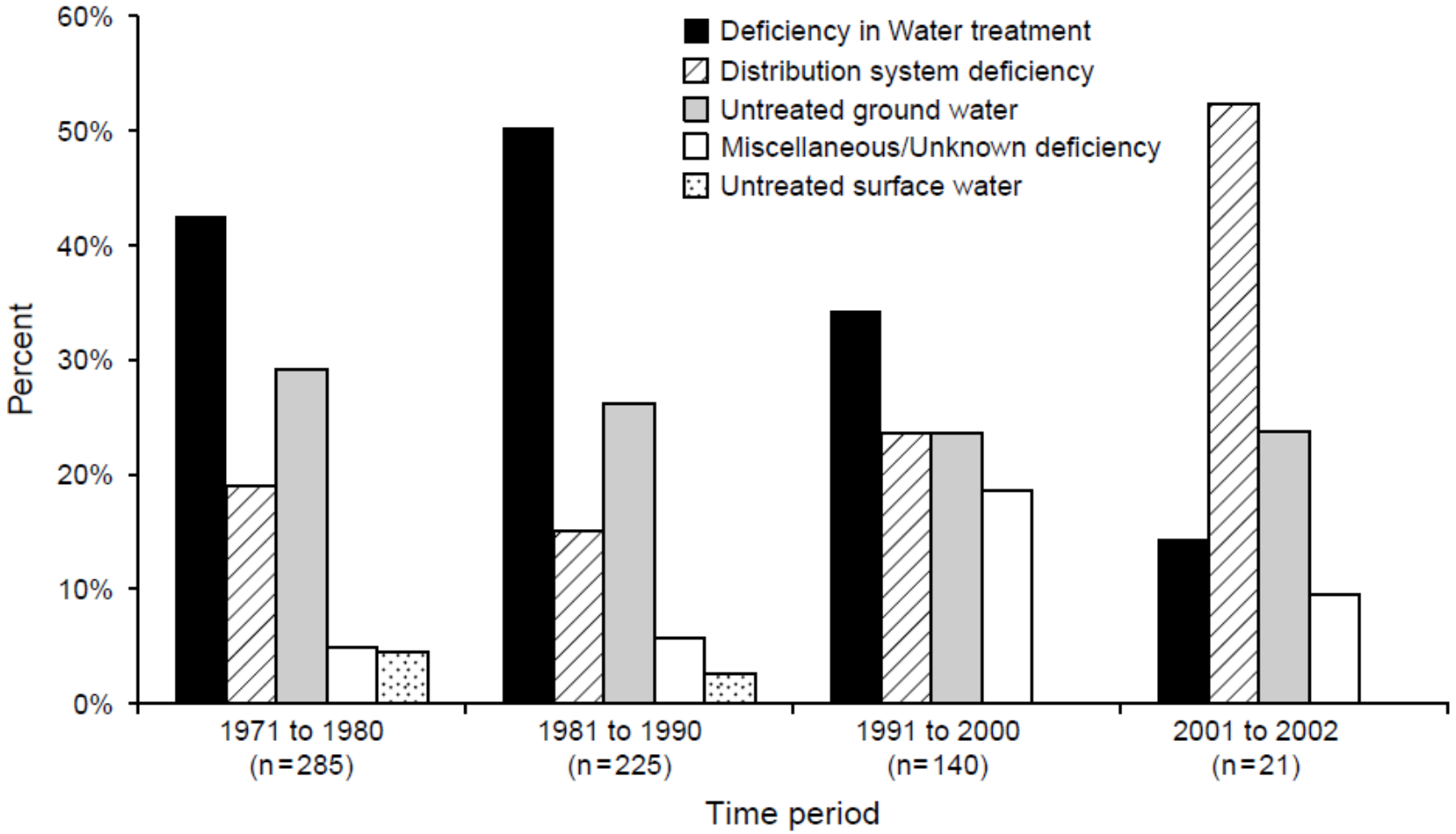
We work with others to protect the health of the people of Washington State by ensuring safe and reliable drinking water.

Cross Connection Control for Reclaimed, Waste, and Potable Water

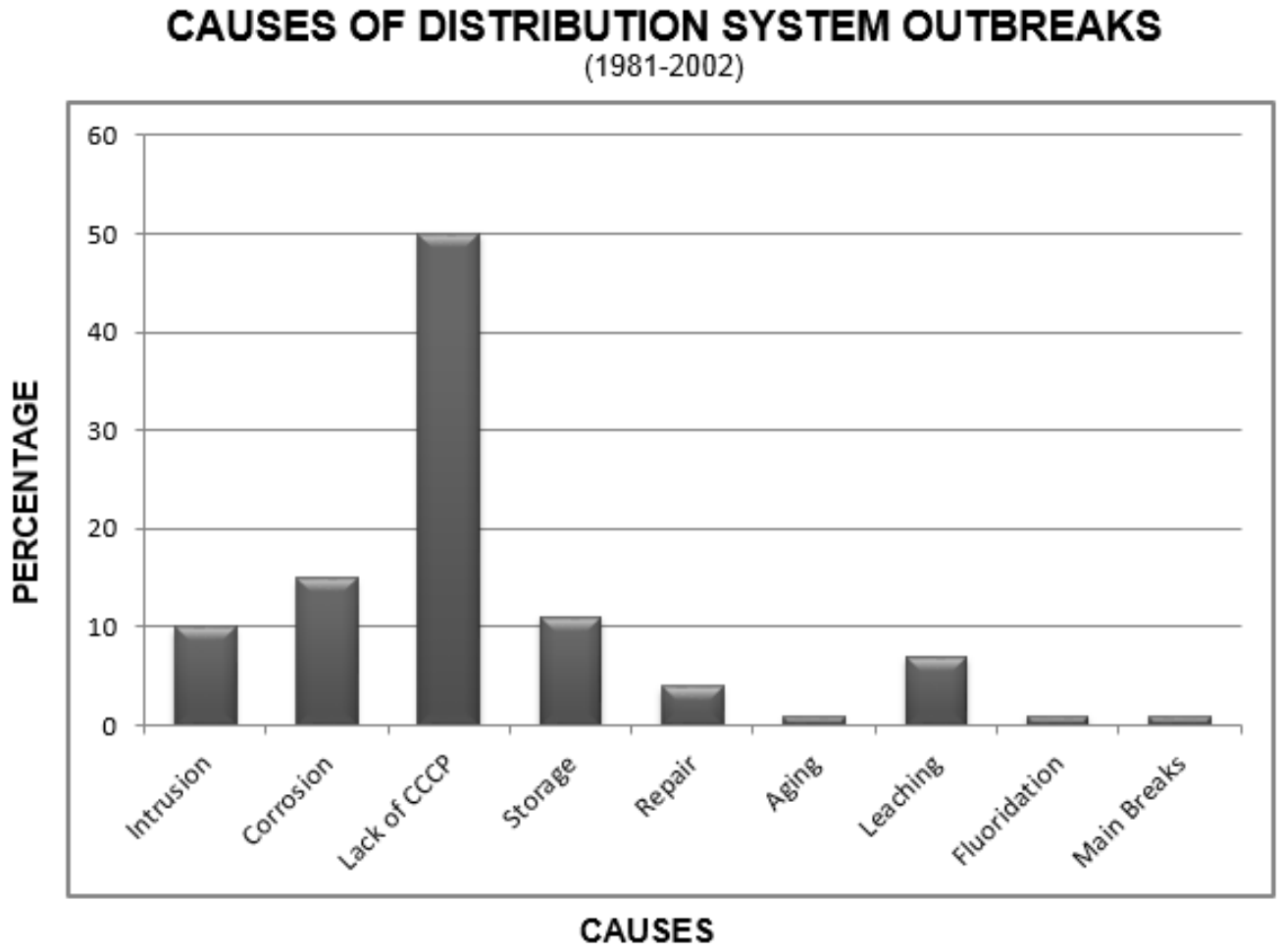
Washington State Department of Health, Office of Drinking Water

Waterborne Disease



M. F. Craun *et al.* | Waterborne outbreaks reported in the United States

CCC Concerns



The Costs of Backflow Incidents

- Your customers could get sick
- You can be subject to litigation
- Loss of consumer confidence
- Hours, flushing, disinfection, sampling…
- May not be able to acquire SRF loans
- Could face actions against your certification
- Regulatory noncompliance

Water's Water…Right?

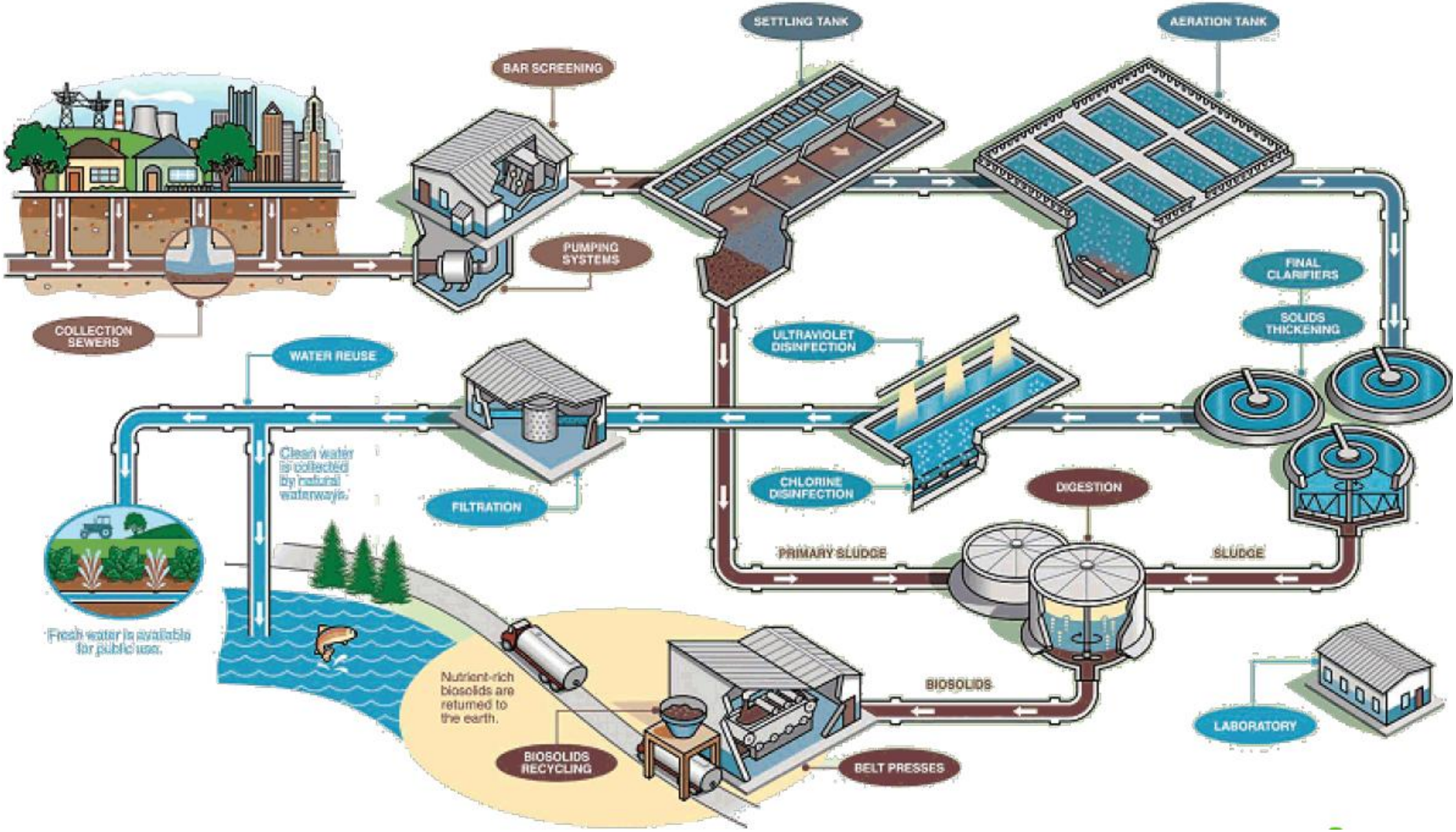
- Drinking Water
- Blackwater
- Graywater
- Rainwater Harvesting
- Storm Water
- Unapproved Auxiliary Water Supplies
- Condenser Harvesting
- Decentralized non-potable re-use

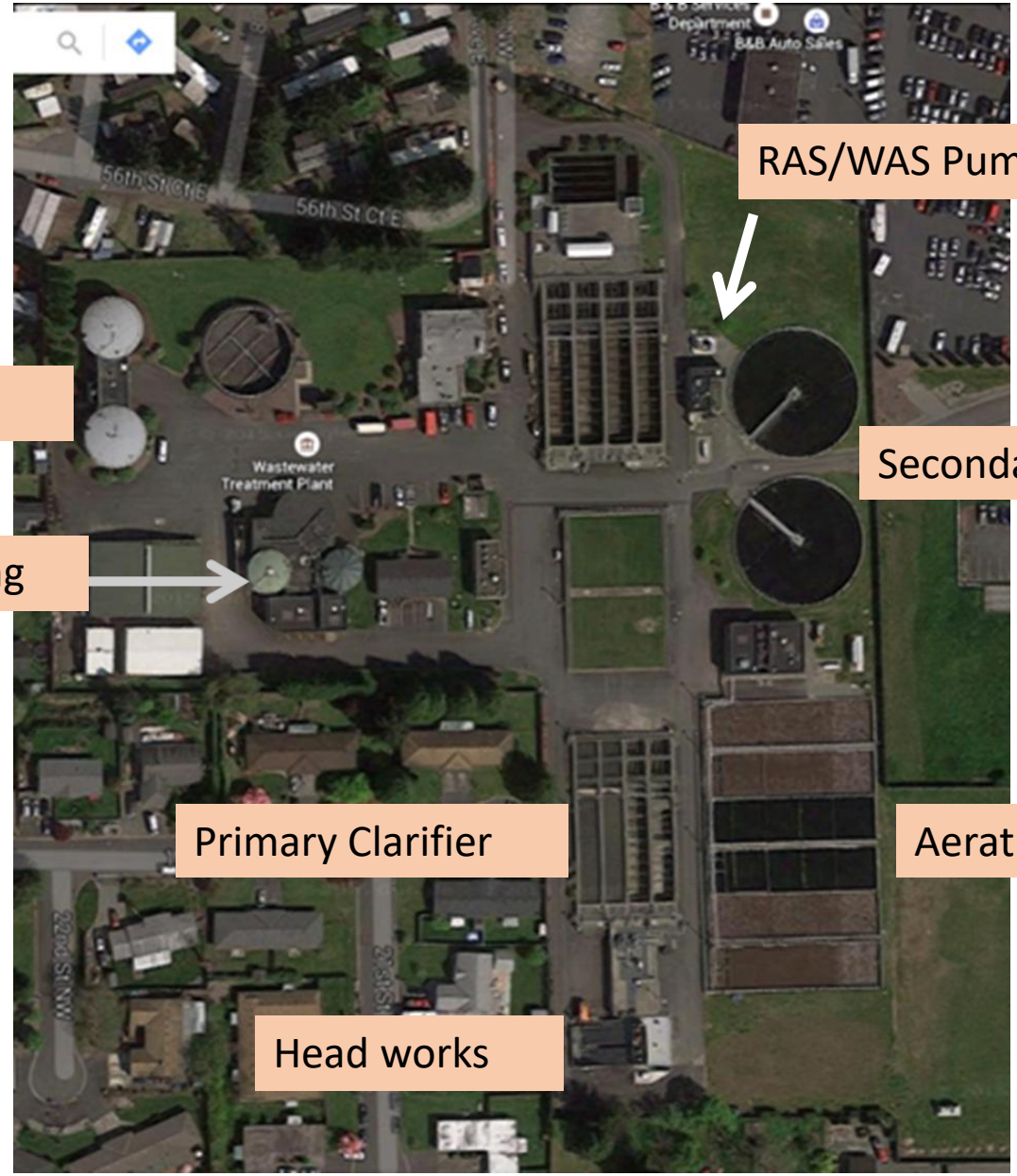
-Continued-

- Wastewater
  - Water that has been used
- Reclaimed Water
  - Water derived in any part from a wastewater with a domestic wastewater component that has been adequately and reliably treated so it can be used for beneficial purposes.
  - Direct potable reuse means the process in which Class A+ reclaimed water is introduced into an existing water distribution, storage, or treatment system without an environmental buffer


PRIMARY SLUDGE
NONPOTABLE WATER
POTABLE WATER
SERVICE AIR
INSTRUMENT AIR
MIXED LIQUOR
CLA
RECLAIMED WTR

Conventional Wastewater Treatment




RAS/WAS Pumps
Digesters
Secondary Clarifier
Solids Handling
Primary Clarifier
Aeration Basin
Head works
Wastewater Treatment Plant
56th St Ct E
B&B Auto Sales

‘Ideal’ Situation

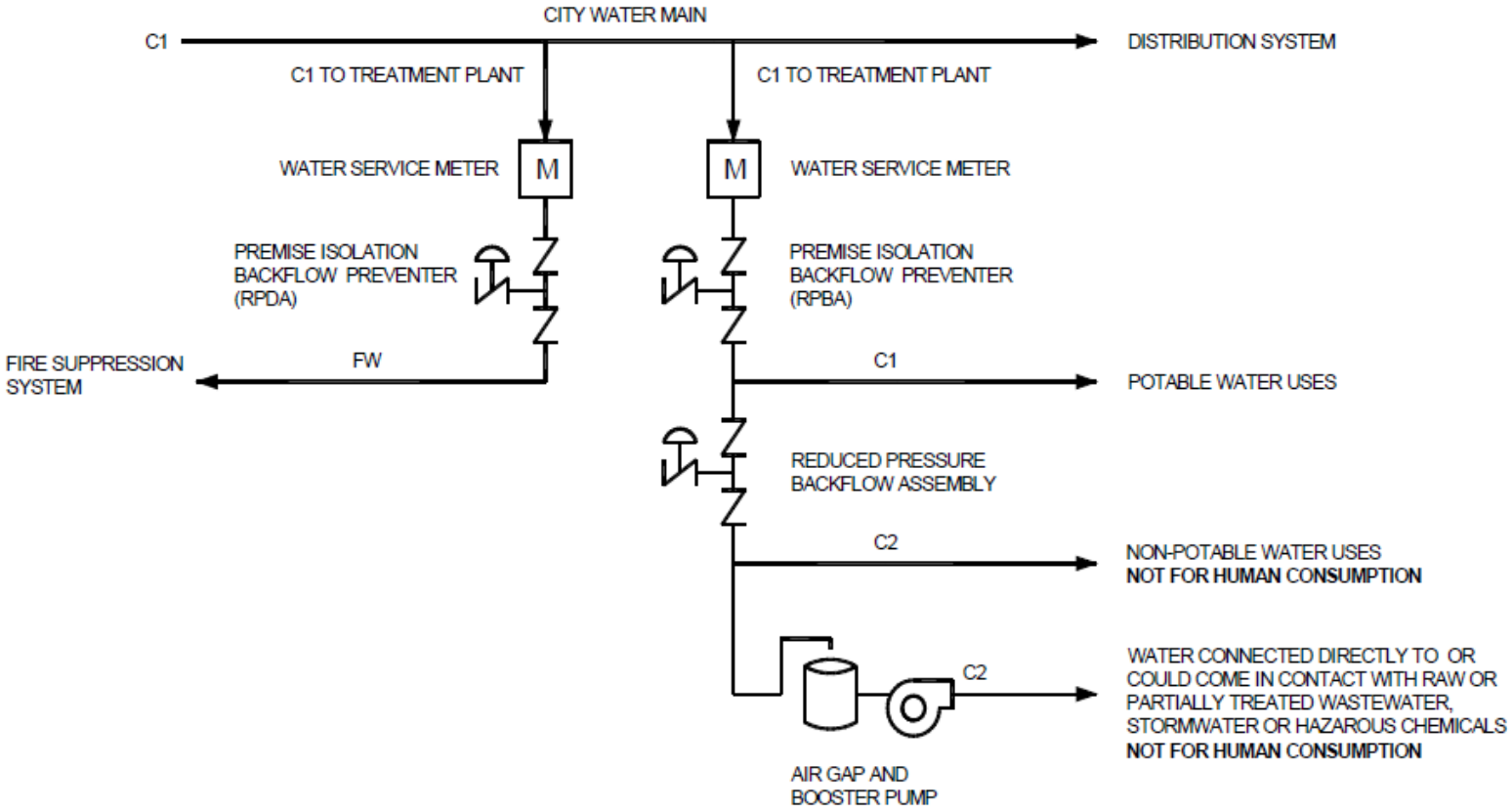


Figure G2- 1 Cross Connection Control Overview

Complicated Situation

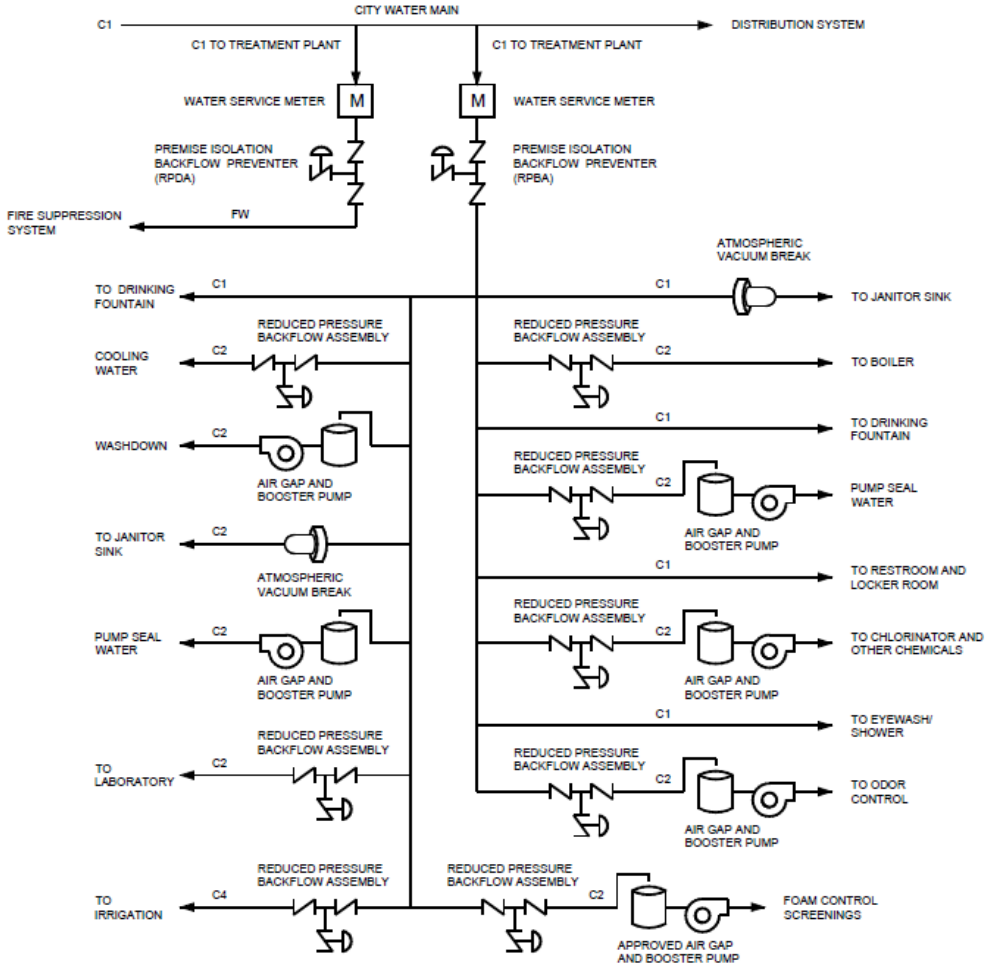
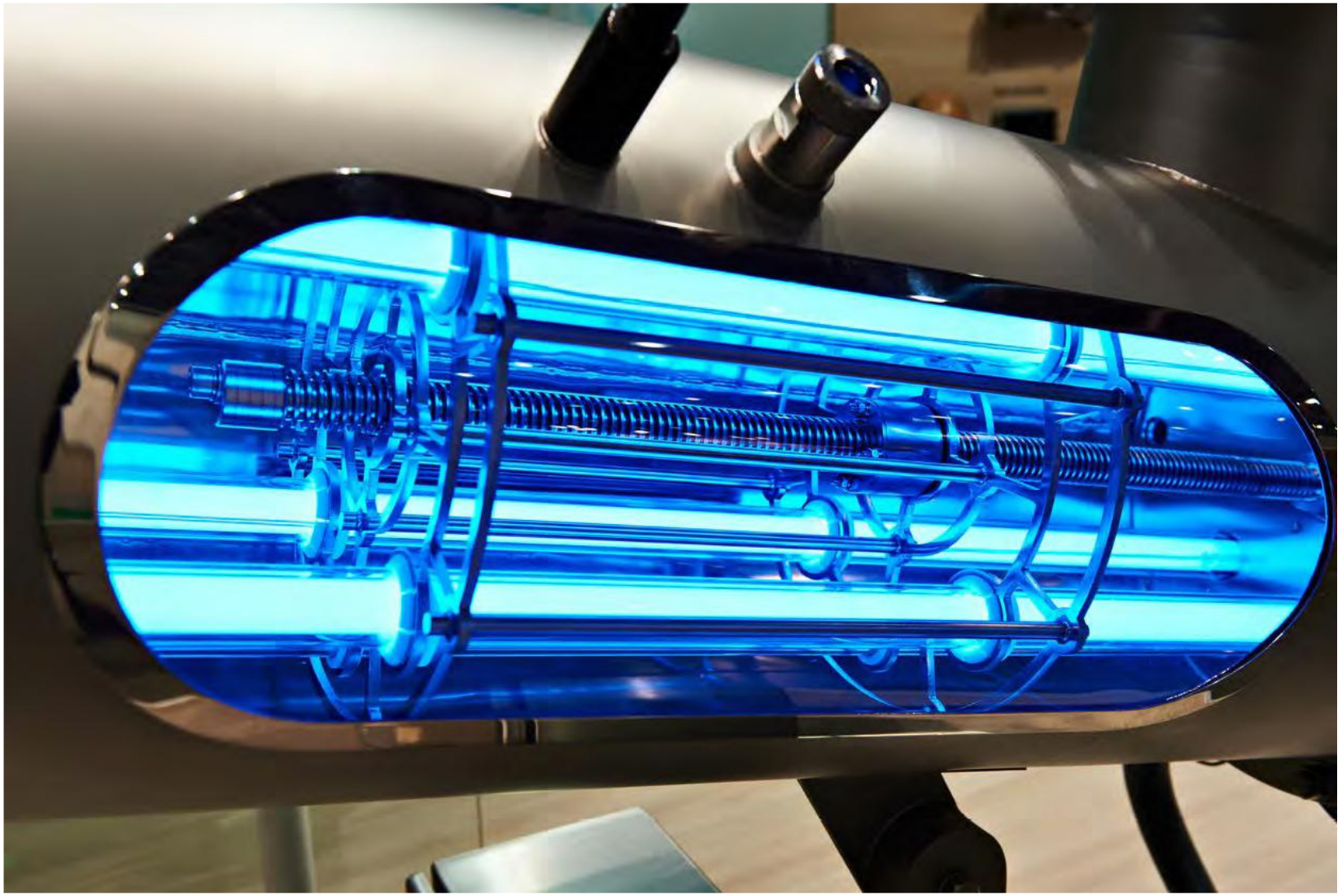


Figure G2- 4 Complex Cross-connection Control Overview

Reverse Osmosis



UV Disinfection



Ozone Disinfection



Key CCC Concepts

- Must protect potable water from reclaimed water as if reclaimed water were sewage
- Must protect reclaimed water as if reclaimed water were potable water
- Actual or potential connections to sewage, process water, or toxic chemicals are downstream of an air gap
- Public water supply to any property receiving reclaimed water is protected by premise isolation RPBAs

Why Are We Concerned?



We're Running Out of Water



Potential Uses for Reclaimed Water


FOR WATER CONSERVATION
THIS PROPERTY IS IRRIGATED
WITH RECLAIMED WATER
DO NOT DRINK
You can Drink
COMO PARTE DE LOS ESFUERZOS DE
CONSERVACION DE LA CIUDAD; ESTA AGUA
HA SIDO TRATADA CON EL PROPOSITO DE
SER UTILIZADA UNICAMENTE PARA RIEGO

Sports Fields and Golf Courses



Landscaping



Agricultural Uses



Industrial Cooling Water



Drinking Water Reservoir Augmentation



Regulations or Guidelines by State

- Agriculture (ID, WA, OR)
- Environmental Restoration (ID, WA)
- Impoundments (WA, OR)
- Industry Reuse (WA, OR)
- Landscaping (ID, WA, OR)
- Livestock Watering (OR)
- Centralized Non-Potable reuse (ID, WA, OR)
- Onsite Non-Potable Reuse (WA, OR)
- Potable Reuse (WA, OR)
- Rainwater Collection (WA, OR)

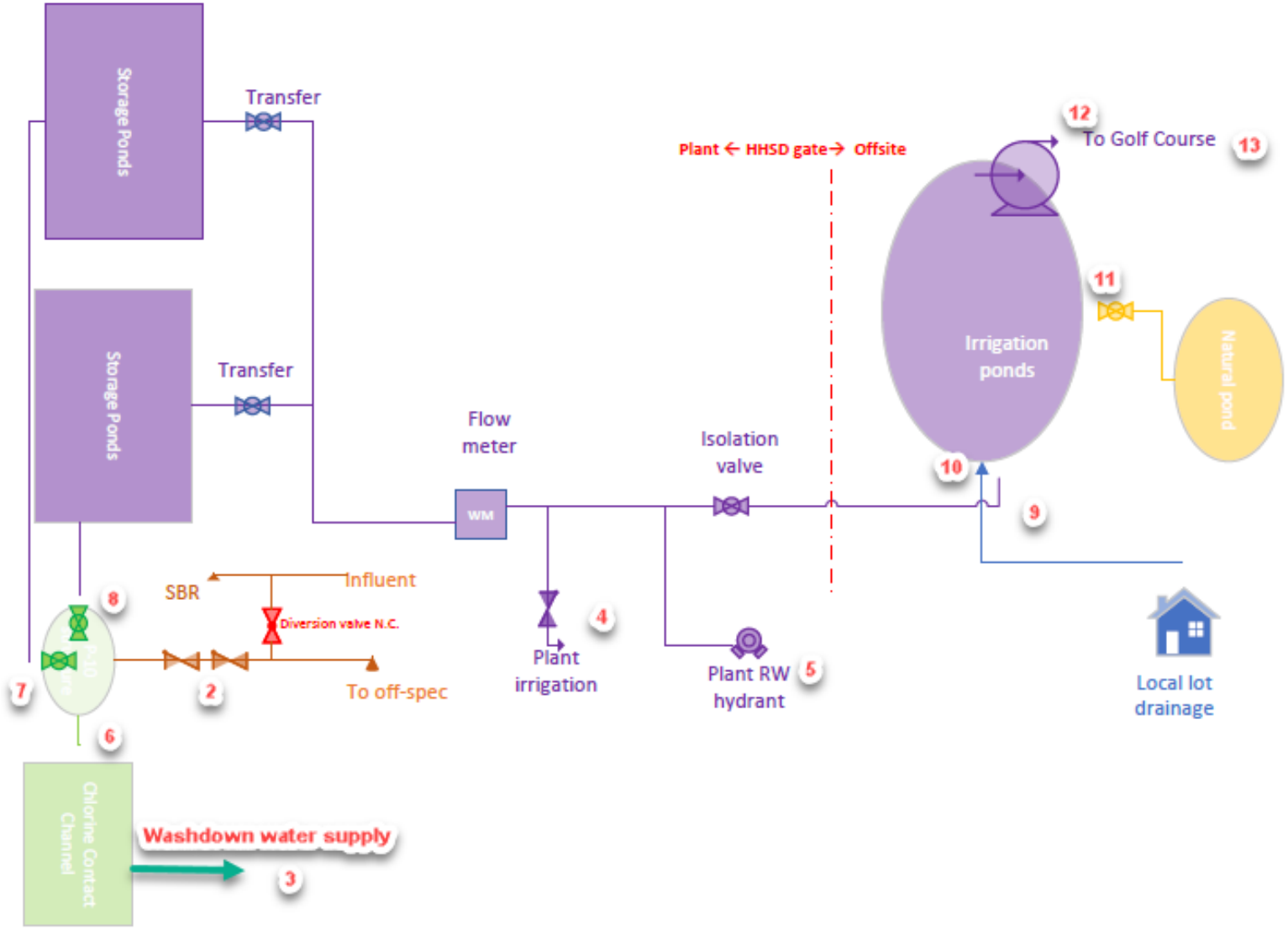
What Should We Do?

- User Agreements (communication)
- Written CCC Program Plans
  - Legal Instrument
  - Procedures to eliminate or control cross connections
  - Quality Assurance
- Backflow Incident Response Plan
- Implement the Plan
- Keep Records

Multibarrier Approach to CCC



Plans


Storage Ponds
Transfer
Storage Ponds
Transfer
Flow meter
WM
Isolation valve
Plant ← HHSD gate→ Offsite
12
To Golf Course
13
Irrigation ponds
11
Natural pond
10
9
SBR
Influent
8
Diversion valve N.C.
7
2
To off-spec
4
Plant irrigation
Plant RW hydrant
5
Local lot drainage
6
Chlorine Contact Channel
Washdown water supply
3

New Construction Inspection






CAUTION RECLAIMED WATER

Color Coding and Labeling

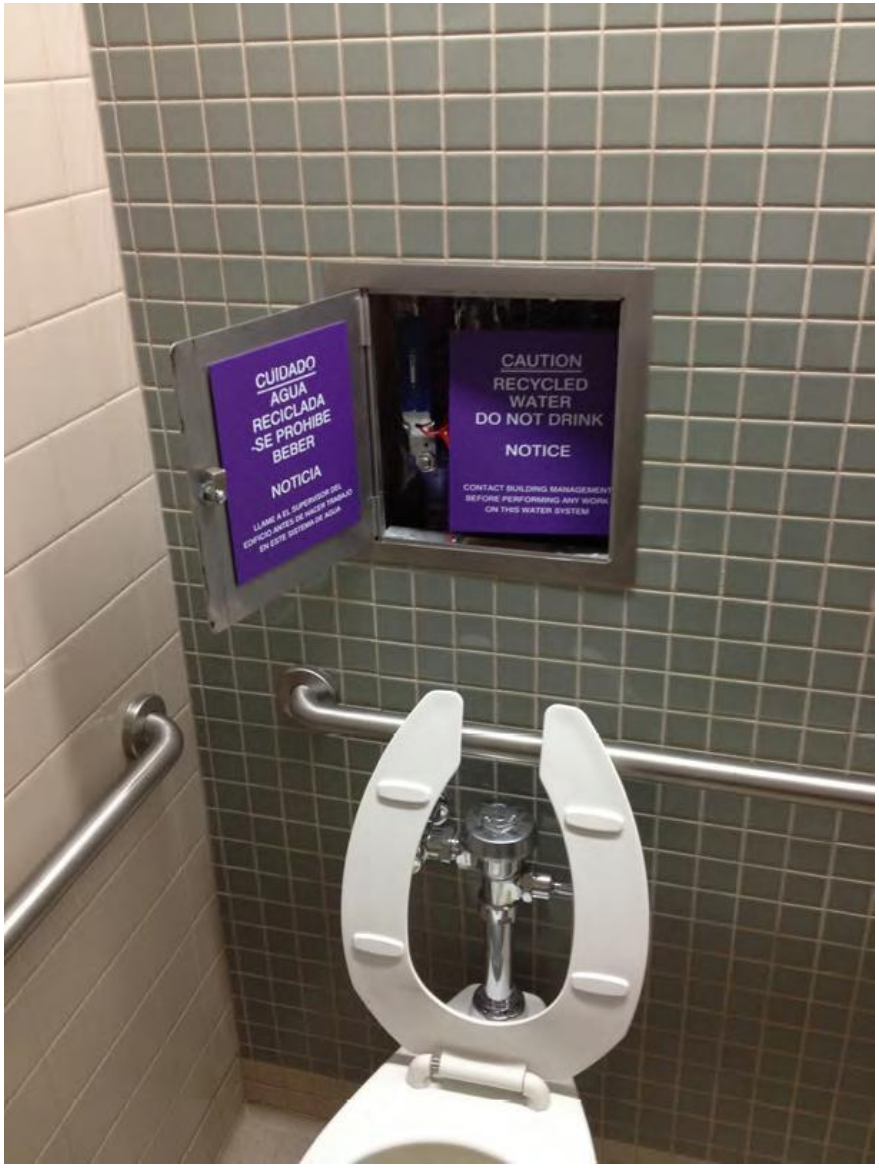








Dual Plumbed Buildings



CCC Testing Methods







What Could Go Wrong?



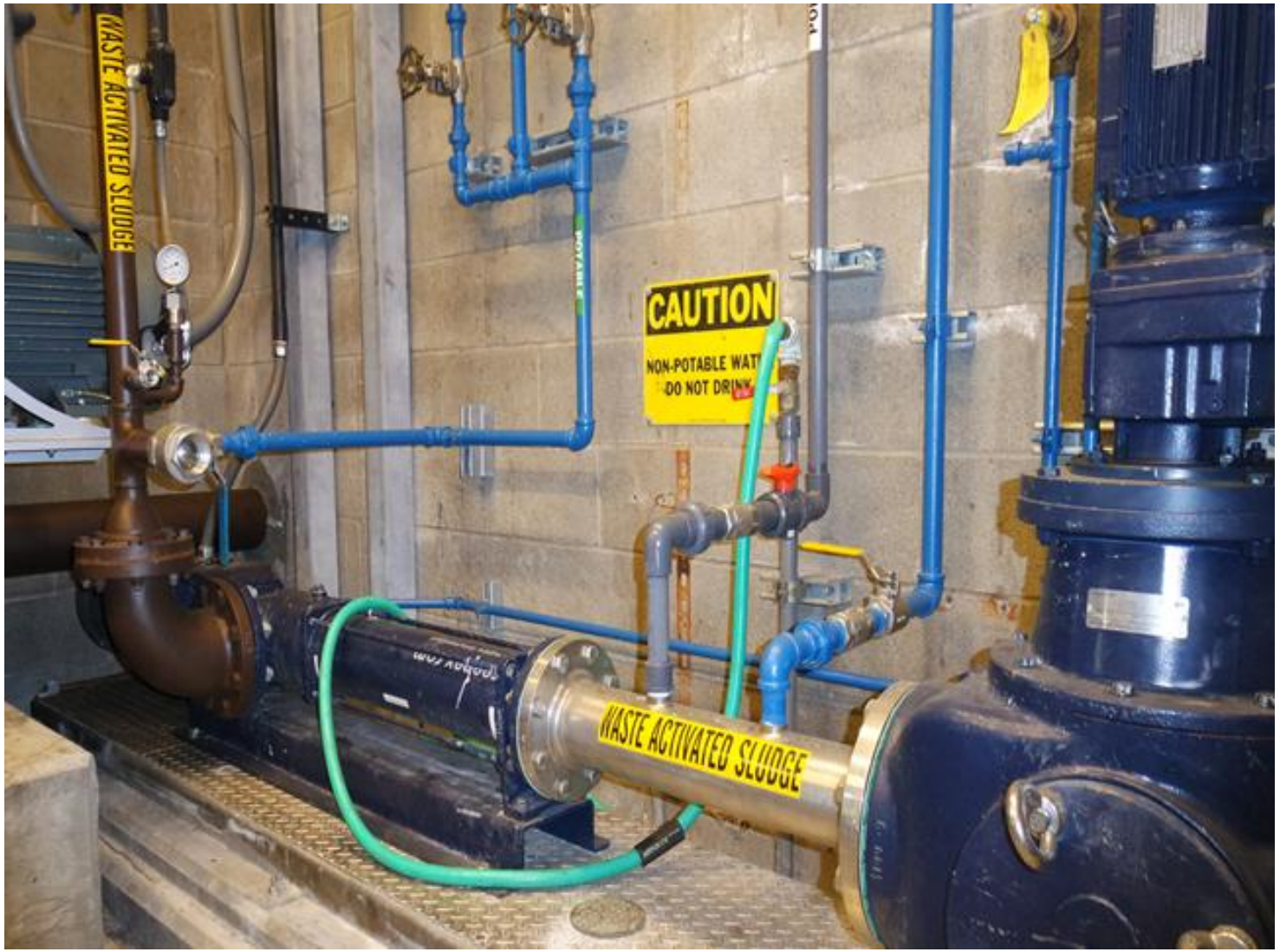
Spool Piece



Lock/out Tagout(?)



Direct Cross Connections






DO NOT
DRINK

School Drinking Fountain





WATTS

0111588
10028298

Reduced Pressure Zone
Assembly

Scan for product
resources and to


Two RPBAs located behind cabinet
Cabinet Wall



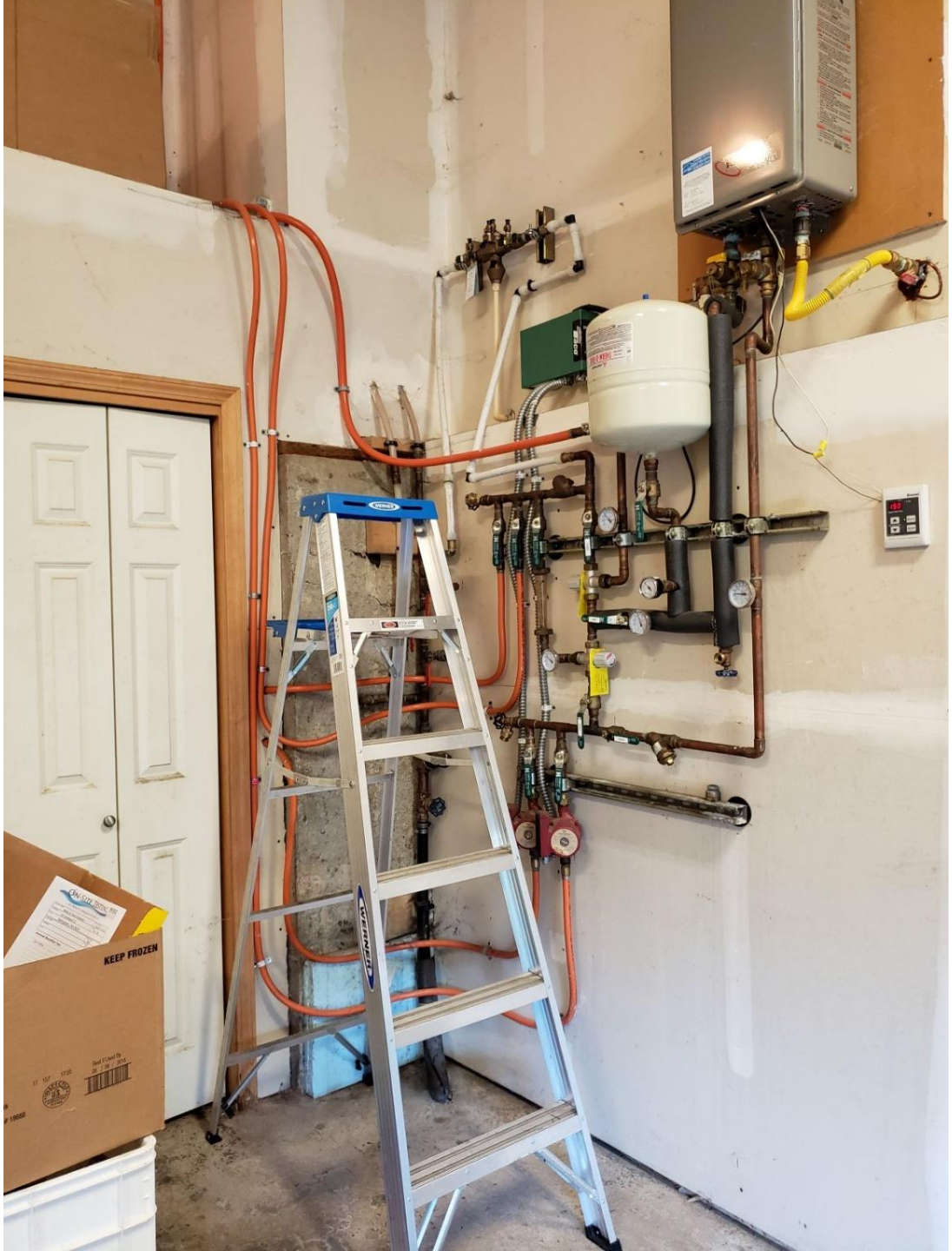

WATTS
REGULATOR
WATTS
REGULATOR
TEST TAG
DATE TESTED
TECHNICIAN TESTING
TEST PASS/FAIL

15,000 lb Check Valve from 1870's





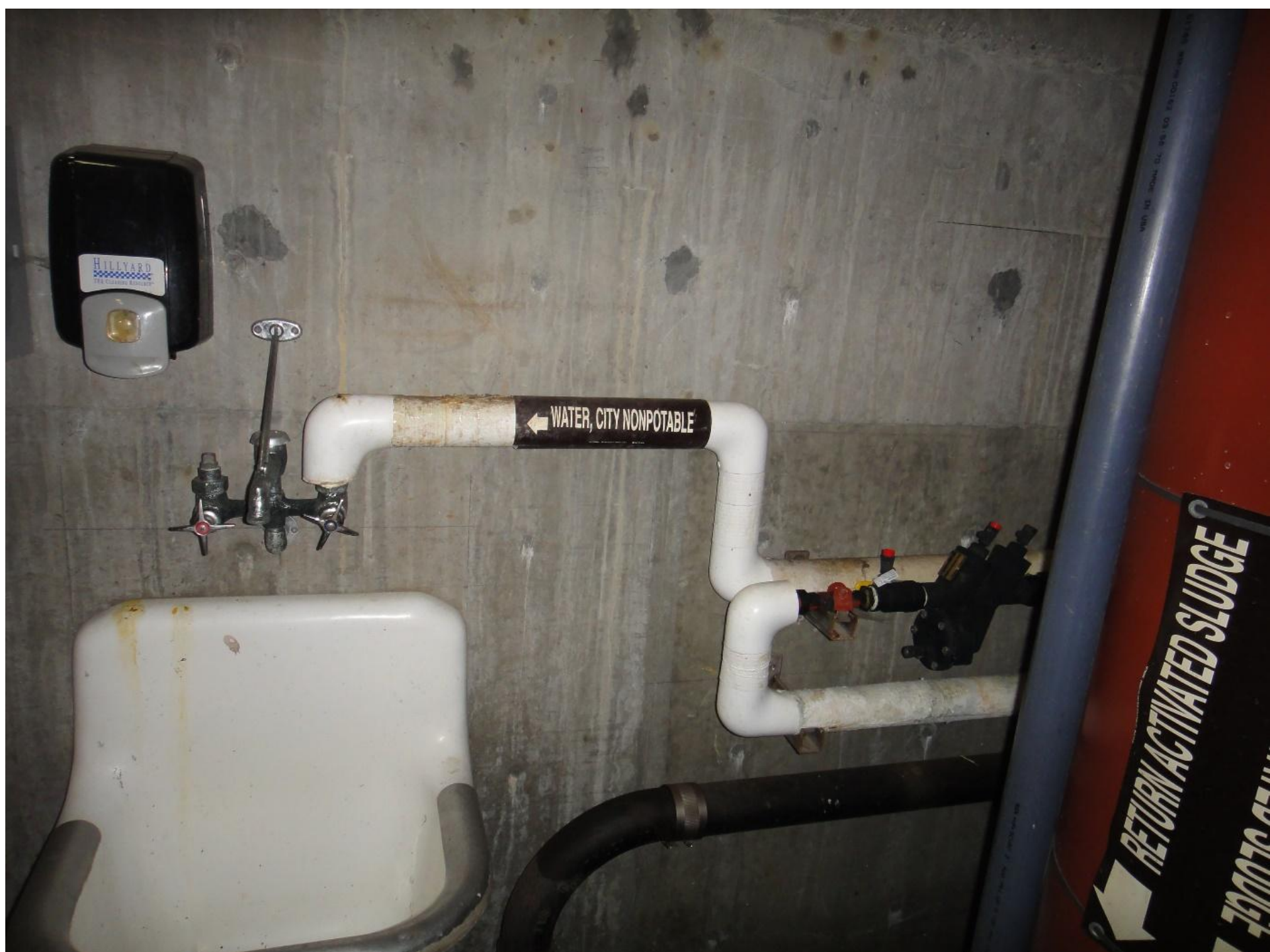

Potable fill for below ground reclaimed water holding tank
POTABLE WATER


KEEP FROZEN


Low inlet for process water air gap


KENNEDY
KENNEDY


PRESSURE VACUUM BREAKER
MODEL 770
SER NO
PAT NO
2722943
FEBCO LA CAL


HILLYARD
WATER, CITY NONPOTABLE
RETURN ACTIVATED SLUDGE



Potable water used for WAS flush and pump seal water


RPBA






1211-
002





Backflow at a Wastewater Treatment Plant

- In December 1983, effluent from a wastewater treatment plant in San Antonio, Texas, back-flowed into the plant's potable water system as a result of maintenance activities. Eight employees reportedly suffered gastrointestinal problems.
- Fortunately, a reduced-pressure principle backflow-prevention assembly (RPBA) was in place at the water service connection to the plant. This assembly contained contamination within the plant site.

Reclaimed Water Backflow Incidents

- Cranbourne, Australia 2015
  - Drinking fountain at a school connected to reclaimed water.
- Boca Raton, CA 2012
  - Fecal matter in drinking water due to reclaimed water use at residences without backflow protection
- Chula Vista, CA 2007
  - Reclaimed water backflow incident from golf course
- Hillsborough, FL 2000
  - Reclaimed water service to a home without backflow protection

Recent Backflow Incidents

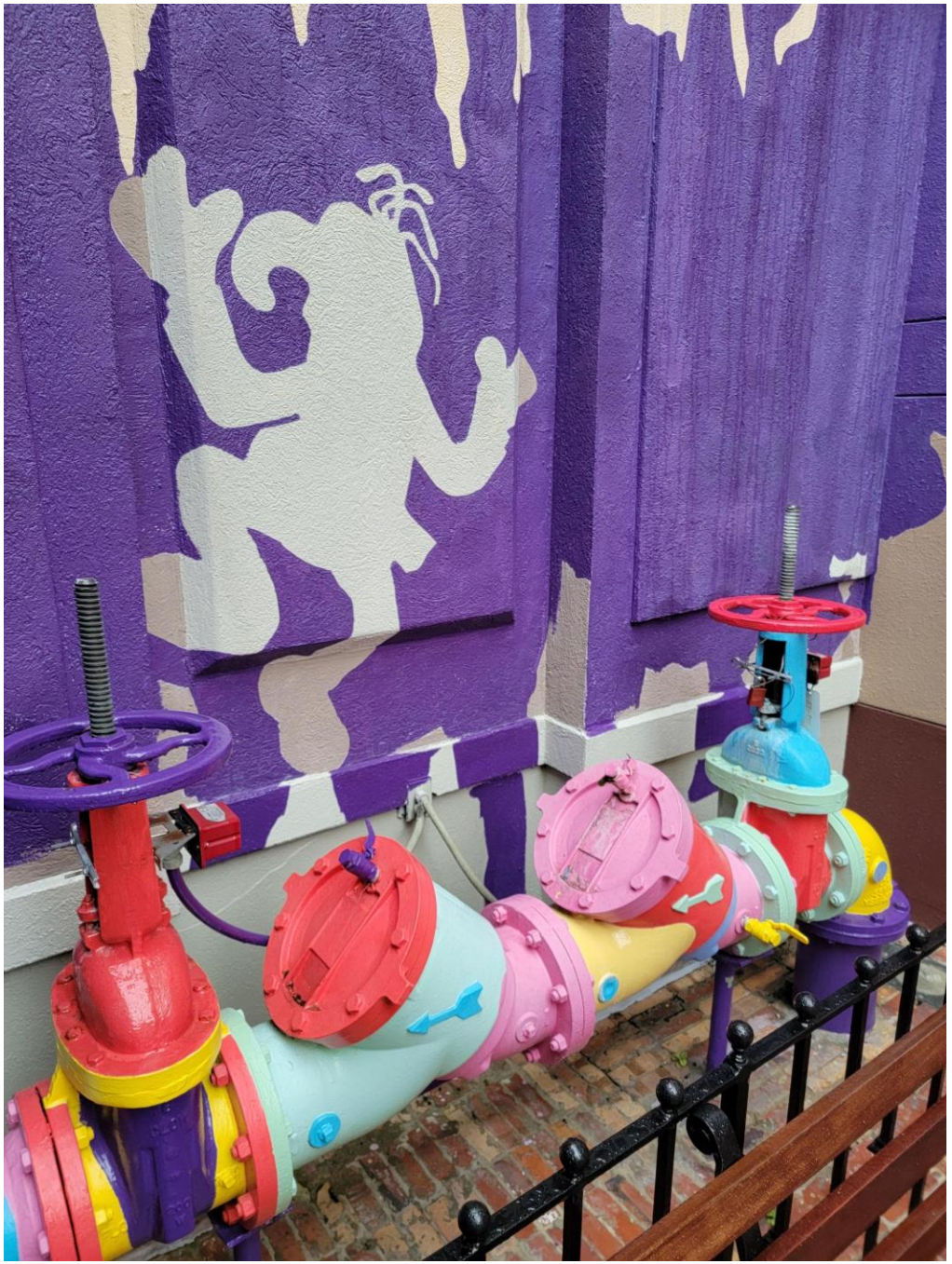
1. Customer hospitalized after chemical burns in the shower. Caustic overfeed due to backsiphonage conditions during alternative water main flow patterns during flushing.
2. The investigation of an e-coli positive sample identified a rainwater catchment system being used for “non-potable” uses in a small church. Close investigation revealed a cross-connection between the rainwater storage and the potable water make-up line.
3. An unapproved well used for “non-potable” uses in a small restaurant was found to be cross-connected to the building plumbing.
4. 4 instances of Compressed air injected into the distribution system through a lawn irrigation system. Air compressors were incorrectly hooked to backflow assembly test cocks to winterize lawn sprinkler systems.
5. An investigation of “muddy” water reports revealed a customer using compressed air to blow-out the fire sprinkler system in a small business.


JANET SHAMLIAN
CBS NEWS CORRESPONDENT
CBS EVENING NEWS WITH NORAH O'DONNELL

Be Safe



And Have Fun





But Not Too Much Fun

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