

## Introduction and Considerations

From the American Water Works Association (AWWA):

The United States is home to one of the safest drinking water systems in the world. Nonetheless, the Centers for Disease Control and Prevention reports as many as 32 million gastrointestinal illness cases every year due to contaminated public drinking water.<sup>1</sup>

These cases often result when water systems are not adequately equipped to prevent instances of backflow. Backflow is a hydraulic phenomenon in which contaminated water can reverse flow into piping that contains potable drinking water. Backflow preventers are mechanical valve assemblies that prevent reverse flow in a water system and ensure public drinking water safety in city water mains, commercial buildings, and at the point of use. Despite the inherent risks, more than 60% of public water systems are designed without proper backflow preventers.<sup>2</sup>

Purveyors are keen to follow the strict Statement of Policy on Public Water established by the American Water Works Association (AWWA), which reads: "The return of any water to the public water system after the water has been used for any purpose on the customer's premises or within the customer's piping system is unacceptable and opposed by the AWWA." To that end, **all commercial and industrial buildings must have backflow prevention on the supply side of the system to protect public drinking water from contamination.** However, standards vary between state and local water jurisdictions regarding where and how backflow preventer assemblies are installed. If guidelines do exist, they are often outdated or are not reflective of current best practices. Without the availability of quick and accurate standard details, engineers defer to whatever was done in prior projects, unattuned to the potentially devastating consequences of installing backflow preventers inside a mechanical room or underground in a utility vault. From millions of dollars of destruction to injury and death, Murphy's Law prevails. What can happen does happen, and all-too-often, the costs are incalculable.

### The Dire Need For Cross-Connection Control Programs

While there is no easy fix for this problem, the AWWA believes that the collaborative efforts of municipalities, health officials, and building owners to develop and administer clear, comprehensive, up-to-date specifications would vastly improve the cost, safety, and liability of designing and installing backflow preventer assemblies. "

AWWA encourages the partnering of utilities, property owners and other stakeholders to jointly develop measures to maintain water quality within premise plumbing systems. Operations should include at a minimum a cross-connection program, routine monitoring, and response training to prevent, detect, control, and resolve water quality issues."<sup>3</sup>

### Best practices in backflow prevention & protection

What causes backflow to happen in the first place?

The backflow of water occurs when a hydraulic event creates more or less pressure inside a water distribution system's piping. Hydraulic events can trigger two types of backflow:

1. Back Pressure Back pressure occurs when the downstream (private side) water pressure becomes higher than the water pressure being delivered to a property through the public distribution lines.

Events that can trigger back pressure include:

- Pump systems with head pressures not set properly
- Draining down a building to make plumbing repairs

2. Back Siphonage Back siphonage occurs when negative pressure is created in the public distribution lines. The consequential vacuum effect draws water to wherever the negative pressure was created.

Events that can trigger back-siphonage include:

- Broken water main or distribution pipe
- Sudden use of mass quantities of water (e.g., firefighter hose)

Now more than ever, jurisdictions acknowledge that without proper prevention for both types of backflow, they cannot effectively comply with the Clean Water Act (CWA), The Cross-Connection Control Manual (CCCM), or the AWWA. In lieu of this, water utilities nationwide have increasingly mobilized efforts to approve and standardize requirements in accordance with the American Society of Sanitary Engineers (ASSE) and the Foundation of Cross-Connection Control and Hydraulic Research (FCCCHR) at the University of Southern California (USC) for backflow isolation on the private side, in addition to backflow containment on the public side.

#### Legal Basis

Thank you for the challenging and lively discussion concerning cross-connection control and backflow prevention. As I stated, I am not an attorney, but we have reviewed the statutes in this area and offer the following for your counsel's review and comment. Pursuant to the many question you raised, please allow me to offer the following in response:

#### **1. Where is the law on cross-connection control and backflow prevention?**

As I stated, there simply is no "one-stop shop" to find the applicable statues and regulations in this area. They are found within various places and within various statutes and regulations.

Oversight of cross-connection control is shared by multiple agencies and jurisdictions, including the Department of Environmental Protection (DEP), the Department of Labor and Industry, local municipalities, and the Public Utility Commission (PUC). The Department of Labor and Industry and local municipalities regulate cross connections through the Uniform Construction Code, which includes the International Plumbing Code. The PUC plays a role because additional details about cross-connection control are often specified in the water system's Tariff.

1. DEP's cross-connection control requirements are found in regulations at Title 25, Pa Code Chapter 109 (Safe Drinking Water) as follows:

*109. 608. Cross-connections. A public water system may not be designed or constructed in a manner which creates a cross-connection.*

*109.709. Cross-connection control program. (a) No person may introduce contaminants into a public water supply through a service connection of a public water system.*

*(1) It shall be the responsibility of the customer to eliminate cross-connections or provide backflow devices to prevent contamination of the distribution system from both Back-siphonage and backpressure. Individual backflow preventors shall be acceptable to the public water supplier.*

*(2) If the customer fails to comply with paragraph (1) within a reasonable period of time, the water supplier shall discontinue service after reasonable notice has been made to the customer.*

*(b) At the direction of the Department, the public water supplier shall develop and implement a comprehensive control program for the elimination of existing cross-connections or the effective containment of sources of contaminations, and prevention of future cross-connections. A description of the program, including the following information, shall be submitted to the Department for approval: (1) A description of the methods and procedures to be used. (2) An implementation schedule for the program. (3) Legal authority for implementation of the program, such as, by ordinance or rules. (4) A time schedule for inspection of nonresidential customers' premises for cross-connections with appropriate recordkeeping. (5) A public education program for residential customers. (6) A description of the methods and devices which will be used to protect the water system. (7) A program for the review of plans for new users to assure that no new cross-connections are developed. (8) Provisions for discontinuance of water service, after reasonable notice, to premises where cross-connections exist.*

2. The 1995 PA DEP published Section VII of the DEP Manual establishes the following. (I took this from the Monroeville Municipal Authority website, so you can see how another system interprets the DEP Regulation).

*"The Department of Environmental Protection (DEP) is authorized under the Pennsylvania Safe Drinking Water Act to establish standards for the construction of a water supply to assure compliance with the provisions of the act. Accordingly, Section 109.608 of DEP's rules and regulations, requires that "a public water system may not be designed or constructed in a manner which creates a cross-connection." In addition, Section 109.709(b) further requires that "At the direction of DEP, the public water supplier shall develop and implement a comprehensive control program for the elimination of existing cross-connections or the effective containment of sources of contaminations, and prevention of future cross-connections." <sup>1</sup>*

Furthermore, Section VII states:

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<sup>1</sup> Public Water Supply System - A system which provides water to the public for human consumption which has at least 15 service connections or regularly serves an average of at least 25 individuals daily at least 60 days out of the year. The term includes any collection, treatment, storage, and distribution facilities under control of the operator of the system and used in connection with the system. The term includes collection or pretreatment storage facilities not under such control which are used in connection with the system. The term also includes a system which provides water for human consumption via bottling, vending machines, retail sale, or bulk hauling methods.

*“The public water supplier and the consumer have the joint responsibility for protection of the public water supply from contamination or pollution due to backflow.”<sup>2</sup>*

3. The International Plumbing Code (IPC) (which PA adopted) states:

**Section 312 Tests and Inspections 312.9 Inspection and testing of backflow prevention assemblies.**

*Inspection and testing shall comply with Sections 312.9.1 and 312.9.2.*

*312.9.1 Inspections. Annual inspections shall be made of all backflow prevention assemblies and air gaps to determine whether they are operable.*

*312.9.2 Testing. Reduced pressure principle backflow preventer assemblies, double check-valve assemblies, double detector check valve assemblies and pressure vacuum breaker assemblies shall be tested at the time of installation, immediately after repairs or relocation and at least annually. The testing procedure shall be performed in accordance with one of the following standards: ASSE 5010-1013-1, Sections I and 2 ASSE 5010-1015-1, Sections I and 2 ASSE 5010-1015-2 ASSE 5010-1015-3, Sections I and 2 ASSE 5010-1015-4, Sections I and 2 ASSE 5010-1020-1, Sections I and 2 ASSE 5010-1047-1, Sections 1, 2, 3 and 4 ASSE 5010-1048- 1, Sections 1, 2, 3 and 4 ASSE 5010-1048-2 ASSE 5010-1048-3, Sections 1, 2, 3 and 4 ASSE 5010-1048-4, Sections 1, 2, 3 and 4 CAN/CSA B64. 10*

Furthermore, the IPC contains the following provisions:

**SECTION 608 PROTECTION OF POTABLE WATER SUPPLY**

*608.1 General. A potable water supply system shall be designed, installed and maintained in such a manner so as to prevent contamination from non-potable liquids, solids or gases being introduced into the potable water supply through cross-connections or any other piping connections to the system. Backflow preventers shall conform to the applicable Standard referenced in Table 608.1. Backflow preventer applications shall conform to Table 608.1, except as specifically stated in Sections 608.2 through 608.16.27 and Sections 608.18 through 608.18.2.*

...

*608.4 Water service piping/Containment to protect potable water supplies. Water service piping shall be protected in accordance with Sections 603.2. Containment to protect potable water supplies shall be achieved in accordance with 608.18 through 608.18.2.*

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<sup>2</sup> 383-3100-111 / June 18, 2001 / Page VII-21

*608.6 Cross-connection control. Cross connections shall be prohibited, except where approved backflow prevention devices, assemblies, or methods are installed to protect the potable water supply. A dual check valve type backflow preventer (i.e., device meeting ASSE 1024 or CSA B64.6 with two spring loaded, independently operating check valves without tightly closing shut-off valves or test cocks which is commonly installed immediately downstream of water meters by water suppliers) is not an approved backflow prevention device when a known cross connection exists downstream of the device. These devices are only allowed to be installed when no cross connections exist downstream of the device or when all downstream cross connections are properly protected by approved backflow prevention devices, assemblies, or methods.*

...

*608.16 Connections to the potable water system. Connections to the potable water system shall conform to Sections 608.16.1 through 608.16.27. These Sections (608.16.1-608.16.27) are not inclusive of all potential contamination sources which may need fixture isolation protection. For potential contamination sources not listed in Sections 608.16.1 through 608.16.27, backflow prevention methods or devices shall be utilized in accordance with Table B1 of CAN/CSA B64.10-1994. When a potential contamination source and its associated backflow prevention method or device is not identified in this code or Table B1 of CAN/CSA B64.10-1994, backflow prevention methods or devices shall be utilized as directed by the building official.*

## **2. Does DEP enforce this program? Give me an example.**

It is hard to give you a direct example, since the public does not have access to required remedial measures from DEP reviews. The following is a quote from a letter from DEP Secretary to State Representative Zimmerman – taking the Secretary at his word – I gleam that this has been done.

*DEP has the authority to require a water system to develop and implement a cross-connection control program and has done so in the past. Typically, DEP has not had to exert this authority because many water systems implement cross-connection control measures voluntarily without being directed to do so by DEP. DEP evaluates cross-connection control methods on an ongoing basis during on-site assessments and inspections. If control measures are found to be deficient, or if a cross-connection has been linked to a contamination incident, DEP can and will issue violations, as needed, and direct the water system to take corrective actions to address the deficiencies and return to compliance. (emphasis added)*

## **3. Must we have an active program in place?**

As we discussed while PA Rural Water and we believe that the law is clear; your Board controls your system. If they decide to disregard this requirement, at the system's and their risk, that is within their proper purview. Editorially, it might not be wise, but your Board sets your policy.

PRWA's and our position is that the only logical answer is that the law requires CCC and BFP programs be in place in all systems. But I cannot speak for your Board. We base this position on the following 1) DEP regulations state that you must design your system to eliminate cross connections; 2) the safe drinking water act states that if cross connections are not eliminated the customer must provide a backflow preventer on their service line; 3) the law further states that is the customer does not respond

after reasonable notice you shall (shall = must in statutory construction) discontinue service (i.e. shut them off); 4) the recently adopted plumbing code establishes that such backflow devices must be tested yearly.

It is illogical in our interpretation that the General Assembly would set up such a statutory scheme and DEP would follow with such a regulatory scheme if they did not want active programs in place. Most importantly such reasoning is in line with best risk management practices and adheres to the overall mandate that you design your system to eliminate cross-connections.

Moreover, from a pure policy perspective the Board has a duty to provide its customers with clean, safe water; backflow prevention is but one method to eliminate the risk of pollution or contamination to the water supply. In our opinion, this is a best practice since a simple google search establishes that backflow is real and dangerous.

#### **4. How does PA define “commercial” and “residential”?**

Pursuant to 2018 changes, 34 Pa Code Section 401.1 (definitions) (attached) includes the following definitions:

*Commercial is defined as “a building, structure or facility that is not a residential building”*

*Residential Building is defined as “Detached one-family and two-family dwellings and townhouses which are not more than three stories above grade plane in height with a separate means of egress and their accessory structures.”*

So, given these definitions (after amendment to this section in 2004, 2006, 2009, 2012, 2018) – any dwelling of three or more families regardless of size is now a commercial building.

#### **5. The charges in Flint, MI were based upon the presence of legionella within the system.**

I offer the following:

a) *5 Charged With Involuntary Manslaughter in Flint Water Crisis, New York Times; June 14, 2017;*  
<https://www.nytimes.com/2017/06/14/us/flint-water-crisis-manslaughter.html>

b) Michigan officials charged in Flint Legionnaires' outbreak

By [Sara Ganim](#), CNN Updated 4:55 PM ET, Wed June 14, 2017

(CNN) Several Michigan state officials, including some who reported to Gov. Rick Snyder, have been charged with involuntary manslaughter in connection with a Legionnaires' outbreak that killed 12 people during the Flint water crisis, the Michigan attorney general's office said Wednesday.

Charges were announced for five state and city officials, including Nick Lyon, the current director of the Michigan Department of Health and Human Services. Former Flint emergency manager Darnell Earley, who had previously been charged, also now faces involuntary manslaughter, along with three other lower-ranking officials, according to the attorney general's office.

Another high-ranking state health department official, Dr. Eden Wells, was charged Wednesday with obstruction of justice and lying to an officer.

At a news conference, Attorney General Bill Schuette told reporters the announcement is about restoring accountability and trust.

"That arrogance that people would want to sweep this away and that there are nameless, faceless bureaucrats who caused this and no one responsible is outrageous," he said adding that this is proof the system is working.

The Michigan Department of Health and Human Services had no comment when asked about the employment status of Lyon and Wells, who are both still listed on the department website under executive bios.

Snyder threw his support behind Lyon and Wells, saying they will keep their jobs and have "my full faith and confidence." He criticized Schuette's investigation thus far, saying "some state employees were charged over a year ago and have been suspended from work since that time. They still have not had their day in court. That is not justice for Flint, nor for those who have been charged."

Fifteen people have been charged as a result of Schuette's ongoing investigation into the Flint water crisis. Schuette said his investigation will continue as they keep combing through evidence. So far, more than 250 people have been interviewed and hundreds of thousands of emails reviewed. It's the largest investigation in Michigan history.

Speaking directly to Flint residents who have been calling for Snyder to be among those charged, Schuette said the evidence so far has not supported his arrest. He added that "we attempted to interview the governor, we were not successful."

"Today's announcement that additional state officials will face criminal charges is an indictment of the state's failed policies that led to this crisis," Congressman Dan Kildee, a Democrat of Flint Township, said in a statement.

Some of the charges deal with lead poisoning, and the reason the city changed its water supply, while others deal with the spread of Legionnaires' connected to the crisis. There are also charges that range from willful neglect of duty, misconduct and conspiracy.

Wednesday marked the first time charges of involuntary manslaughter were brought.

Kildee noted that the crisis is not over yet. "The state and the Governor created this crisis and they must do more to help Flint's recovery."

'A beginning, maybe, for some justice'

Wednesday's charges revolve around two waves of a deadly Legionnaires' disease outbreak in Flint. County health officials [told CNN last year](#) the outbreak could have been stopped, but they were stymied by state officials.

In the end, 12 people died and more than 80 were sickened.

Troy Kidd, whose mom Debra died in August 2015, said the news of the charges was a "sorrow happiness."

"It's a whole 'nother chapter to what's getting to be a long novel," Kidd said.

His mom contracted Legionnaires' at Flint's McLaren hospital while being treated for a migraine. Legionnaires' is a respiratory bacterial infection usually spread through mist that comes from a water source; it isn't spread person-to-person. Symptoms include fever, chills and a cough.

To the defendants, he said, "you're responsible for the well-being of other people, you can't just negate that duty and stand by idly and watch to see if something bad happens."

Another Flint resident, Keri Webber, said her daughter, Stephanie, got Legionnaires' in August of 2015 at the age of 20 and survived it.

"This is not a win for the people, however it is a beginning, maybe, for some justice," Webber said. "Hearing them talk this morning that the first time (state officials) knew was in 2014 -- Steph never needed to have Legionnaires', if they had just said something. Now she has breathing problems and permanently will."

Webber also said that Snyder's statement in support of Lyon and Wells was "horrifying."

"How does anyone in Michigan trust him?" she said of Snyder. "They didn't just miss a little bit of information. We have a lot of people gone. A lot of people permanently ill. If I did this at a work position, I would not still be in my job. I can't see asking the residents of Genesee County to continue to believe them as we go through this process."

Attorneys for Wells and Lyon did not respond to a request for comment.

Questioning the source of the outbreak

Lyon has insisted publicly that it's McLaren hospital that is the culprit for the outbreak, not the state or the water supply.

Schuette and prosecutors shot down that argument at the press conference, stating that the source of the Legionnaires' outbreak was the water, not the hospital, and said experts would testify to that. Prosecutors say that more than 50% of the cases came from outside the hospital.

Charging documents also allege that professors at Wayne State University were asked by Snyder's office to do research into the Legionnaires' outbreak and a possible link to

<https://www.cnn.com/2017/06/14/health/flint-water-crisis-legionnaires-manslaughter-charges/index.html>

c) Was Flint's deadly Legionnaires' epidemic caused by low chlorine levels in the water supply?

By [David Shultz](#); February. 5, 2018, 3:00 PM

<https://www.sciencemag.org/news/2018/02/was-flint-s-deadly-legionnaires-epidemic-caused-low-chlorine-levels-water-supply>

d) Legionella bacteria discovered in water at Flint hospital – report

Published time: 23 Jan, 2016 05:58 Edited time: 29 Feb, 2016 00:09

<https://www.rt.com/usa/329884-legionnaires-bacteria-flint-hospital/>

e) Legionnaires' Disease Bacteria Found in Flint Residents' Water

The data cannot confirm whether an outbreak of cases in recent years in Michigan was caused by contaminated drinking water. *June 7, 2017*

## 6. What about residential?

As we discussed, the law makes no distinction between residential and commercial customers. ("No customer may introduce a pollutant ...") That being said, all of the systems we are now working



with are seeking to focus their programs on industrial, commercial and business related customers seeking to make sure that these potential higher hazards are in compliance before they focus upon residential customers. The law in this area is found within the IRC (International Residential Code).

The International Residential Code, adopted in Pennsylvania in 2015, includes the following:

***P2503.8 Inspection and testing of backflow prevention devices.***

*Inspection and testing of backflow prevention devices shall comply with Section P2503.8.1 and P2503.8.2.*

***P2503.8.1 Inspections.***

*Inspections shall be made of backflow prevention assemblies to determine whether they are operable.*

***P2504.8.2 Testing.***

*Reduced pressure principle, double check detector and pressure vacuum breaker backflow preventer assemblies shall be tested at the time of installation, immediately after repairs and every year thereafter.*

Accordingly, we are working with the systems under our administration to bring commercial, industrial and business customers into compliance, before the system instructs us to begin the residential program. At some point, they will instruct us to implement a residential program for their system.