

CROSS CONNECTON CONTROL AND BACKFLOW PREVENTION

Starting and Maintaining a Program for
your Water System

PRINCIPLES AND THEORY



DRINKING WATER

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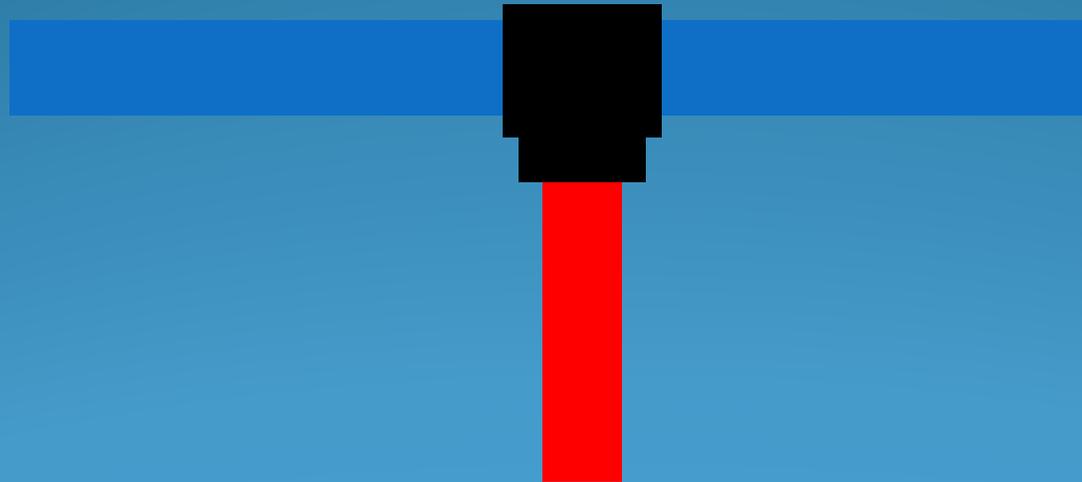




Before beginning your program, there are some concepts you need to know!

- What is a **Cross Connection**, and what are the types?
- What is **Backflow**, and what are the types?
- What **Health Hazards** are involved?
- What are the ways to prevent backflow from occurring through cross connections?

CROSS CONNECTIONS





WHAT IS A CROSS CONNECTION??

Is any actual or potential connection between a potable (drinking) water system and any other source or system through which it is possible to introduce into the public drinking water system any used water, industrial fluid, gas or substance other than the intended potable (drinking) water.

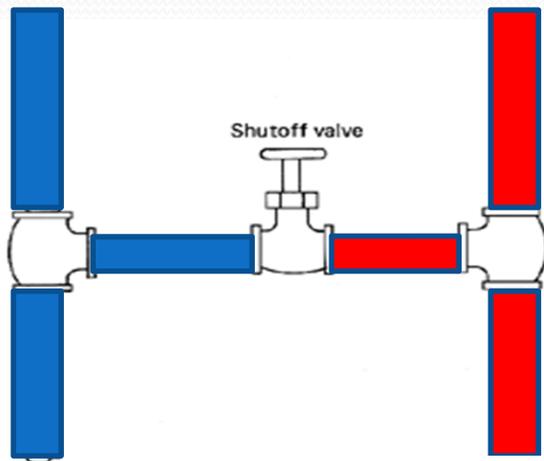


THERE ARE TWO TYPES OF CROSS CONNECTIONS

- **Direct Cross Connection**
- **Indirect Cross Connection**

DIRECT CROSS CONNECTION

A **Direct Cross Connection** is a cross connection that is a physical connection between potable and non-potable water and is subject to both backsiphonage and/or backpressure.



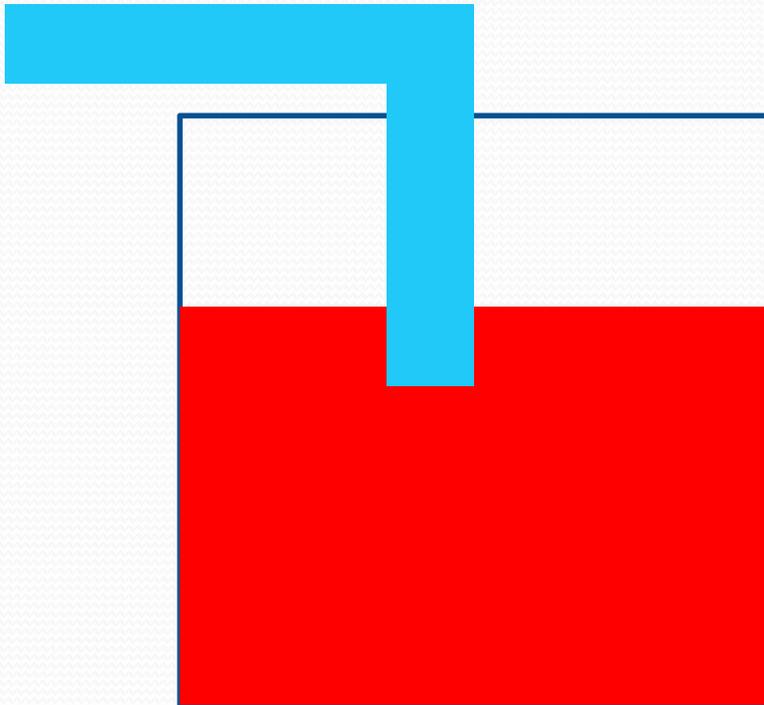
Potable Water

Non-potable Substance



INDIRECT CROSS CONNECTION

An **Indirect Cross Connection** shall mean a Cross Connection which is subject to Back-siphonage only. Pressure cannot be created.



BACKFLOW CONDITIONS (Water Hydraulic Conditions)

WHAT IS BACKFLOW??

Backflow is the undesirable reversal of the flow of water

Normal Flow



Backflow



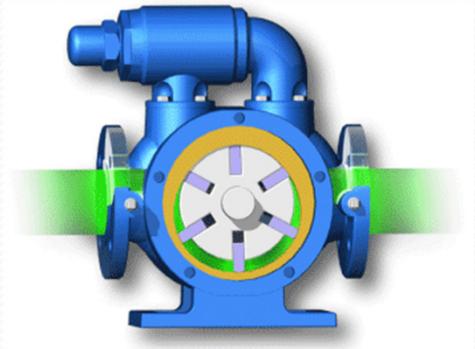


THERE ARE TWO TYPES OF BACKFLOW CONDITIONS

- **Backpressure Backflow**
- **Backsiphonage Backflow**

BACKPRESSURE BACKFLOW

- Is caused when the pressure on the customers side is higher than the water systems pressure
- Backpressure is a “pushing force”
- Causes of Backpressure:
 - Pumps
 - Elevated piping (head pressure)
 - Thermal expansion
 - Pressurized containers



*Flow reverses due to
system pressure greater
than line pressure*

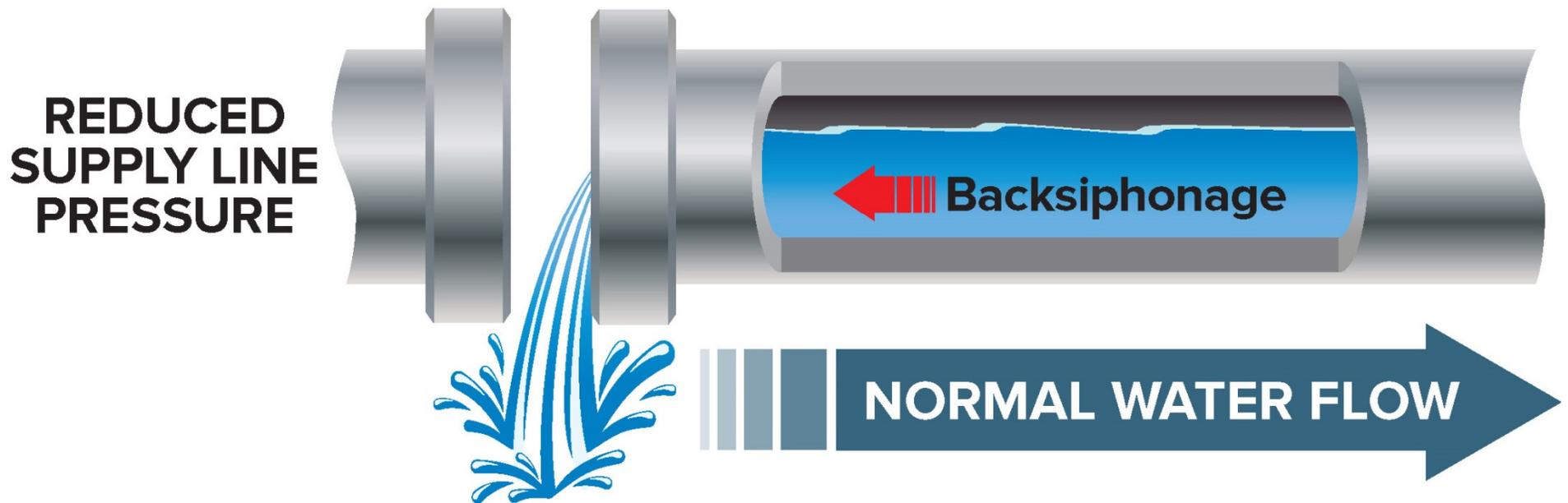


BACKSIPHONAGE BACKFLOW

- Is a form of backflow due to a reduction in water system supply pressure which causes a sub-atmospheric pressure to exist at a site in the customers water system.
- Backsiphonage is a “pulling force”
- What can cause the pressure to drop to cause a back siphonage?
 - High water demand (high Velocity decreases pressure in pipe)
 - Opening a fire hydrant
 - A break in the water piping
 - Suction side of a booster pump
 - Change in pipe sizing



Flow reverses due to decrease or loss of supply line pressure

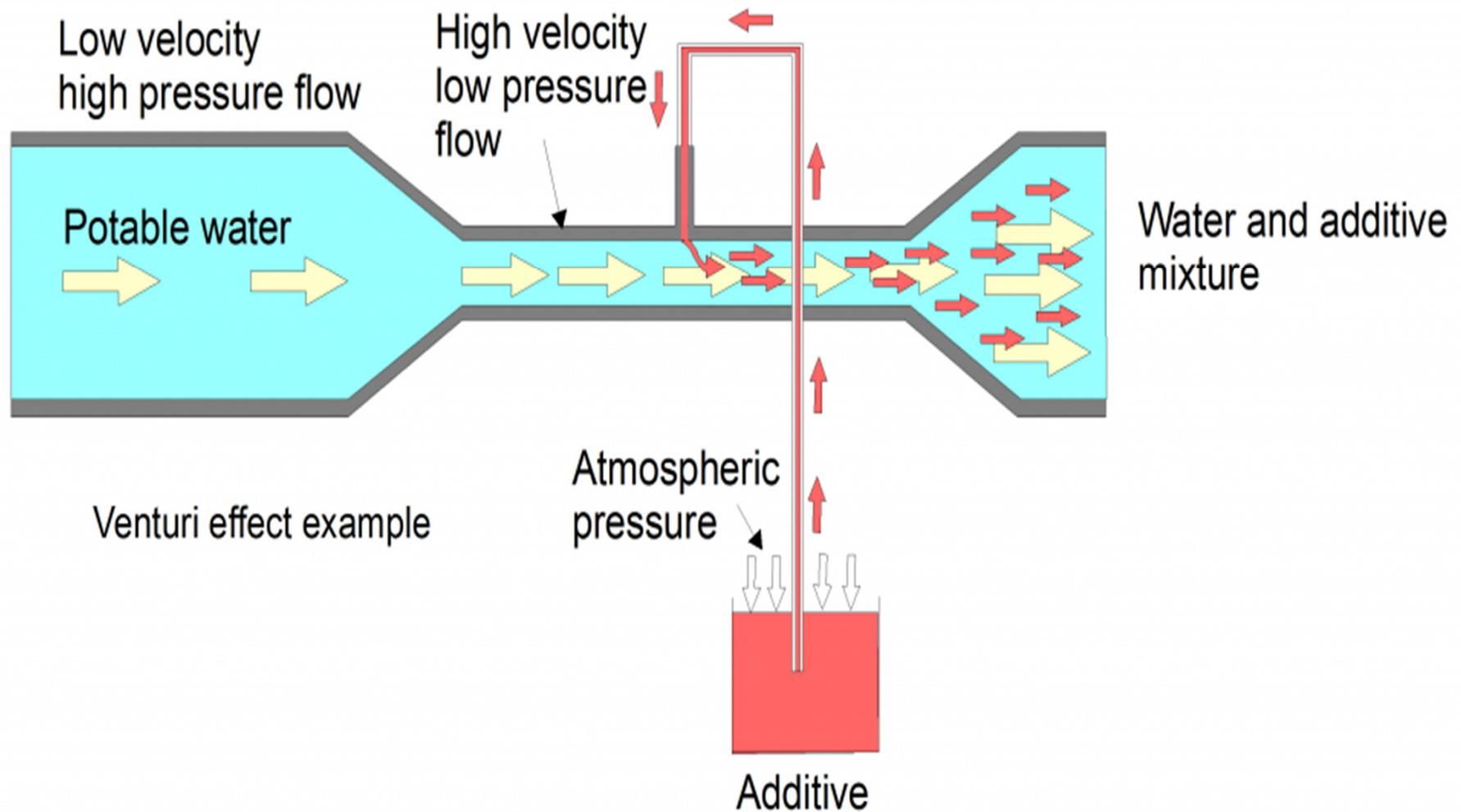




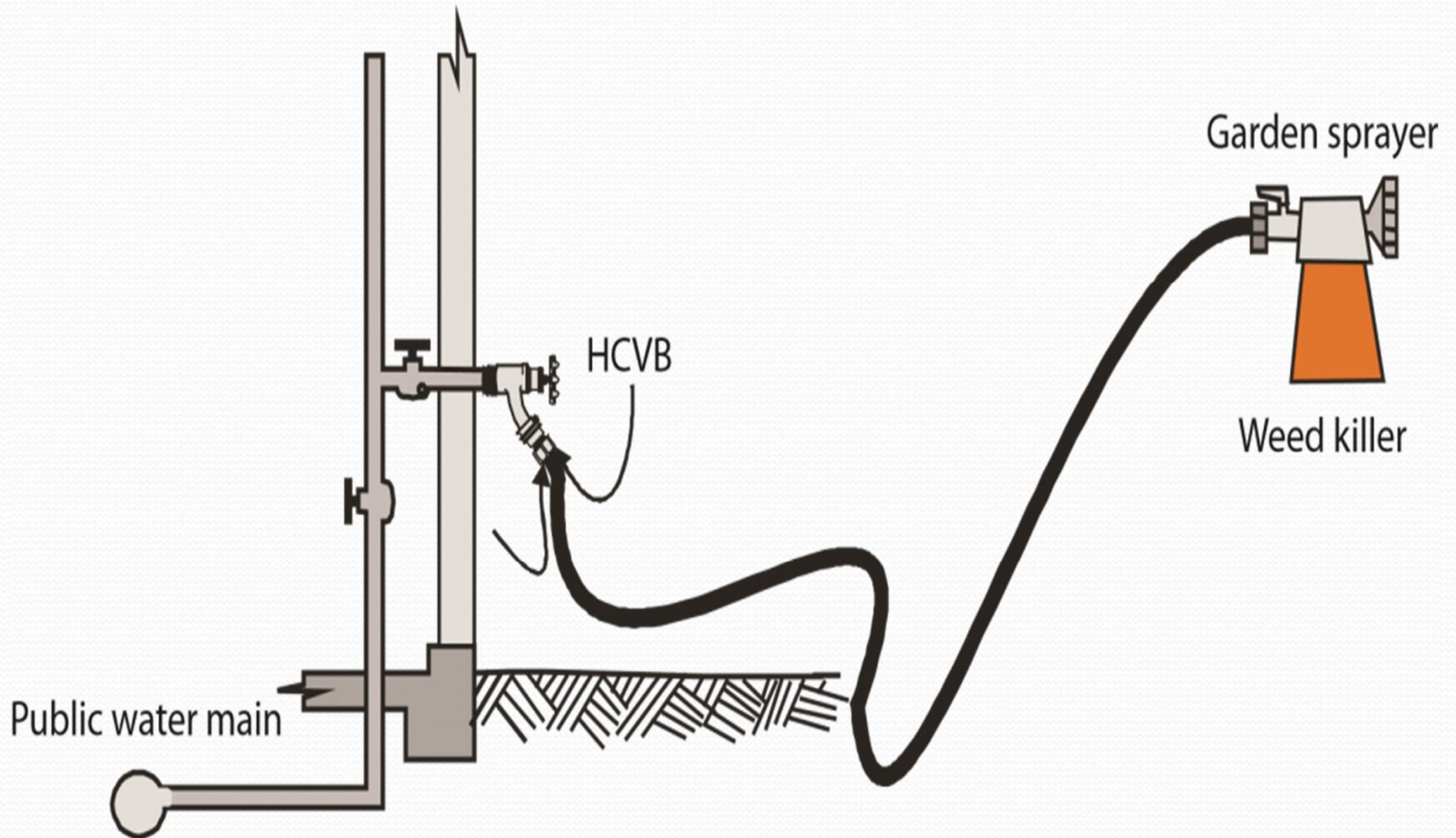
VENTURI EFFECT

- Caused by a change in pipe size or a constriction in a pipe
 - The velocity increases as it enters smaller sized piping.
 - As the velocity increases, the pressure in the piping decreases , which may create a vacuum.

VENTURI EFFECT



VENTURI EFFECT



HEALTH HAZARDS



HEALTH HAZARDS

It will be important to determine what the health hazard is to to determine what type of backflow prevention will be needed.



TWO TYPES OF HEALTH HAZARDS

- **HEALTH**

- Something that could cause illness or death
- Contaminant

- **NON HEALTH**

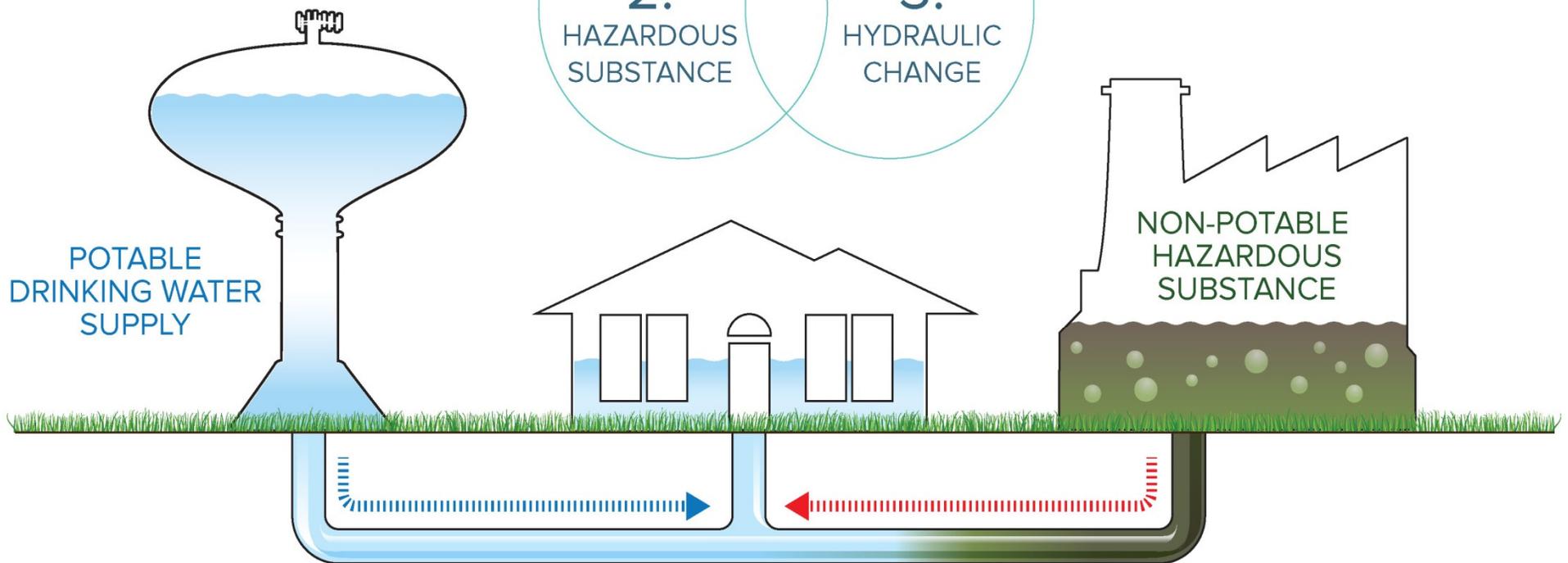
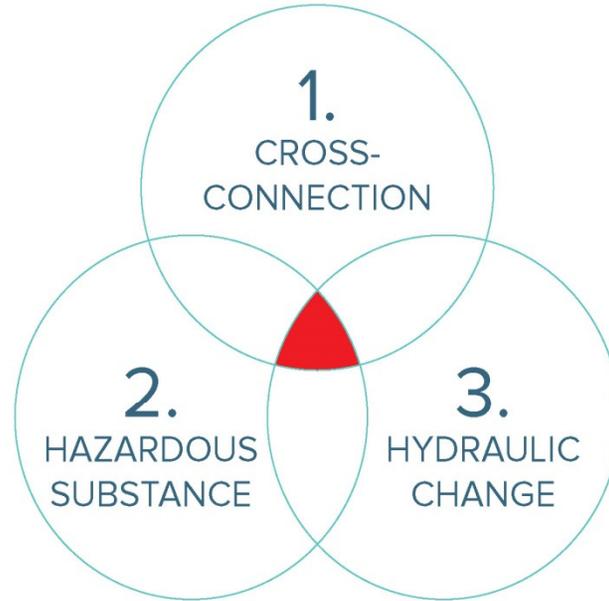
- Undesirable but won't cause health affects
 - Aesthetics such as taste, color, odor
- Pollutant (not to be confused with “pollution”)



BACKFLOW INCIDENT!!!

- What can cause a Backflow Incident to occur?
 - Three conditions are necessary:
 - An unprotected cross connection
 - Hydraulic changes in water system
 - A hazardous, nonpotable, or undesirable substance

Three Conditions
Are Required For A
Backflow Incident:



NORMAL WATER
SUPPLY FLOW

CHANGE IN HYDRAULIC
CONDITION RESULTS IN BACKFLOW

METHODS OF PROTECTION



METHODS OF PROTECTION

- Plumbing Code Compliance
(Protection determined by the plumbing code)
- Meter protection

PLUMBING CODE COMPLIANCE

(Isolation Program/Protection)

- Backflow protection installed at each point of cross connection within facility
 - Advantages
 - Water system is protected
 - Occupants inside facility are protected
 - Protection at point of each water use



METER PROTECTION

(Containment program)

- Backflow protection is installed on water supply line to facility at meter
 - Advantage
 - Water system is protected
 - Disadvantage
 - People within facility are not protected