Water Purveyor's Roles and Responsibilities for Cross-Connection Control

Jishnu Basu

3800 Pebblecreek Ct. Apt. 826, Plano, TX 75023

(612) – 242 – 4317

Jishnubasu21@gmail.com

Plano Senior High School- 11th Grade

2200 Independence Parkway, Plano, TX 75075

(469) - 752 - 9300

Plano, Texas

Public concerns around cross-connections and backflow incidents are a vital topic facing water purveyors across the United States. Unfortunately, it seems that the municipalities across the country have been turning a blind eye to the issue of cross-connection control as a survey of 724 systems across the country conducted by the American Water Works Association found only 50% of them had a designated cross-connection control staff member due to a lack of funds and trained personnel ("Backflow Prevention Programs Hampered"). Going forward it is imperative that water purveyors understand their role and responsibilities when it comes to reducing water contamination throughout the country in order to maintain water safety.

Contamination of the water system through backflow occurs when water flows from the site of water usage back into the water utilities systems. This poses a variety of contamination risks including the introduction of chemical contaminants i.e. pesticides/metals[1] and biological contaminants i.e. bacteria (EPA 9-13). The majority of backflow cases revolve around cross-connections which connect sources of non-potable water to the water utilities. Specifically, for water contamination to occur via a cross-connection three conditions must be met: 1) a cross-connection must exist, 2) the pressure in the distribution system must be negative compared to the usage system, & 3) there is no cross-connection control to prevent backflow from occurring. It is important to note that for the second condition to be met there are two ways: 1) backpressure which is where an incident causes the pressure of the usage system to increase to a level greater than the distribution system (most often seen in chemical feed pumps) and 2) back-siphonage which is where distribution system pressure drop significantly due to an incident such as a fire hydrant

[1] Metals include copper which has been linked to adverse effects including vomiting and liver damage. For more information, see EPA 2001 report from pages 10-11

being used (EPA 3-4). In both situations water purveyors have the greatest role and responsibility to ensure water contamination does not occur by taking safeguards.

In the United States the principle piece of legislation that governs water safety is the Safe Drinking Water Act of 1974[2] which outlined federal laws concerning the standards for drinking water quality, the implementation of programs to help local and state governments meet these standards, and established the authority of the EPA to set further standards for levels of contaminants ("Safe Water Drinking Act"). In legal terms under this law water purveyors are responsible for the water quality delivered to customers at the meter. In addition, the law established state and local governments primacy, the ability to enforce or administer the laws, along with the ability to establish more stringent standards with regards to water safety ("Backflow Prevention and Cross Connection Control"). Under these circumstances although the Safe Drinking Water Act did not specifically make water purveyors liable for cross-connection control, many local and state governments have passed laws that do so. Some examples include Tennessee and Washington[3] which have established the liability of water purveyors when it comes to cross connection control and the maintenance of those systems. Along with the legal responsibilities that water purveyors carry towards cross-connection control, it is imperative to understand the moral responsibility of water purveyors to provide cross-connection control as safe drinking water is something every American should have access to and a lack of cross-connection control can translate into sickness and even death. Fortunately, there are several things water purveyors can do to help their cross-connection programs achieve their critical role of keeping drinking water safe.

[2] See S.1251- Safe Drinking Water Assistance Act of 2019 on Congressional website for new updates on regulations
[3] Washington is one of the few states providing sample reports for technicians to follow, a standard that should be adopted everywhere

One of the most important roles water purveyors have in the communities that they provide for is the role of an educator to provide public education concerning cross-connections and the potential for backflow that it provides (EPA 29). Providing education not only reduces the likelihood that customers will inadvertently create cross-connections, but by elucidating the dangers of a cross-connection it also incentivizes them to install cross-connection control mechanisms at their residence or building[4] (Florida Dept. of Environmental Protection 2019). Educational tools that can be used to help water purveyors inform their customers include meetings, brochures, and seminars[5] along with more modern methods including the creation of websites to help distribute information concerning cross-control. In some cases of education, customers have responded by asking for more information concerning the issues and how to prevent cross-connections (EPA 29). The awareness that public education can bring about the issue of cross-connections and how that awareness translates to effective measures being taken on the part of the consumer to reduce the chance of a cross-connection is the most important reason why public education is an effective mechanism to help water purveyors with cross-connection control.

In addition to public education, annual inspections are a critical responsibility of water purveyors and offer the opportunity to drastically improve cross-connection programs. A vital part of these inspections are hazard surveys[6] which identify potential cross-connection hazards and then ensure that there is backflow prevention device installed to help prevent any potential backflow (Ohio Environmental Protection Agency 21-22). This allows for the documentation of such potential hazards as well the assurance that local legal codes are being followed. In the

[4] See Q & A section of Florida Department of Environmental Protection for more information
[5] Such seminars have been extremely effective in states like Nevada and are being increasingly state-sponsored to remove funding barriers
[6] See Ohio Environmental Protection Agency Report for more information

process of conducting these hazard surveys another direct benefit is the improvement of documentation concerning possible cross-connections which is imperative as in the case of a backflow incident this documentation allows for a much more efficient identification and isolation of the problem. Annual inspections while seeming unnecessary in the short-term offer water purveyors the opportunity to improve cross-connection programs and improve their response to a potential backflow incident.

There are also physical mechanisms that water purveyors can utilize to improve their cross-connection programs. The choice of which backflow preventer device to install should depend in the hazard level of the system in which it is being placed in and on legal codes[7] in the area. The most commonly found backflow preventer device is the atmospheric vacuum breaker (AVB) which is primarily used for irrigation system and protects from back-siphonage by utilizing air pressure to prevent backflow through a check valve. Pressure vacuum breakers (PVB) operate in a similar fashion and can be used also to protect from back-siphonage. Double Check Valve Assemblies (DCV) are more advanced in that they can prevent backflow in both back-pressure and back-siphonage cases by utilizing independently operating check valves with four test cocks in between two shutoff valves. However, DCVs should only be used for low hazard applications. The most complex backflow preventer device is the reduced pressure zone[8] (RPZ) which operates with two check valves and a differential relief valve in between. In the case of backflow both check valves will close and the differential relief valve will open to release the water in between. RPZs offer the most secure protection from backflow among all devices. Along with all these devices,

[7] These legal codes vary greatly from area to area but new regulations are looking to standardize them on the federal level; see new federal legislation on issue

[8] Unfortunately, these are also the most expensive meaning few companies actually utilize them

water purveyors should utilize air gaps, physical gaps between the water source and usage site like ones seen in kitchen sinks, to prevent back-flow.

In today's world where safe drinking water is the most treasured resource it is imperative that water purveyors accept their role and responsibility to enact cross connection control programs to ensure safe drinking water for all Americans.

Word Count- 1318

"I certify that this essay is my own work, and that any ideas or quotations from the work of other people, published or otherwise, are fully referenced."

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Jishnu Basu

Education Plano Senior High School, Class of 2021

Experience President of Science Club at Vines High School (2018-2019)

- Promoted increased participation in STEM Activities

Scientific Research (2012-Present)

- Conducted & Presented Scientific Research Projects in various professional environments

Schools on Wheels Online Tutor (August 2017-Present)

- Instructed Homeless K-12 Students in Math & Science
- Communicated reports of student development to coordinators

Activities/Positions

- Varsity High School Swim Team (2017-2018) & JV (2018-2019)
- Vines High School Debate (2017-Present) & Team Captain (2018-2019)
- NHS Chapter Secretary (2018-19)
- Science Fairs (2012-Present) with Awards in Section Below-
    1. Dallas Regional Science Fair (2016-19)
    2. PISD District Fair (2017-2019)
    3. School Fairs (2012-Present)

Awards

Academics

- Duke TIP Talent Search Participant and Invited to attend State/National Recognition Ceremonies for ACT Score (2015)

Research

- Baylor Research Institute Prize at Dallas Regional Science Fair (2018-2019)
- Second Place in District & Regional Science Fair (2018-2019)
- Invited to Present at Texas Junior Science and Humanities Symposium (2018-19)

Extracurriculars

- Semifinalist at Texas Debate State Championships for Congressional Debate (2018) & Extemporaneous Speaking (2019)
- Top 16 Finisher in World Schools Debate at National Speech and Debate Tournament (2019)

ABPA Harrington/Arthur Memorial Scholarship Essay Competition

Parental Consent Form

We require a parental consent form signed & returned from the parents or legal guardian of each applicant under age 18 who is submitting an essay for the ABPA Harrington-Arthur Memorial Scholarship Essay Competition.

Consent

I SABYASACHI BASU hereby certify that I am the parent or guardian of JISHNU BASU and I am fully aware that my child/ward has the intention to register for the ABPA Harrington-Arthur Memorial Scholarship Essay Competition, has read the rules and regulations of the scholarship competition, and agrees to abide by them.

Certification and Authorization

I herby certify that all information provided by my child or ward in the application form is true.

SABYASACHI BASU
Parent or Guardian's Full Name

sabya_basu@hotmail.com
Parent or Guardian's Email Address

320-420-4465
Phone number (at which you agree we may contact your child and/or you) (Include Area Code)

JISHNU BASU
Child or Ward's Full Name

06/21/2003
Date of birth (mm/dd/yyyy)

jishnubasu21@gmail.com
Child's or Ward's Email Address

Sabyasachi Basu
Parent or Guardian Signature

03/13/2020
Date

FORWARD ALL COMPLETED SUBMISSIONS TO:
bacflounlimited@gvtc.com