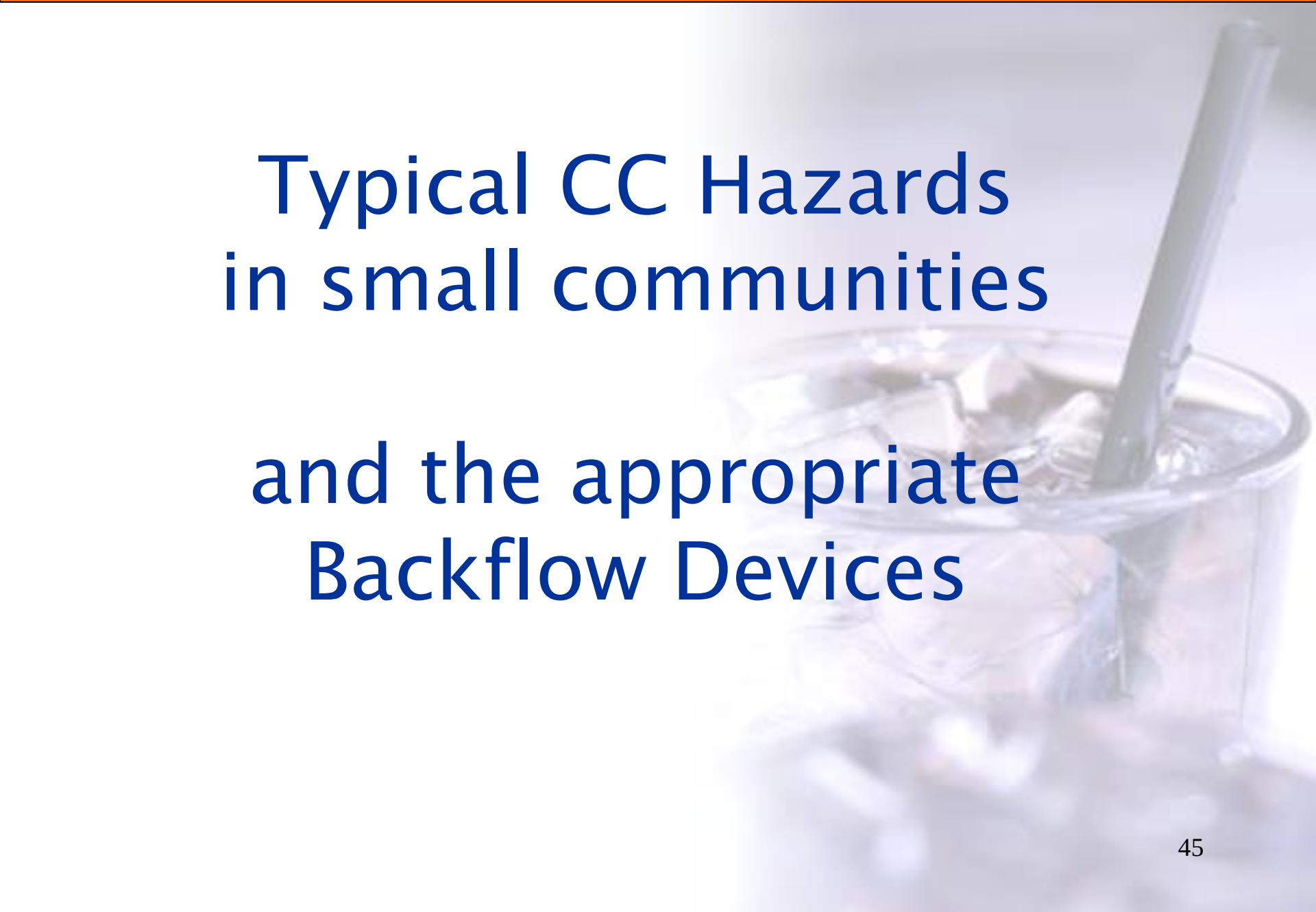
(Vacuum breakers) Limitations



* For Back-siphonage conditions only

Typical CC Hazards in small communities

and the appropriate Backflow Devices



Hose Connections

Hose connection Vacuum breakers

Frost free drain type

Irrigation systems

DCVA

Cooling Systems

RP

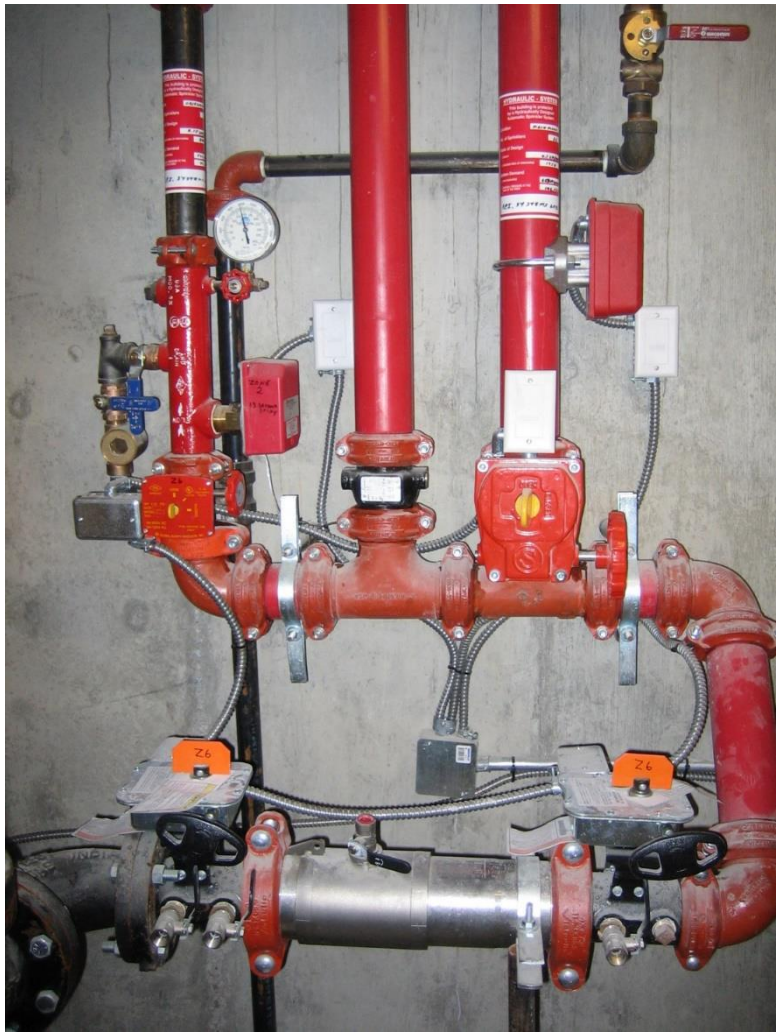
DCAP

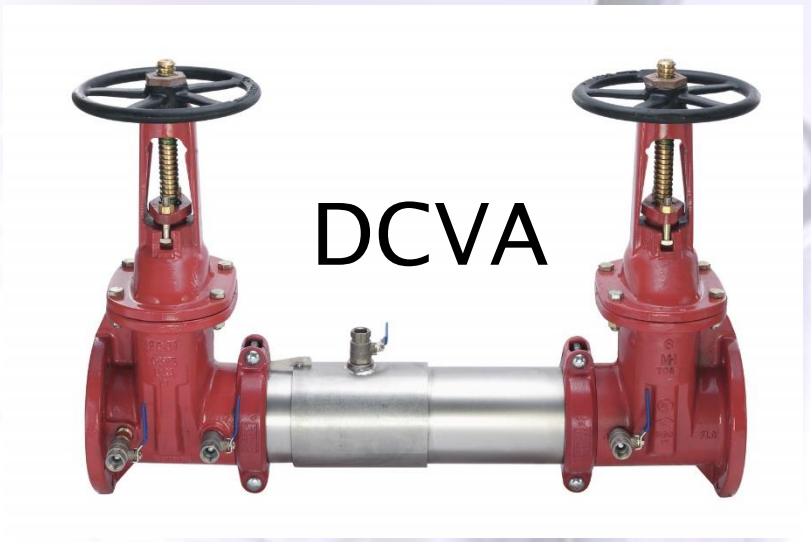
Hydronic Heating Systems

RP

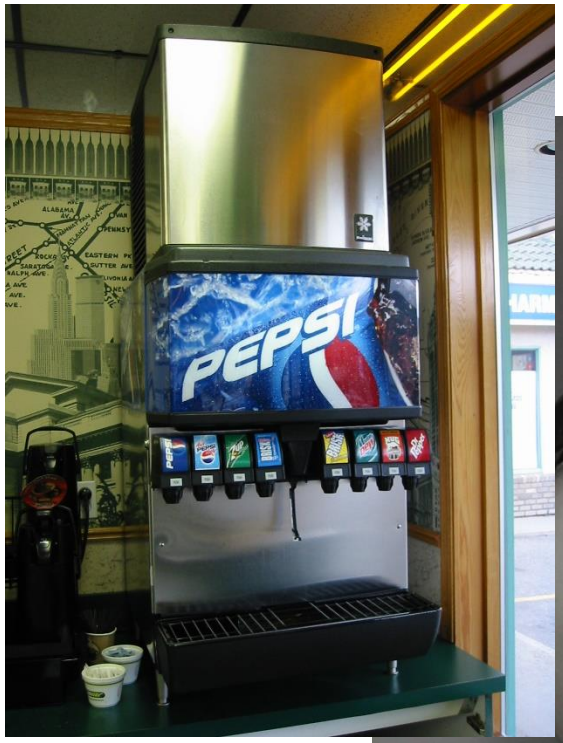
DCAP

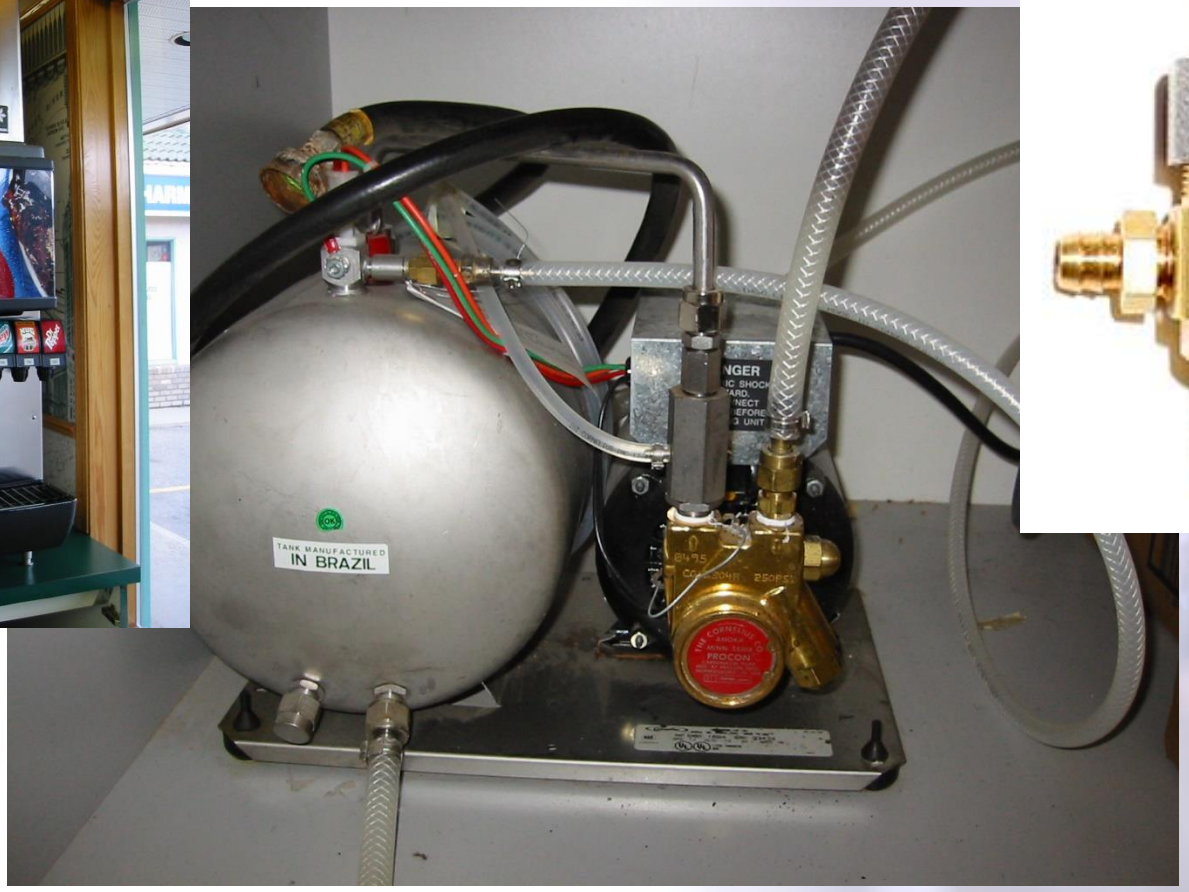
Fire Sprinklers





Pop Machines with CO2





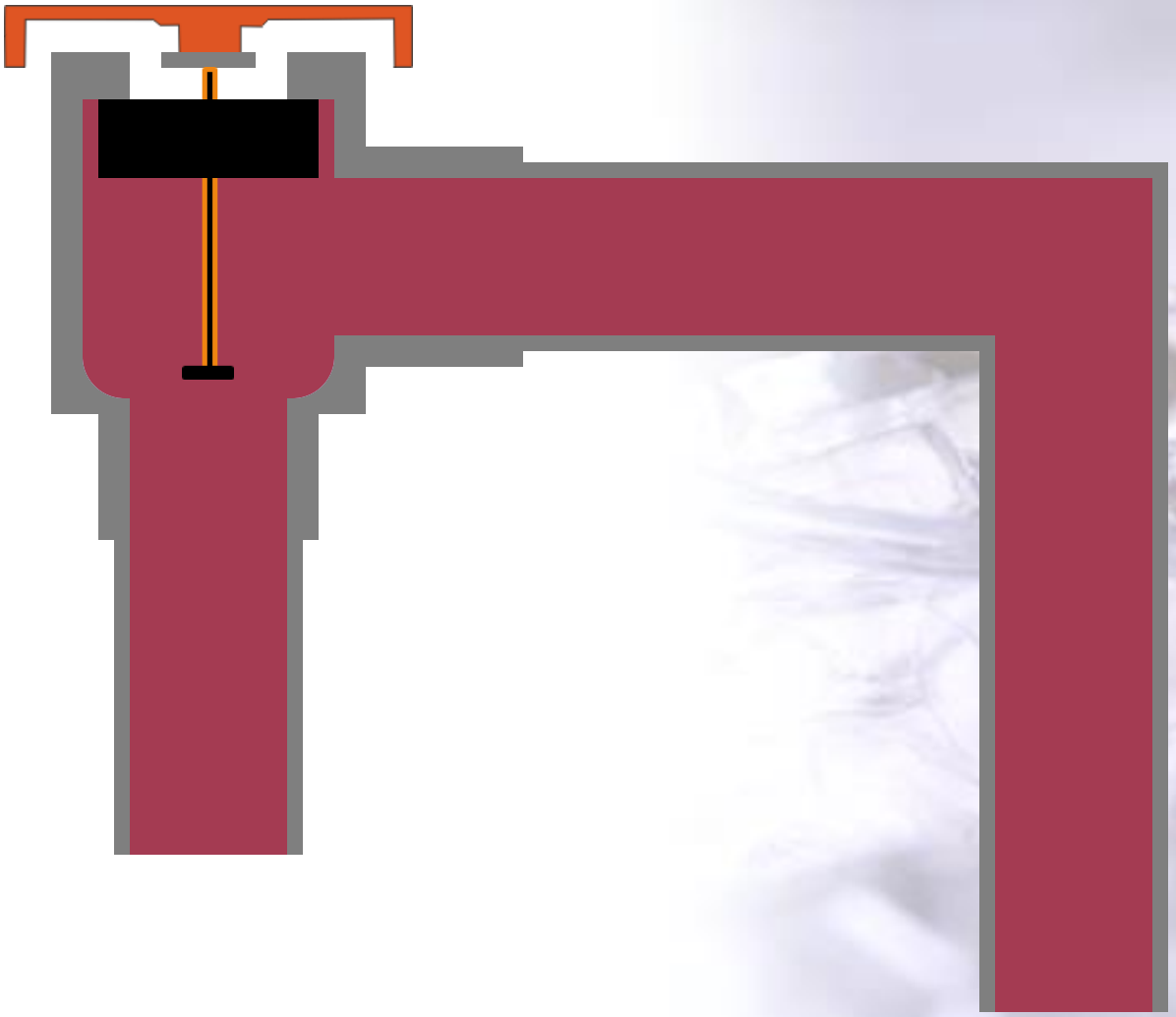
DCAPC

Soap Dispensers

Air Gap

Soap Dispensers Connected to Utility Sinks

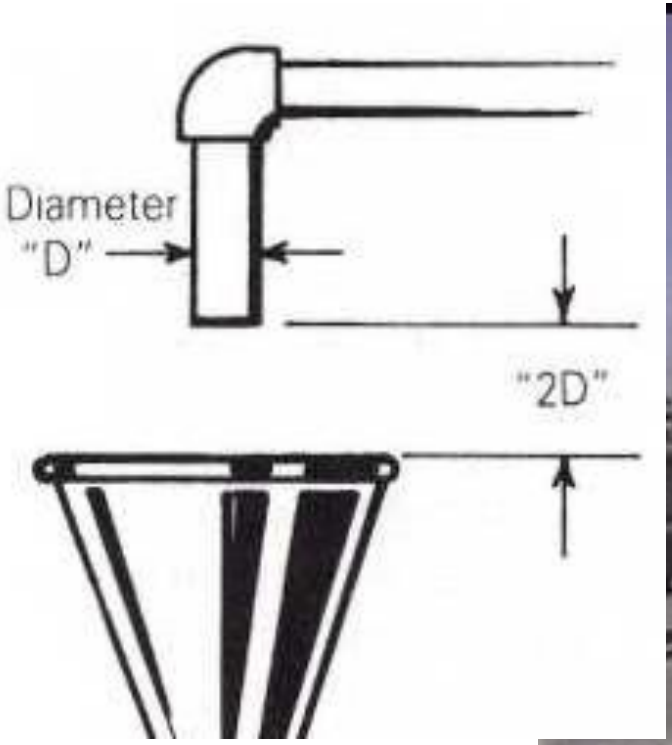
AVB / Not for Backpressure Conditions



Salon Sinks

Fire Hydrant / Temporary (Non-Emergency Use)

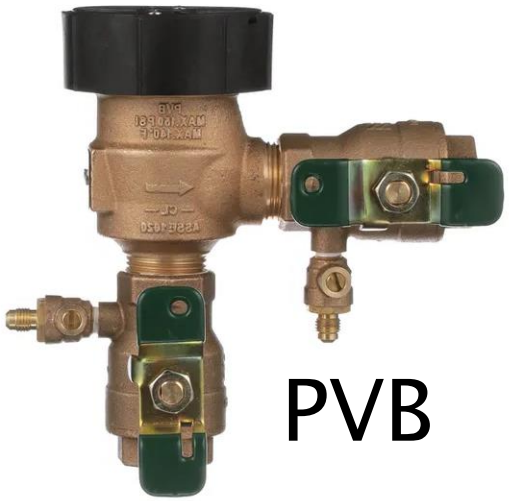
Truck Fill & Air Gap



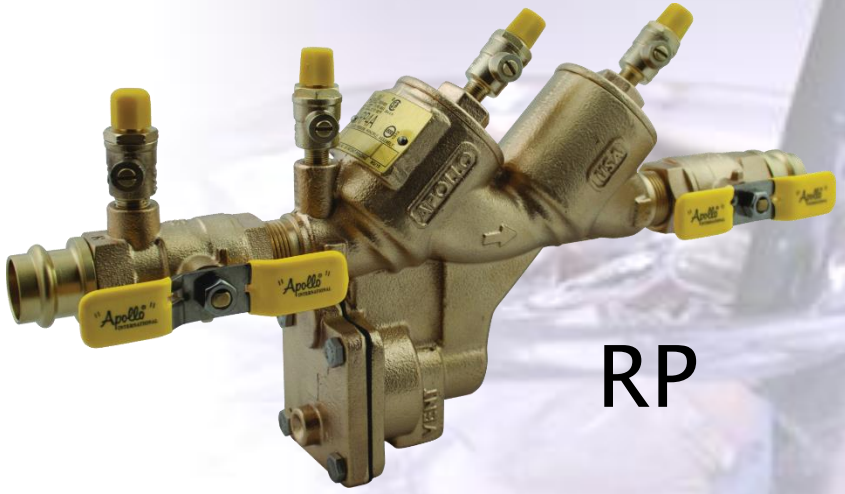
Sewer Lift Stations

Maintenance & Testing

Testing



PVB



RP

DCVA

Test Equipment

Testing

1. Testable assemblies are to be tested upon installation & then annually.

2. Tests must be:
   a) Performed by certified BFP testers.
   b) Results documented on acceptable forms.
3. Test Reports are submitted to the water purveyor.

4. Test Reports are filed for keeping

5. Testers should submit equipment calibration dates on reports

6. Failed assemblies must be repaired.
   - 75% just need cleaning!
   - Repair kits can be on hand
   - Only replace the parts that are damaged

CCC PROGRAM
for Small Communities

1. Authorities

- Environmental Health Officer
  - Drinking water protection Act & Regs
- Water Supplier / Purveyor
  - Permit to operate a water system
  - Local bylaw enforcement
- Building / Housing Department
  - Plumbing Code

2. Internal education & co-ordination

- Water Operators
- Building & Housing
- Mayor / Chief & Council

3. CCC Awareness

- Public Awareness Program.
- More awareness means better protection of the water distribution system.

4. Standards

- Canadian Standards Association (CSA B64-10) “Manual for the Selection & Installation of backflow preventers”
- Guidelines / National or Prov. Building Code

5. Record Keeping

Records used for enforcement action or legal defence.

- Document BFP inventory.
- Test Reports & Certified Testers.
- CCC Survey reports
- All Correspondence Relating to CC

6. Inspection of Existing Buildings

1. Prioritize & Inspect buildings to identify CC threats

2. Document Cross Connections on a survey report form

3. Determine if protection is required

4. Document existing BFP's

Existing Buildings

- Residential
  - Ensure outside hose bibs are protected
- Commercial

  Fire Hall

  Municipal Hall or Band Office

  Day Care

  Clinic

  Docks & Boat works

  Lift Stations

  Maintenance Shop

7. Compliancy of New Buildings

- Building / Housing development
- Engineering

8. Annual Testing

- An annual testing program should be developed to ensure continuous operation of all testable assemblies.

9. Emergency Response Plan

- Develop a Backflow Incident Emergency Response Plan.
- Identify an incident is occurring
- Proper Sampling techniques for Backflow.
- Methods of Restoration of supply

A CCC Program Will:

- Protect the public water supply;
- Reduce the risk of water-borne illness;
- Ensure compliance with operating permits;
- Reduce the risk of liability to water supplier;
- Reduce the number of water quality complaints;
- Increase public confidence; and
- Increase awareness about cross connection control.

Questions

Trevor Hoff
Training Instructor & CCC Program Development & Consulting Services
www.mtsinc.ca
Email: trevor@mtsinc.ca
Ph:250-503-0893

Backflow device glossary

- AG – Air gap
- AVB – Atmospheric Vacuum Breaker
- DCVA – Double check valve assembly
- DuC – Dual Check Valve
- DCAP – Dual check with atmospheric port
- DCAPC – Dual check with atmospheric port for carbonators
- HCVB – Hose connection vacuum breaker
- PVB – Pressure vacuum breaker
- RP – Reduced pressure principle