Current Implementation of Cross-Connection Control Programs

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TCRDS Federal Advisory Committee
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This Meeting's Presentations

Objectives

Provisions

System compliance

Improvement

Research

CCC Program Implementation

Presentation Objectives

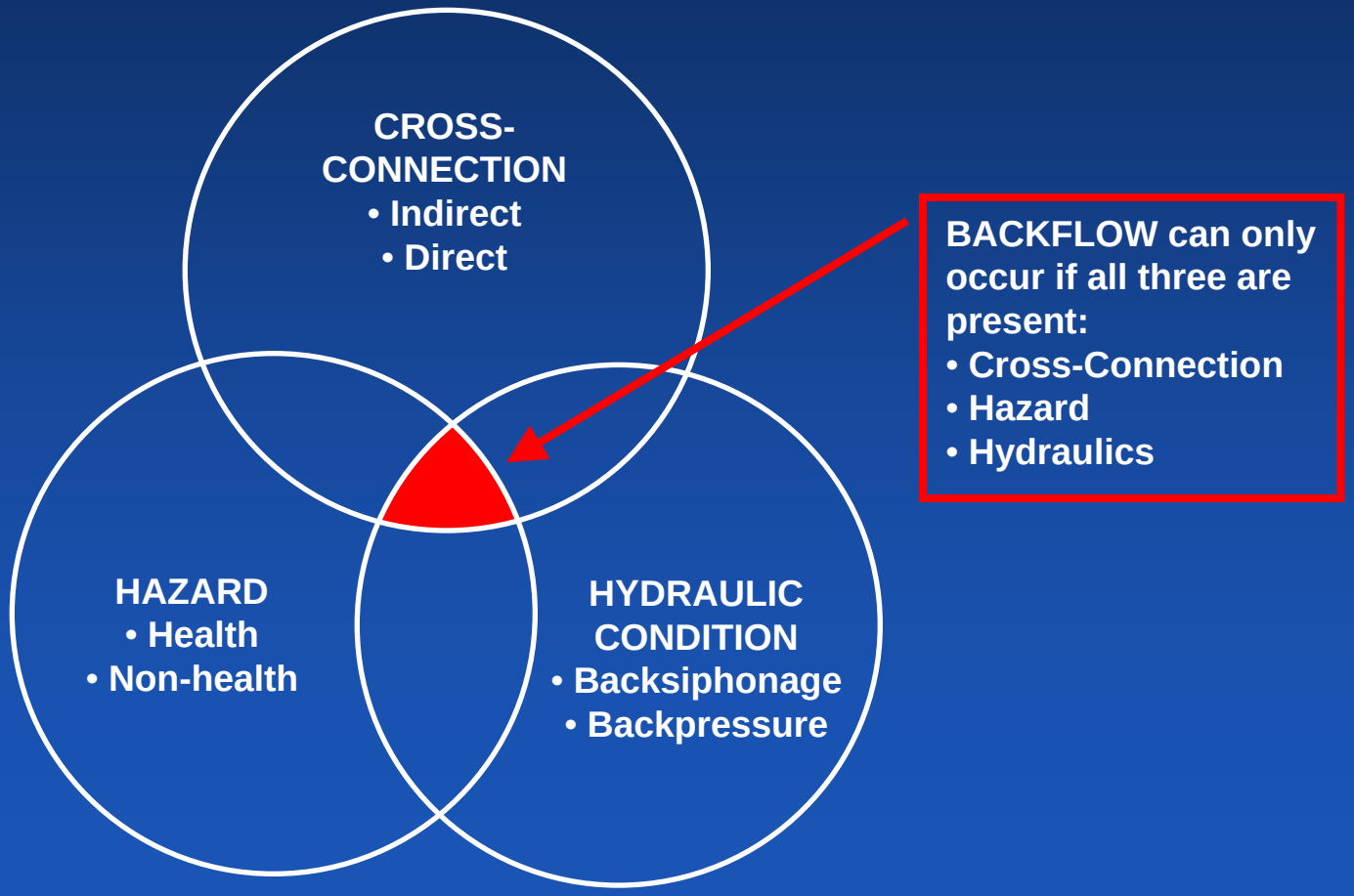
- Provide background on cross-connections and control measures
- Summarize data on types of cross-connection incidents
- Provide an overview of codes/statutes currently governing cross-connection control
  - Plumbing codes
  - State programs
  - City/County programs
  - Utility programs
  - Guidance/standards

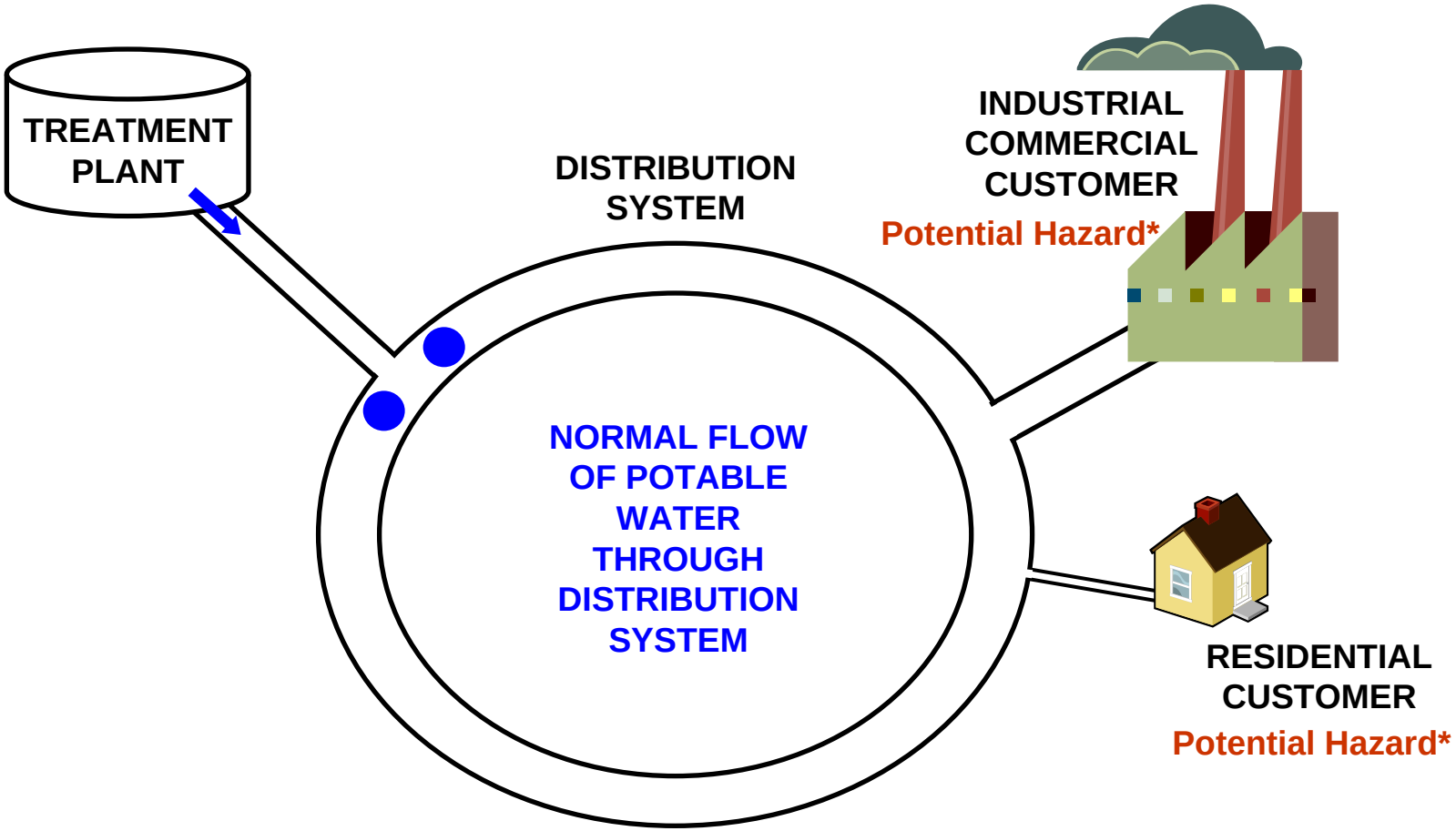
CCC Programs are Intended to Prevent:

- Cross Connections - any unprotected actual or potential connection or structural arrangement between a public or private potable water system, and any other source or system through which it is possible to introduce into any part of the potable system any used water, industrial fluids, gas, or substance other than the intended potable water with which the potable system is supplied
- Backflow – any unwanted flow of used or nonpotable water, or other substances from any domestic, industrial, or institutional piping system back into the potable water distribution system

Source: USC Manual of CCC

Backflow Incident Requirements

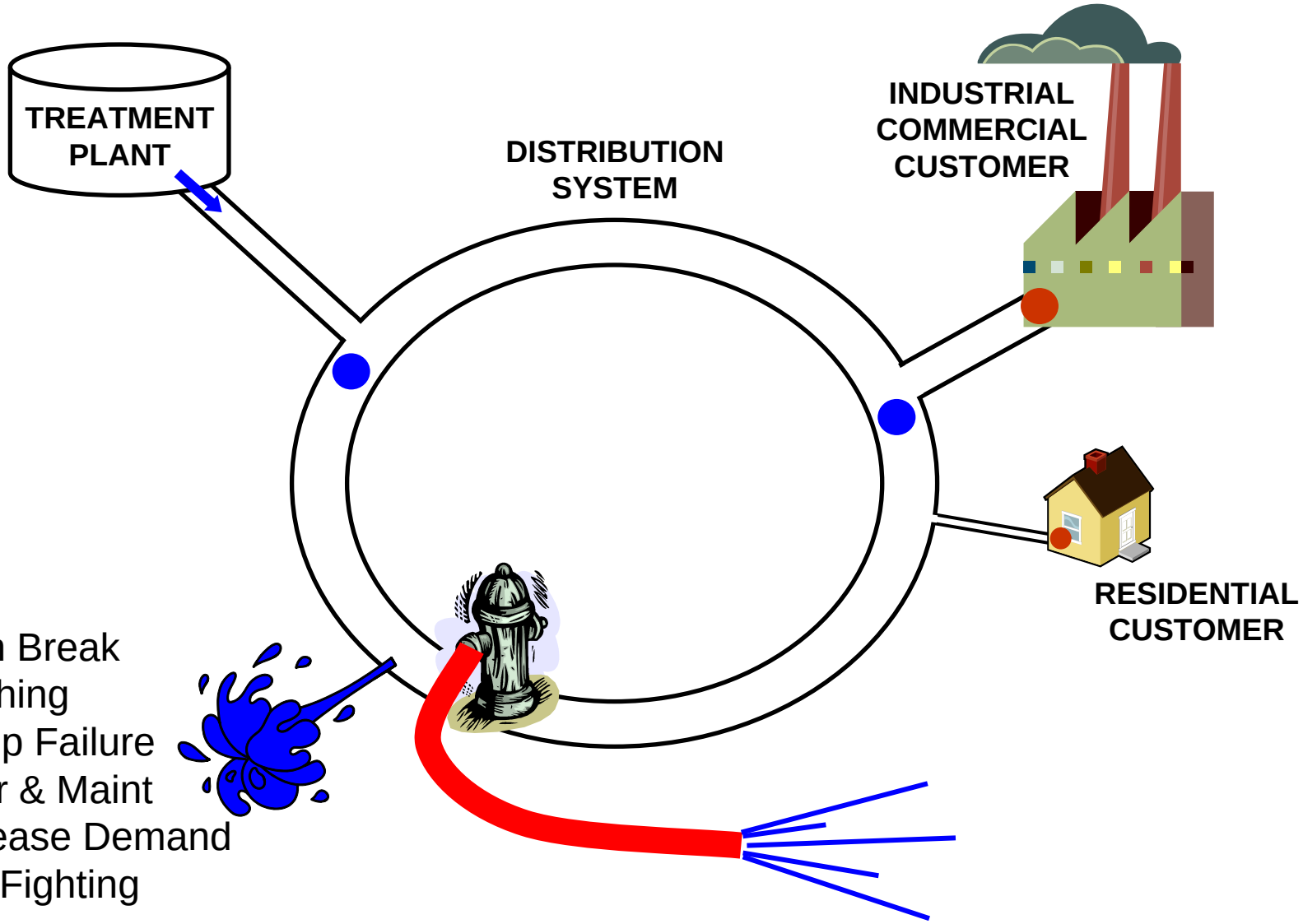




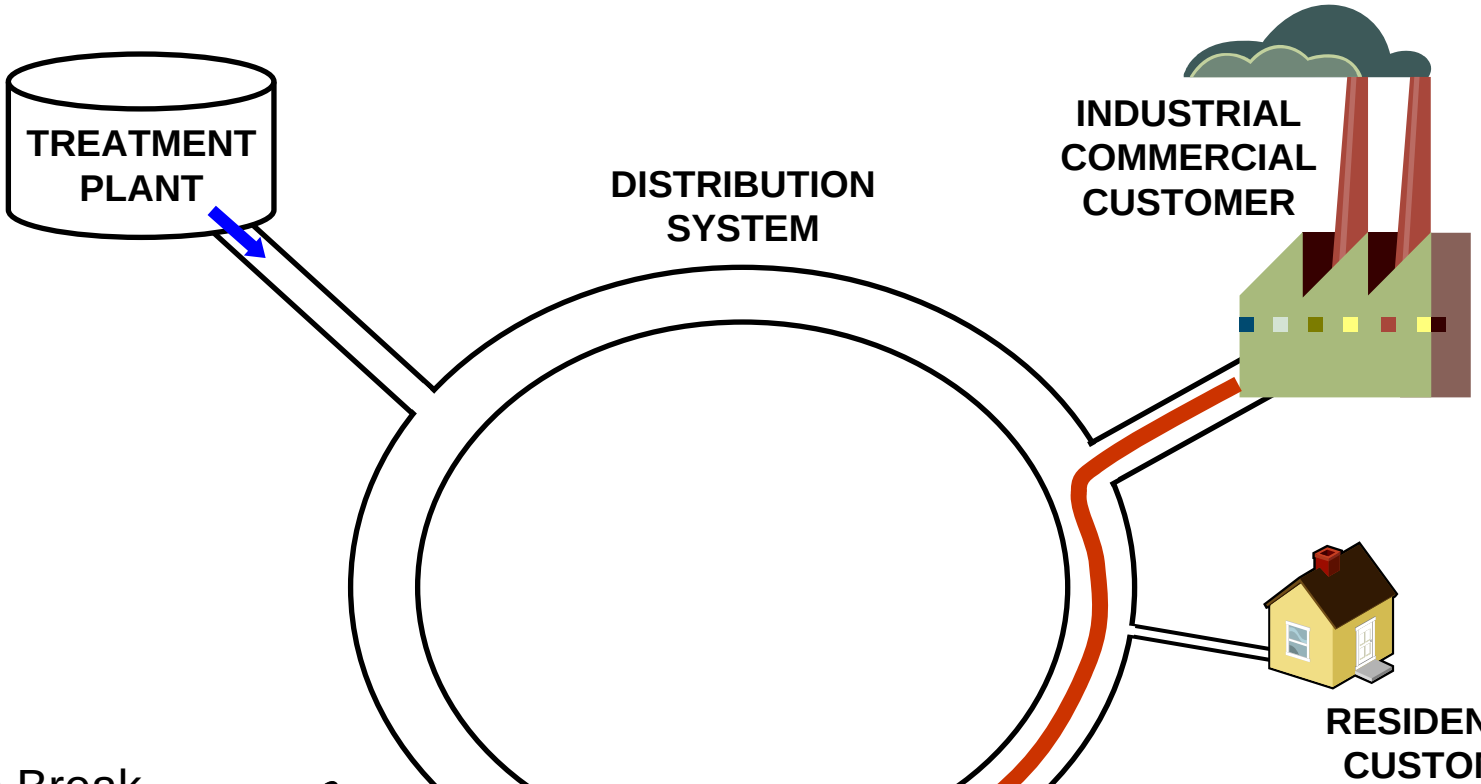
Residential Customers

- **66% of total water used**
- **80% of which is not ingested (irrigation, toilet flushing, etc.)**

*Hazard assessment required to determine the actual risk to public health from individual connections



- Main Break
- Flushing
- Pump Failure
- Oper & Maint
- Increase Demand
- Fire Fighting



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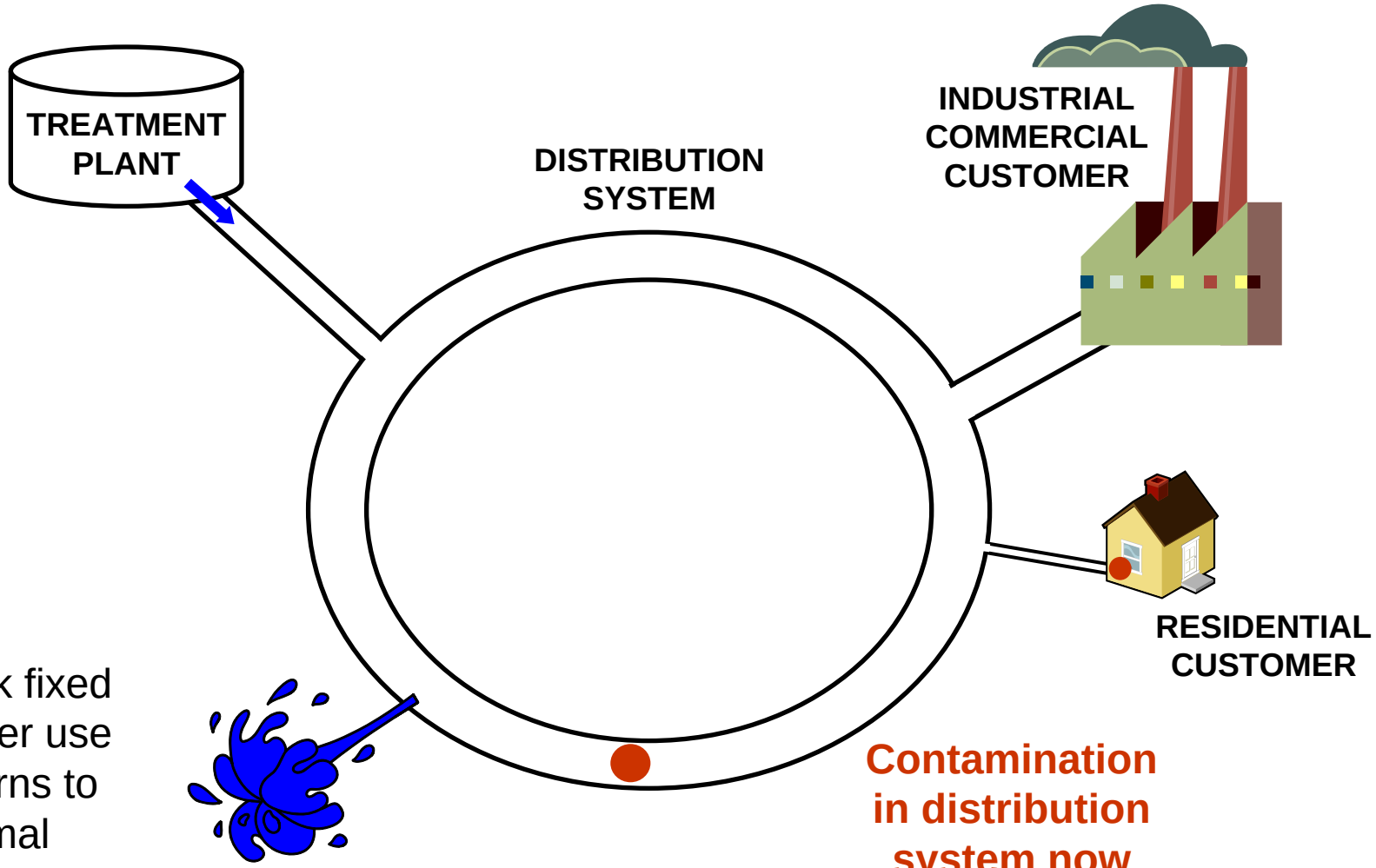
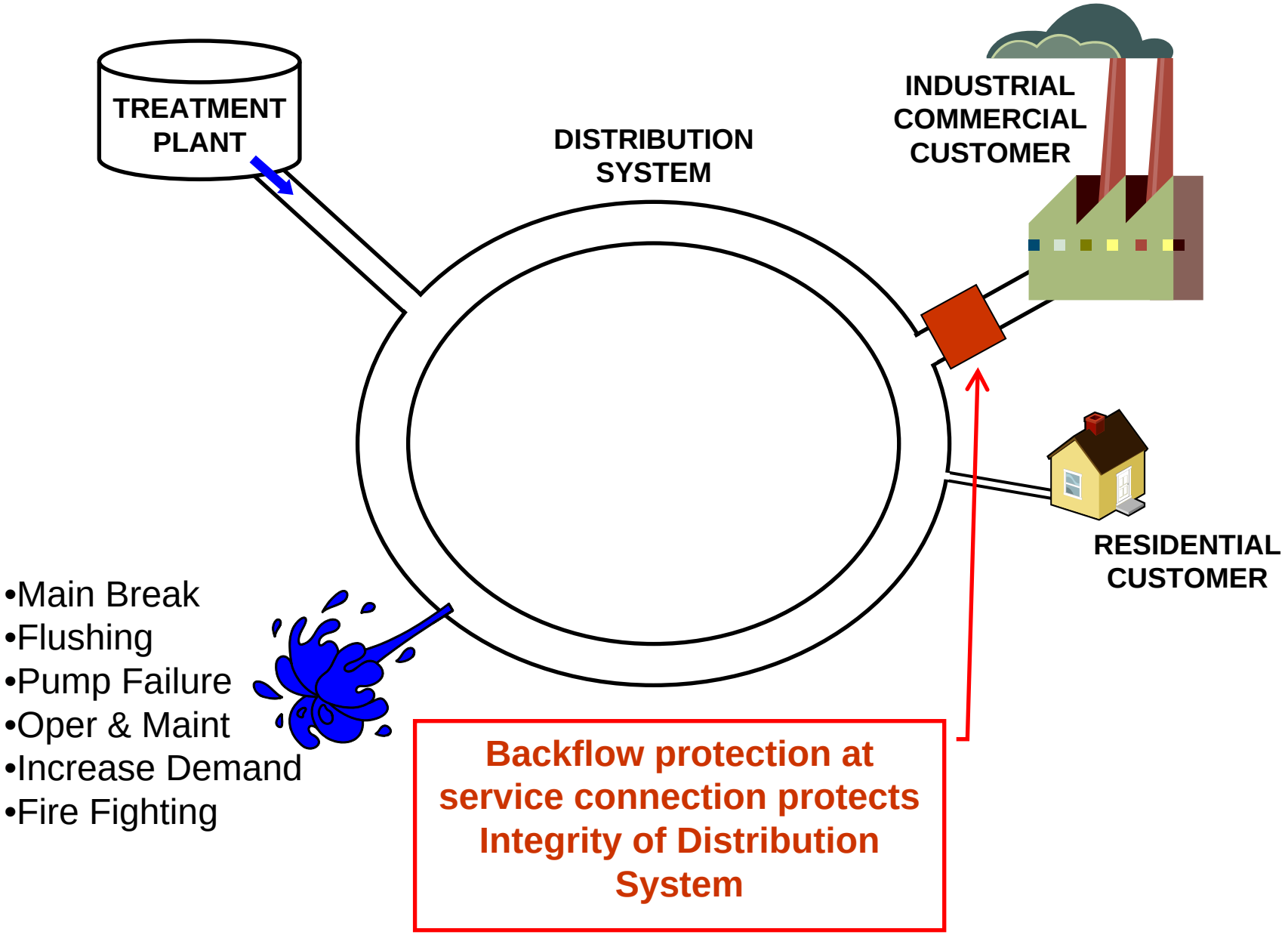
BACKFLOW

- **Transient in nature**
- **May disperse or travel in slug form**
- **May reoccur if problem is not corrected**
- **Degree of Hazard**
  - **Biological**
  - **Chemical**



- Leak fixed
- Water use returns to normal

Contamination in distribution system now distributed to some or all water users


TREATMENT PLANT
DISTRIBUTION SYSTEM
INDUSTRIAL COMMERCIAL CUSTOMER
RESIDENTIAL CUSTOMER
•Main Break
•Flushing
•Pump Failure
•Oper & Maint
•Increase Demand
•Fire Fighting
Backflow protection at service connection protects Integrity of Distribution System

Two Types of Protection

- System Protection (Containment)
  - Backflow protection at service connection
- Internal Protection (Isolation)
  - Backflow protection at point of use

Backflow Incidents (from EPA White Paper)

- 459 backflow incidents between 1970-2001 with at least 12,093 illnesses
  - Chemical contaminants (294 incidents, 1,354 ill)
  - Biological contaminants (58 incidents, 7,065 ill)
  - Other contaminants (107 incidents, 3,674 ill)
- Number of incidents are underreported
  - Monitoring of most contaminants does not occur in the distribution system
- Between 1971 and 1994, at least 57 waterborne disease outbreaks were attributed to cross connection or backsiphonage (Craun, 1999)

Summary of Plumbing Codes

- Model Codes are developed by plumbing industry groups
  - 2 major versions, some older versions by other groups
- Some States adopt a model code with their own modifications as part of their building code
  - 3 have no code
  - 12 have non-model code
- Most cities and counties (or similar jurisdictions) adopt the State code and include modifications
- Some jurisdictions have no code

Enforcement of Plumbing Codes

- Most often done during the building permit process
- Inspectors from designated local department
  - Can include building, public health, plumbing, consumer protection, and other departments
- Generally cover new construction and major facility modifications only
  - Permits usually only issued to licensed contractors or plumbers
  - Minor modifications which can be undertaken by homeowners may establish cross-connections; plumbing inspectors may be unaware
- No enforcement for work done that does not fall within permit process

Summary of State Programs

- 50 States have a requirement for CCC and/or BFP
  - 31 States specify that the system must implement or develop a CCC and/or BFP program
- 42 States require authority to implement a local ordinance or rule for CCC and/or BFP
  - 30 States require the rule or ordinance to allow the system to take enforcement action
- 38 States require inspection of devices and/or testing of assemblies
  - 42 States require training, licensing, or certification of BFP assembly testers
- 37 States have record keeping requirements
- 17 States require public notification following an event
- 10 States require public education

Source: EPA, November 2006 Survey

Summary of State Programs

- ASDWA Survey of 30 States Published in 1999
  - 23 States require CCC programs; 3 do not
  - 2 States require CCC programs only in plumbing code
  - 2 States have only guidelines for CCC programs
- PHCC 1999 Survey of Plumbing CCC and BFP Requirements
  - 10 of 12 States surveyed have State plumbing law related to CCC and BFP
  - Responsibility for administering program varies among States
  - States identified problem areas for CCC and BFP

Elements of City/County Programs

- Case Studies Developed for 18 Programs as Part of 2000 EPA CCC White Paper
- Common elements:
  - Authority or ordinance to implement[E,S]
  - Installation of approved assemblies
  - Public education[E,S]
  - Data management and record keeping[E,S]
  - Testing and repair of backflow preventers[S]
  - Hazard surveys
  - Personnel training[E]
- Most have containment programs and test preventers annually
- Some address residential with reclaimed or auxiliary systems
- Frequency of inspections vary

E – Critical element in expert EPA workshop. S – State identified important part

Implementation of Program Elements

Program Element	Jurisdiction / Authority / Implementation		
	Water System	Local Gov't	State Agency
Authority or ordinance to implement	x	x	x
Approval of devices / assemblies	x (some)		x
Public education	x	x	x
Data management and record keeping	x	x	x
Testing and repair of backflow preventers	x		
Hazard surveys	x		
Personnel training	x	x	x

Summary of Guidance Materials

- Program Implementation and Maintenance:
  - AWWA M14 3rd ed. 2004
  - USC FCCCHR Manual of CCC 9th ed. 1993 (2008)
  - University of FL TREEO Center 2nd ed. 2004
  - PNWS-AWWA CCC Accepted Procedures and Practices 6th ed. 1996
  - EPA Manual 2003 (reflects practices in Northeast US)

- States and training providers

Conclusions

- Most states do have programs
  - Implementation varies
  - Some more comprehensive than others
- Successful programs dependent on interaction among:
  - System program
  - Local codes/ordinances
  - State program
  - State codes/ordinances
- Industry guidance is available
- Evidence of health risk from documented cases
  - Difficult to know the true national occurrence

Appendix

EPA Cross-Connection Control Manual Summary

- Educational, administrative and technical reference in conducting cross-connection control programs
- Theories, methods and devices
- Procedures and administration
- Revised 1989
- http://www.epa.gov/safewater/crossconnection.html