State of Michigan
Department of Environment, Great Lakes, and Energy (EGLE)

Backflow Prevention and Cross Connection Control Program

Michigan Environmental Compliance Conference

Burt Steinman, PE

Outline

- Understanding of Cross Connections, Backflow, Inspections vs Testing and Testable vs. Non-Testable Devices.
- Laws, Rules & Guidance
- SDWA Part 14 Resource Challenges
- Backflow Prevention Tester Credentials & Recent Changes
- EGLE's Effort for Improvements

Why are Cross Connections a Concern?

- Public Health Hazard
- Links through which contaminating materials may enter a potable water supply
- Can cause water quality complaints, illness, sickness and even death

What is a Cross-Connection?

"A connection or arrangement of piping or appurtenances through which a backflow could occur."

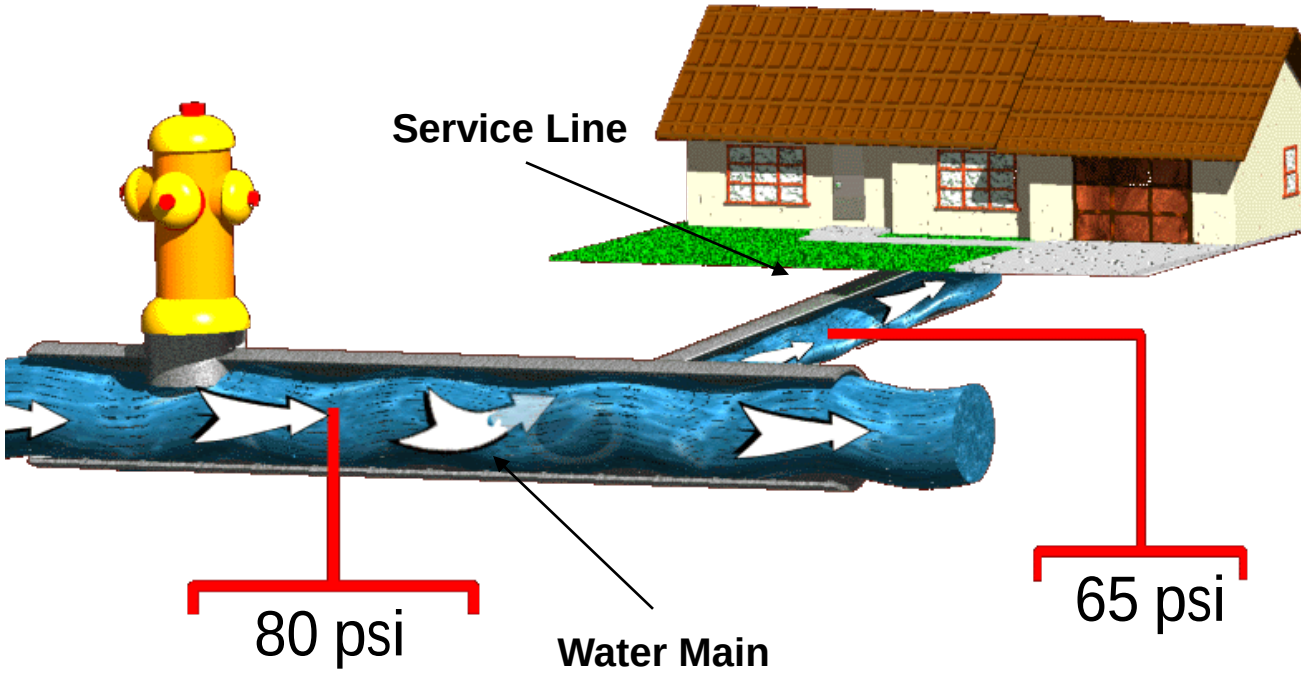
Or

"Any piping arrangement which allows a potable water system to be connected to a non-potable system."

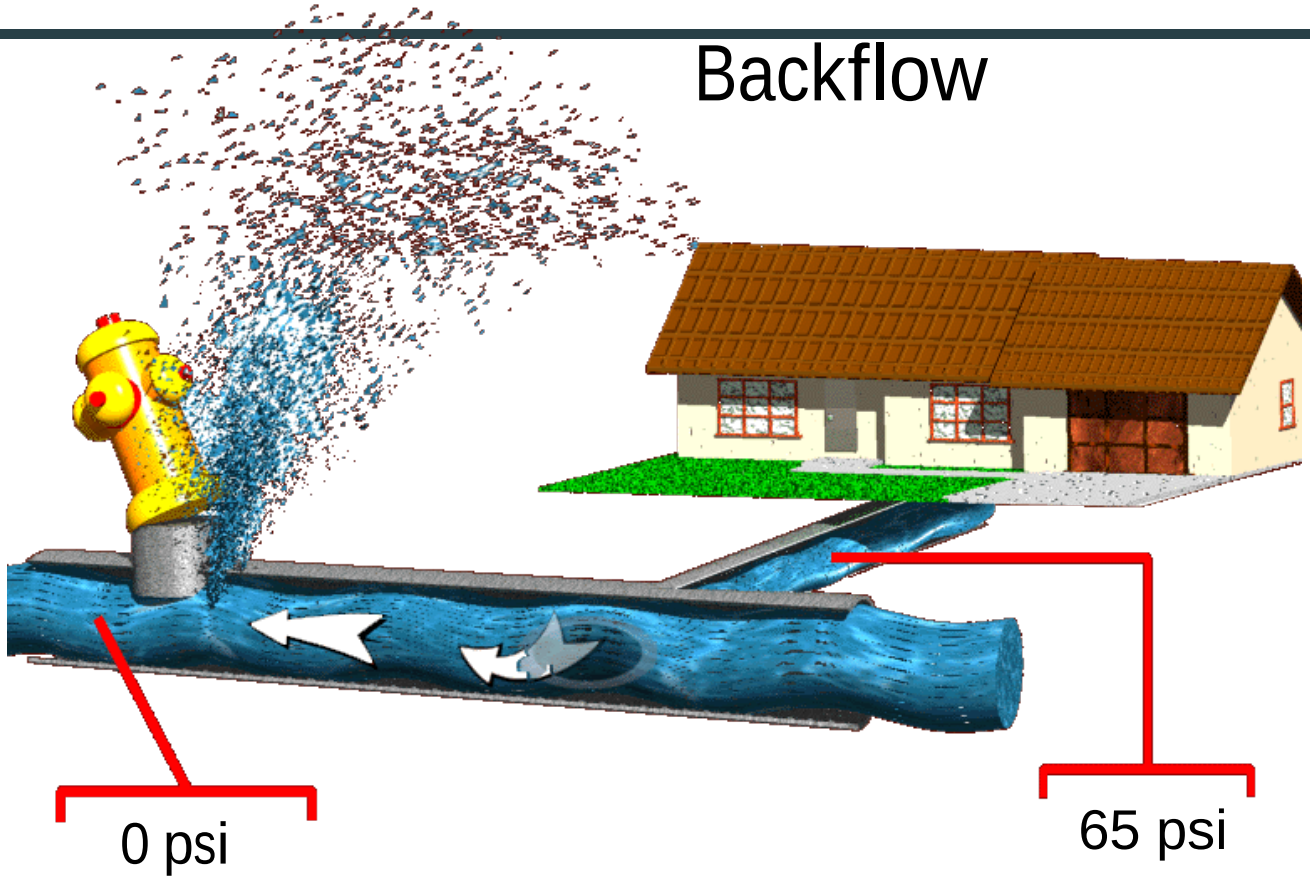
Other Cross Connection Terms

- Backflow
  - Backpressure
  - Backsiphonage
- High Hazard vs. Low Hazard
- Testable vs. Non-Testable
- Inspections vs. Testing

Normal Flow

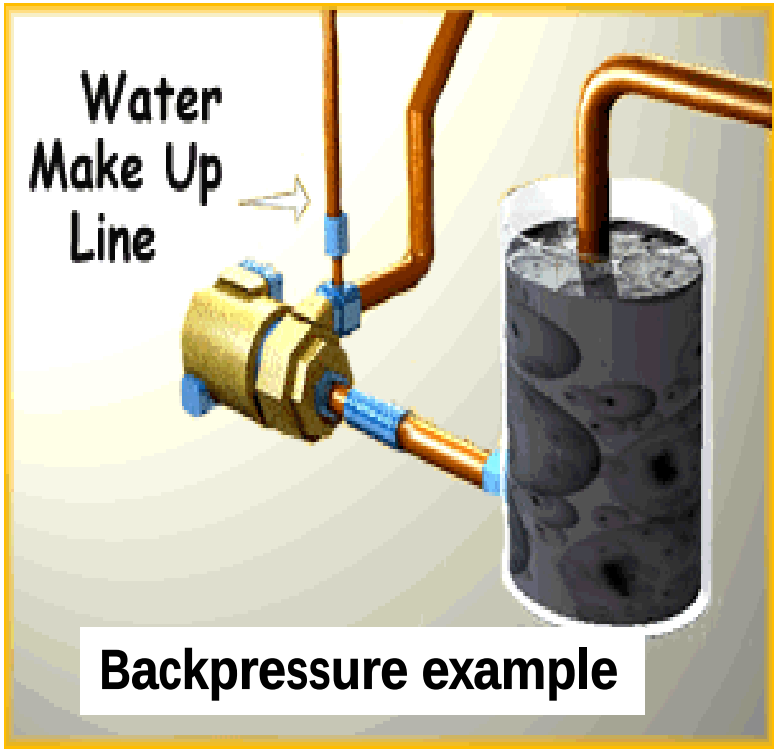


Backflow



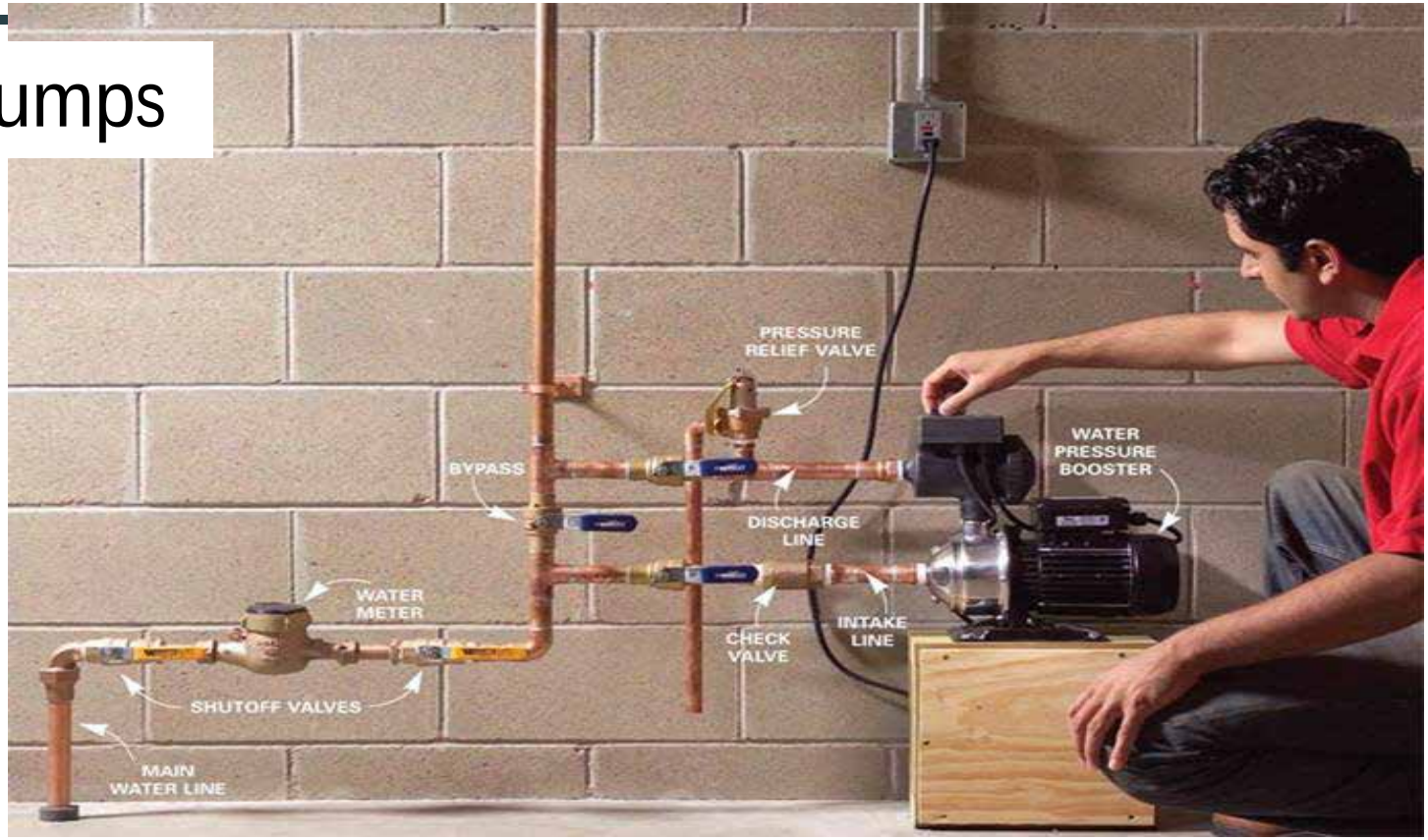
Backpressure

- Is the reversal of normal flow caused by the downstream pressure exceeding the upstream pressure in the potable water lines.
- Common Causes:
  - Pumps
  - Boilers
  - Elevation differences



Backpressure example

Booster Pumps



Backsiphonage

- Is the reversal of normal flow caused by a vacuum or partial vacuum in a water supply system.

- Common Causes:
  - Poor Hydraulic Capacity
  - Water Main Breaks
  - Fire Demands

Backsiphonage by Heavy Demands

Fire Fighting

Water Main Breaks

High Hazard vs. Low Hazard

Health Hazard = High Hazard (Contaminant)

Non-Health Hazard = Low Hazard (Pollutant)

Does your water taste or smell bad?

High Hazard vs. Low Hazard

Typical High Hazard

- WWTPs
- Funeral Homes
- Dentist Offices
- Car Washes
- Plating & Chemical Plants
- Laboratories
- Marinas
- Hospitals
- Restaurants & Taverns
- Chemically Treated Boilers
- Chemically Treated Lawn Irrigation System
- Fire Suppression with Additives
- Sumps

Typical Low Hazards

- Offices
- Fire Suppression Systems (with no additives)
- Residential (with no lawn sprinkling)
- Low Pressure Untreated Boilers

Testable vs. Non-Testable Backflow Preventers

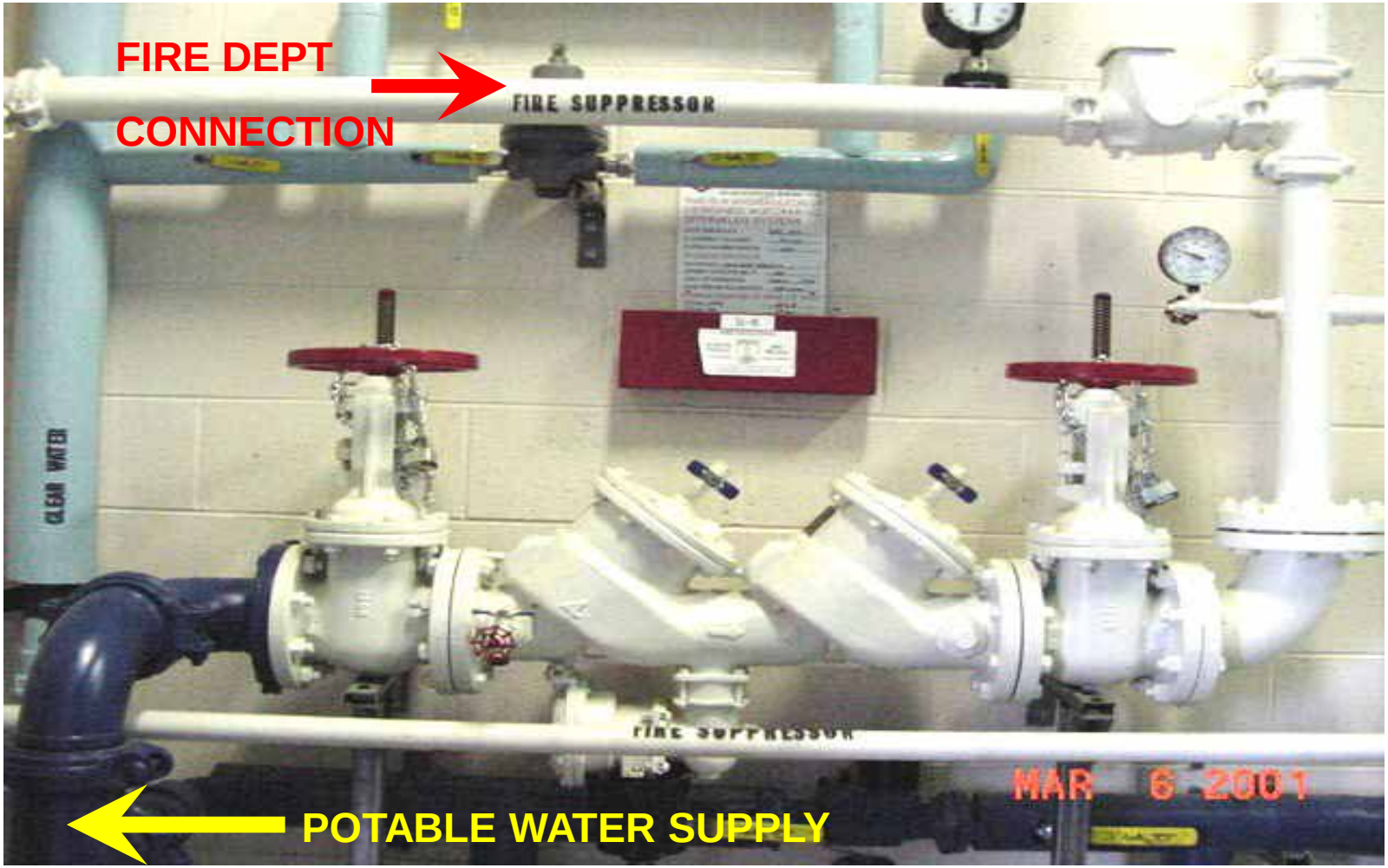
- Testable Assemblies can and must be tested routinely to assure they are working properly. Assemblies will have test cocks and isolation valves for performing the test.
  - RPZ, DCVA, PVB

- Non-Testable Devices are not designed to be tested and are not required to be tested.
  - AVB, HBVB, Vented DCVA

Testable vs. Non-Testable

Testable

Non-Testable


FIRE DEPT
CONNECTION
FIRE SUPPRESSOR
CLEAR WATER
FIRE SUPPRESSOR
MAR 6 2001
POTABLE WATER SUPPLY

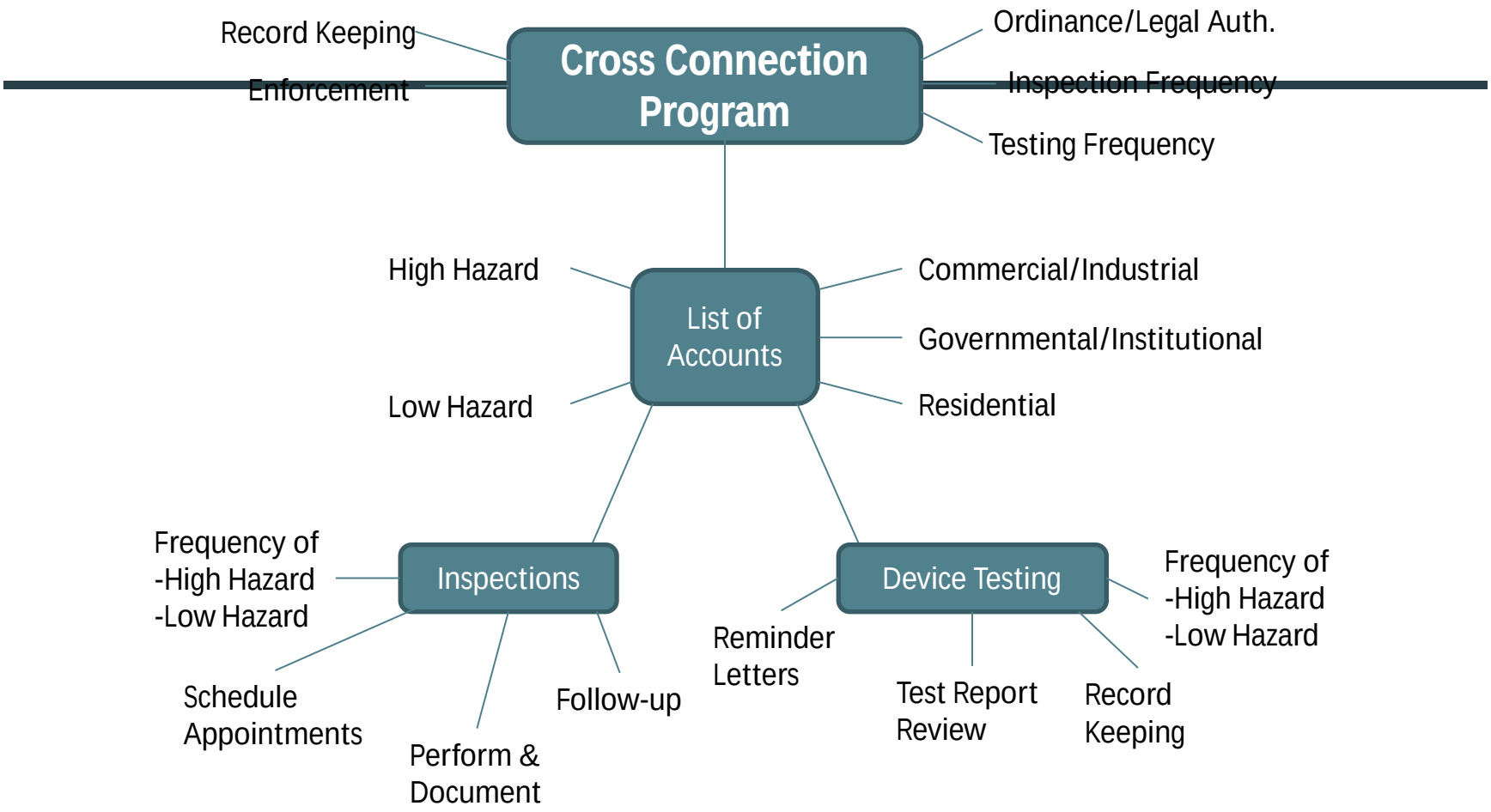
Inspections vs. Testing

Inspections: Usually done by municipal personnel or their contractor to identify potential cross connections.

Testing: Must be done by a master plumber. ASSE 5110 Certified individuals will have a grace period until July 31, 2024.

Laws and Rules & Guidance

- Part 14 of the Safe Drinking Water Act 399 prohibits any unprotected cross connection to Public Water System (PWS).
- Requires PWS's to have a local cross connection control program.
  - Adopt ordinance & implement a program to identify and eliminate cross connections.
- Michigan Plumbing Code
- "DEQ Cross Connection Manual"


Cross Connection Program
Record Keeping
Enforcement
Ordinance/Legal Auth.
Inspection Frequency
Testing Frequency
List of Accounts
High Hazard
Low Hazard
Commercial/Industrial
Governmental/Institutional
Residential
Inspections
Frequency of
-High Hazard
-Low Hazard
Schedule Appointments
Perform & Document
Follow-up
Device Testing
Reminder Letters
Test Report Review
Record Keeping
Frequency of
-High Hazard
-Low Hazard

Part 14 Resource Challenges

- General Shortage in Industry
  - EGLE staff
  - Local program administrators
  - Certified testers
- Inexperienced EGLE Staff
- Competing Priorities
  - Local program administrators (multiple jobs)
  - EGLE staff (permits, emergency response, DWRF, lead & copper, ect.)

Assessments of the Cross Connection Prevention in Michigan

- Prompted by letters from the Michigan Backflow Prevention Assembly to the Governor highlighting concerns with inconsistency of existing regulatory requirements in Act 399 and the MI Plumbing Code.
- Phase 1 - Conducted by the University of Michigan - Graham Sustainability Scholars Program & EGLE.
- Phase 2 – Conducted by Michigan State University – Master of Public Policy Program & EGLE

Phase 1 - Assessment of the Cross Connection Protection Requirements in Michigan

- Develop online surveys for internal and external stakeholders in the backflow prevention & cross connection protection industry.

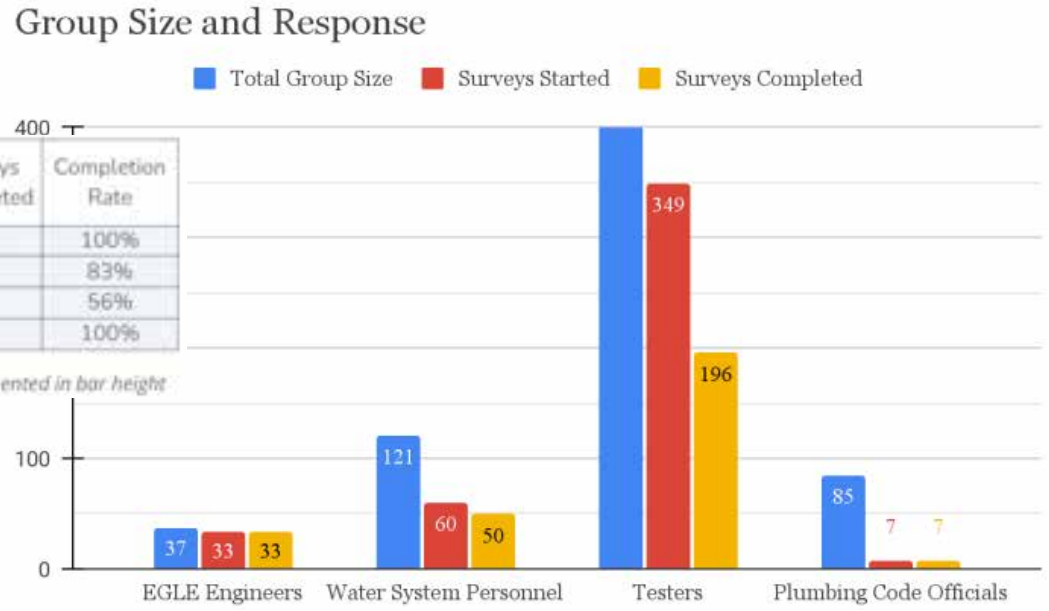
- Assessment formed and engaged 4 stakeholder groups:
  - EGLE District Engineers
  - Water System Personnel
    - CC Inspectors both water system & industry contractors.
  - Certified Backflow Preventer Testers
  - Plumbing Code Officials

Phase 1 – Online Survey's

- Survey consisted of 9-15 questions for each stakeholder group.

Group	Total Group Size*	Surveys Started	Surveys Completed	Completion Rate
A. EGLE Engineers	37	33	33	100%
B. Water System Personnel	121	60	50	83%
C. Testers	1636**	349	196	56%
D. Plumbing Code Officials(PCO)	85	7	7	100%

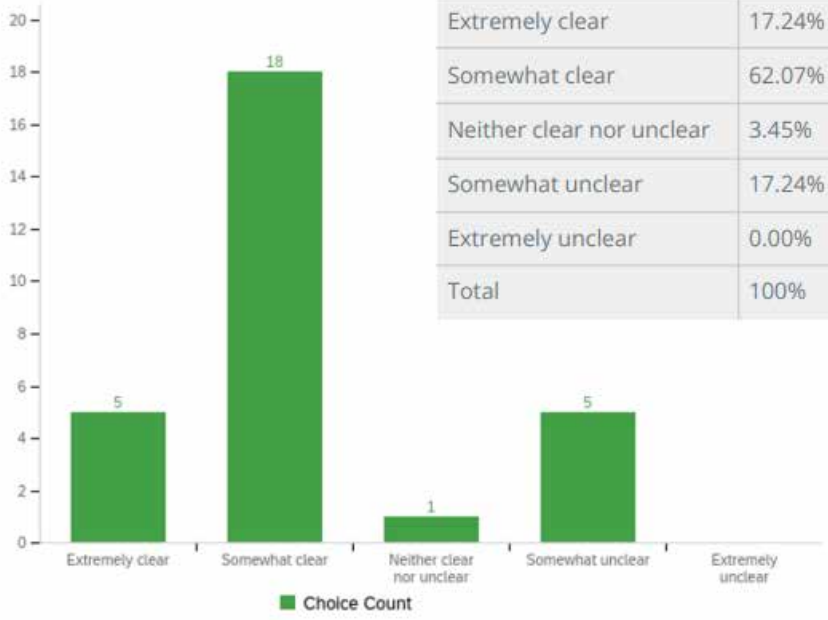
***For ease of interpreting chart below, the testers group size (1636) is not fully represented in bar height*



- Examples of EGLE District Engineer Survey Questions:

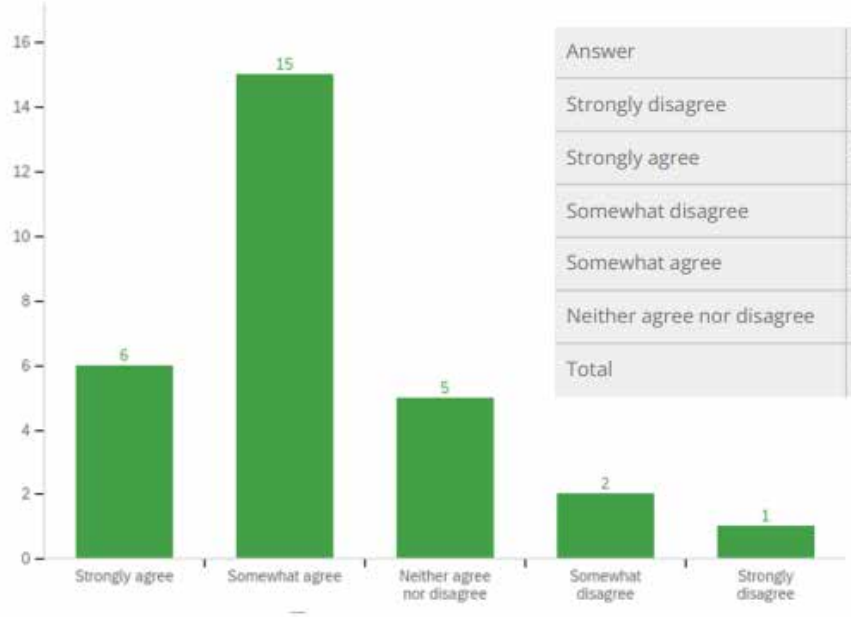
Q1 - Please select the most accurate statement. The set of conditions necessary in rating a water system's cross connection control program (deficient, significantly deficient, etc.) are ___ to me.

Answer	%	Count
Extremely clear	17.24%	5
Somewhat clear	62.07%	18
Neither clear nor unclear	3.45%	1
Somewhat unclear	17.24%	5
Extremely unclear	0.00%	0
Total	100%	29



- Examples of EGLE District Engineer Survey Questions:

Q4 - Considering information in the water supply files and the information gained from the sanitary survey checklists, I feel that I have sufficient information to adequately evaluate the cross connection control program.

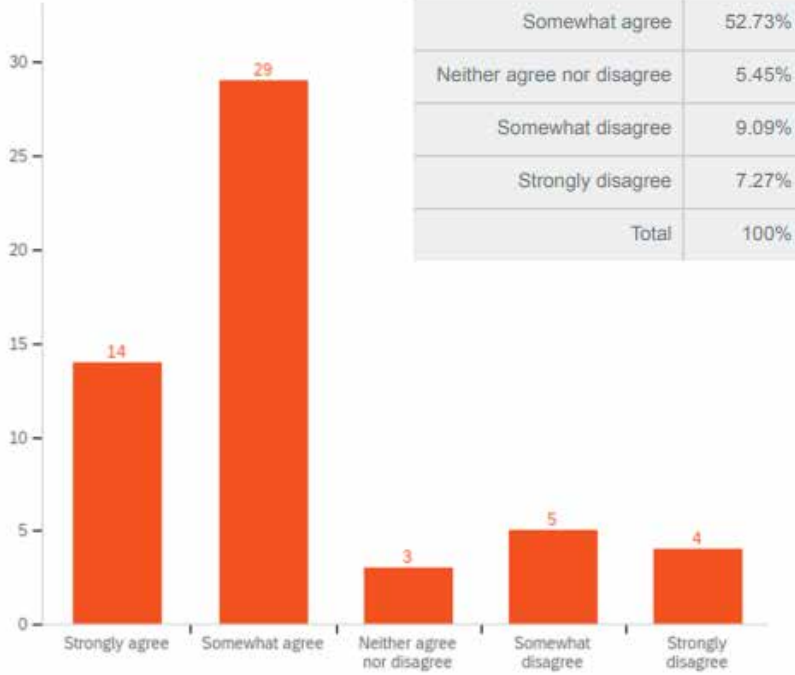


Answer	%	Count
Strongly disagree	3.45%	1
Strongly agree	20.69%	6
Somewhat disagree	6.90%	2
Somewhat agree	51.72%	15
Neither agree nor disagree	17.24%	5
Total	100%	29

- Examples of Water System Personnel Survey Questions.

1 - Please select the most accurate statement. The state rules and guidance make clear what I must do to comply with the state's cross connection rules.

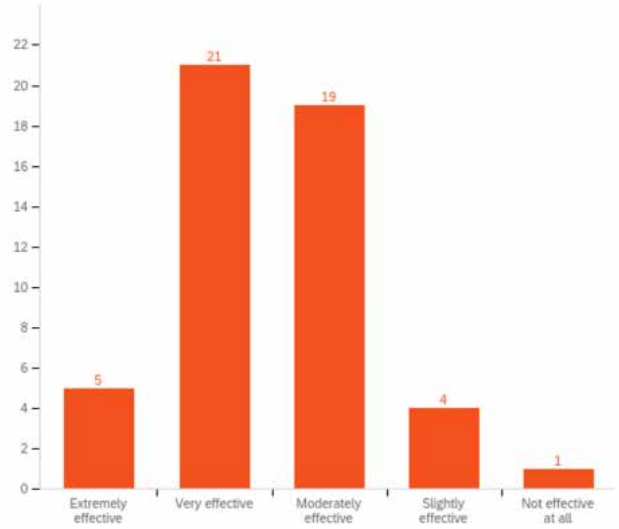
Answer	%	Count
Strongly agree	25.45%	14
Somewhat agree	52.73%	29
Neither agree nor disagree	5.45%	3
Somewhat disagree	9.09%	5
Strongly disagree	7.27%	4
Total	100%	55



- Examples of Water Syster Personnel Survey Questions.

6 - Do you think the current EGLE (Part 14) rules are effective in controlling backflow?

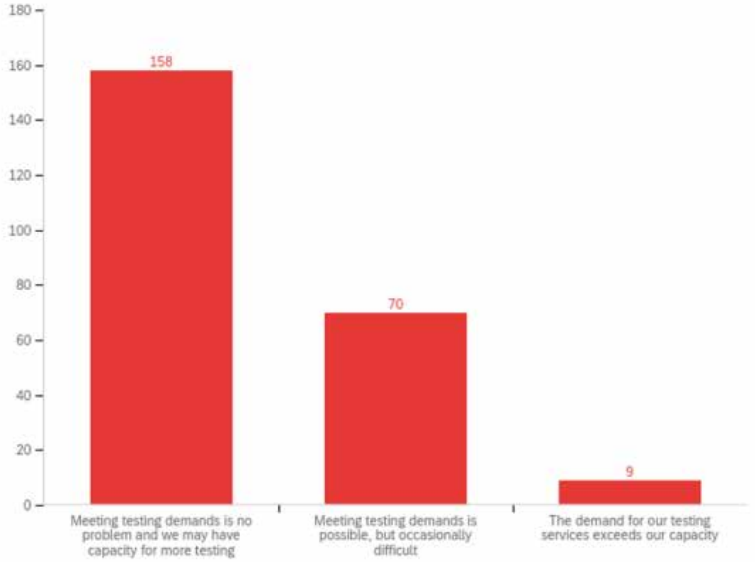
Answer	%	Count
Extremely effective	10.00%	5
Very effective	42.00%	21
Moderately effective	38.00%	19
Slightly effective	8.00%	4
Not effective at all	2.00%	1
Total	100%	50



- Examples of Certified Testers Survey Questions.

1 - Please choose the most accurate statement. How would you rate your or your company's ability to meet the demand for testing customer backflow preventers?

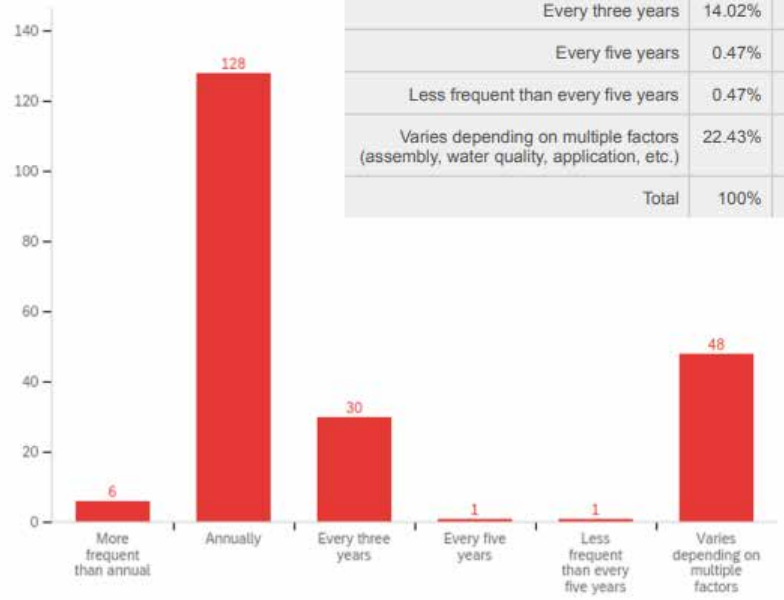
Answer	%	Count
Meeting testing demands is no problem and we may have capacity for more testing	66.67%	158
Meeting testing demands is possible, but occasionally difficult	29.54%	70
The demand for our testing services exceeds our capacity	3.80%	9
Total	100%	237



- Examples of Certified Testers Survey Questions.

3 - Based on the results of your testing, what testing frequency do you feel is necessary to ensure backflow prevention assemblies are in good working order?

Answer	%	Count
More frequent than annual	2.80%	6
Annually	59.81%	128
Every three years	14.02%	30
Every five years	0.47%	1
Less frequent than every five years	0.47%	1
Varies depending on multiple factors (assembly, water quality, application, etc.)	22.43%	48
Total	100%	214



Phase 2
Comparison of Cross Connection Protections Requirements in Michigan and Surrounding States

- Comparing Michigan's cross connection and backflow prevention rules with the rules of other surrounding 8 states.

- Survey of cross connection contractors in MI and surrounding states. Services include:
  - Conducting surveys of plumbing to identify cross connections
  - Notifications
  - Review
  - Tracking of assembly testing
  - Managing records for clients

COMPARISON TABLE BETWEEN STATES

	Michigan	State One	State Two	State Three	State Four	State Five	State Six	State Seven	State Eight
Annual testing frequency	X (Annual recommendation for high hazard)	✓	✓	✓+ (Annual testing and 5-year rebuild)	✓	X (No testing requirements)	✓	✓	✓
Required plumping inspections	✓ (5-10 years, annual for high hazard)	✓+ (Every 3 years)	X	X (Varies by utility)	X	X	X	✓ (10-20 years, 2 years for high hazard)	X
Isolation required	X	X	X	✓- (Containment is likely happening)	X (Containment is the standard)	X	X	✓	X
Residential customer requirements	✓+	✓+	✓+	✓ (Specifics can vary by locality)	X (Residential accounts are exempt)	✓- (When a program is in place)	✓- (When a program is in place)	✓+	✓- (Single-family residential customers are exempt)
Specialized staff w/ training	✓	✓	✓	X	✓ (Regional offices)	X	✓ (Local officials)	X (No dedicated cross connection staff)	✓
Sanitary survey used	✓	✓	✓	✓- (self-enforcement)	✓	✓- (When a program is in place)	X	✓	✓
Utility required to have legal enforcement mechanisms	✓	✓	✓	X	X	✓- (When a program is in place)	✓- (When a program is in place)	✓	✓

Key:

X	Program does not have this feature.
✓-	Program has this feature, but it may be lacking.
✓	Program has this feature.
✓+	This program feature is robust.

	Michigan	State One	State Two	State Three	State Four	State Five	State Six	State Seven	State Eight
Active state enforcement	✓- (Attempts to)	✓	✓	X (Local government)	✓- (Attempts to)	X (No statewide program)	X (No statewide program)	✓	✓
Utility required to report cross connection control activities	✓+ (Annual survey)	✓ (Triannual survey)	X	X	X	X	X	✓+ (Annual summary)	✓+ (Annual report)
Non-compliance actions	✓	✓+ (Fines)	✓+ (Can remove service)	✓- (Can vary by locality)	✓	✓	✓- (Can vary by locality)	✓	✓
All system types are regulated the same	✓	✓	✓- (Different sanitary survey frequencies)	X (Regulations vary between localities)	X	✓- (When a program is in place)	X	X (Only municipal water systems are regulated)	X (Most private systems are not regulated)
Tracks BF incidents	X	X	X	X	X	X	X	X	X
Water systems required to report BF incidents	✓	✓	✓	X	✓	✓+ (Must report within an hour)	X	X	✓ (Notify for loss of pressure events)

Key:

X	Program does not have this feature.
✓-	Program has this feature, but it may be lacking.
✓	Program has this feature.
✓+	This program feature is robust.

Phase 2
Comparison of Cross Connection Protections Requirements in Michigan and Surrounding States

- Conclusions
  - 7 of 8 states require annual testing of backflow prevention assemblies.
  - All surveyed contractors spoke to Michigan's lenient testing frequency requirements.
    - High Hazard can go up to 3 years between tests.
    - Residential irrigation can go up to 5 years between tests.
  - Only Michigan and two other states require plumbing inspections.
  - Michigan has a substantial and robust cross connection program.

Testing Credentials 2023 Changes Background

- Before 2014: Licensed plumbers could take an “approved” testers course to get on DEQ’s testers list.
  - Courses were inconsistent
  - Non-licensed individuals could perform “restricted testing”
  - No renewal or continuing education
- 2014 to 2018: Transition period
- After January 2018: Individuals had to get ASSE-5110 certified.
  - Adopts a national testing course (40 hours) and exam standard
  - 5 years in “related fields” prerequisite
  - Requires continuing education and renewal

Tester Requirement Change

- A question was brought before the State Plumbing Board
- The BCC sought an informal interpretation from the AG's office
- The conclusion changes the tester requirements set forth in 2014
- BCC-EGLE Joint Interpretive Statements - Final (govdelivery.com)
- Frequently Asked Question (REVISED) about the July 2023 Testing Credential Update (EGLE Cross Connection Webpage)

Summary of Impact

- Must be a licensed plumber **and** have ASSE 5110 certification
- Non-licensed plumbers will no longer be allowed to test
  - Lawn irrigation companies
  - Fire suppression companies
  - Large industrial facility personnel
  - Municipal operators and technicians (W/WW treatment plants)
- Will impact tester availability and costs along with MI testing school enrollment.

EGLE's Efforts for Improvements

- Sanitary Survey Process Overhaul and Checklists
  - Purpose is to improve consistency and effectiveness by improving procedures throughout Community Water Supply Systems.

- Staff Training
  - New EGLE staff are encouraged to shadow an inspector to gain understanding of local cross connection control programs.
  - EGLE is always looking for new local opportunities?

Part 14 Rule Changes

- Governor's Executive Directive 2021 – 9 tasked EGLE with "line by line" review of all the Safe Water Drinking Act.
- EGLE proposed rule changes based on the Phase 1 and 2 survey results.
  - Annual testing requirement was to be proposed.
- Required to go through formal stakeholder and legislative process.

History of Legislative Interest in Testing Frequencies

- 2014 HB 5317: No more frequent than every five (5) years.
  - **Vetoed by Synder**
- 2015 HB 5112: Prohibited local program from requiring any testing after installation!
  - **Not passed by the House**
- 2018 HB 5854 and 5755: No more frequent than every four (4) years.
  - **Not passed by the House**
- 2018 HB 5780: Limited some high hazard tests to no more frequent than every three years.
  - **Draft Bill not introduced**

Conclusion

- EGLE continues to train new staff and evaluate local cross connection programs during sanitary surveys as well as update rules and guidance to meet current needs.
- Local PWS's should continue to implement their EGLE-approved program to the best of their abilities.
- Local decision makers in control of PWS's should be familiar with their ordinances and support enforcement efforts when necessary.
- Local business connected to PWS should understand the risk their water use may pose to public health and their obligation to have necessary protections in place.
- Certified testers should be familiar with testing, reporting, and credential requirements.

[Cross Connection Control (michigan.gov)]