CROSS-CONNECTION CONTROL PROGRAM

LAKE WHATCOM WATER & SEWER DISTRICT

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LAKE WHATCOM WATER & SEWER DISTRICT
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The material and data in this report were prepared under the supervision and direction of the undersigned.

LAKE WHACOM WATER & SEWER DISTRICT

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ACRONYMS AND ABBREVIATIONS

ASSE	American Society of Sanitary Engineering
AWWA	American Water Works Association
BAT	backflow assembly tester
DCDA	double check detector assembly
DCVA	double check valve assembly
District	Lake Whatcom Water and Sewer District
DOH	Washington State Department of Health
Program	District Cross-Connection Control Program
psi	pounds per square inch
RPBA	reduced pressure backflow assembly
WAC	Washington Administrative Code

1 INTRODUCTION

The Lake Whatcom Water and Sewer District (District), in its operation of four (4) potable water systems (South Shore, North Shore – Eagleridge, North Shore – Agate Heights, and Johnson Well), is required to ensure protection of public health through the provision of minimum requirements and standards for design, construction, operation, and maintenance of its systems. It is essential that physical cross-connections, which create or have potential to create an imminent and substantial danger to public health, be eliminated from the distribution system and plumbing system of customers. Backflow can result in potable water systems becoming a transmitter of disease, toxic materials, and other hazardous liquids. Therefore, it is necessary to establish and maintain this Cross-Connection Control Program (Program) to protect the health of water customers by the control of actual and/or potential cross-connection through methods of containment and/or isolation.

1.1 Authority

Washington Administrative Code (WAC) 246-290-490 requires public water supply systems to establish a routine cross-connection control program for the purpose of detecting and preventing cross-connections that create or have the potential to create an imminent and substantial danger to public health by and from contamination due to the cross-connection. Upon detection of a prohibited cross-connection, both community and non-community water systems shall either eliminate the cross-connection by installation of an appropriate backflow prevention assembly acceptable to the water purveyor or discontinue service until the contaminant source is eliminated. Such a program shall be developed utilizing accepted practices of the American Water Works Association (AWWA) guidelines as set forth in AWWA Manual M14, *Backflow Prevention and Cross-Connection Control Recommended Practices* (AWWA, 2015).

1.2 Purpose

The intent of this Program is to provide for the permanent abatement or control, by way of backflow prevention, of all cross-connections in the District's systems, as required by WAC 246-290-490. When it is deemed necessary by the District's Program Administrator, there will be installed, at a customer's service connection, an approved backflow prevention assembly commensurate with the degree of health hazard to the water supply.

1.3 Definitions

Air Gap Separation An unobstructed vertical distance through which the free atmosphere between the lowest opening from any pipe or faucet supplying water to a tank, plumbing fixture, or other assembly and the flood rim of the receptacle, and shall be at least double the diameter of the supply pipe measured vertically above the flood level rim of the vessel. In no case shall the gap be less than one (1) inch. This gap shall also be above the established 100-year flood level.

Auxiliary Water Supply Any water supply on or available to the premises other than the District's approved public potable water supply. These auxiliary water supplies may include water from another purveyor's public water supply or any natural source(s) such as a well, spring, lake, river, stream, harbor, etc., or "used waters" or "industrial fluids." These waters may be polluted, contaminated, or may be objectionable and constitute an unacceptable water source over which the District does not have sanitary control.

Backflow The flow of water or other liquids, mixtures or substances into the distribution pipes of a potable supply of water from any source or sources other than its intended source.

Backflow Assembly Tester A person who is certified by the Washington State Department of Health to test backflow prevention assemblies.

Back Pressure Backflow caused by a pump, elevated tank, boiler, or other means that could create pressure greater than the supply pressure.

Back Siphonage Backflow due to a negative or sub-atmospheric pressure within a water system.

Backflow Prevention Assembly An assembly to counteract back pressure or prevent back siphonage.

Backflow Prevention Assembly – Approved The term approved backflow prevention assembly shall mean an assembly that has met the requirements of the Manual of Cross Connection Control published by the University of Southern California Foundation for Cross-Connection Control and Hydraulic Research (USC, 2011).

Check Valve A generic term used for a variety of valves that specifically allow flow in one direction only. A check valve in an approved assembly must be an approved check valve that is drip tight in the normal direction of flow when the inlet pressure is at least one (1) pound per square inch (psi).

Consumer's Water System Any potable and/or industrial water system that begins at the point of delivery from the District water meter or connection and is located wholly or partially on the customer's premises.

Containment A method of controlling potential and/or confirmed cross-connections by installation of a *double check valve assembly* or a *reduced pressure principle backflow prevention assembly*.

Contaminant Any substance present in drinking water that may adversely affect the health of the consumer or the aesthetic qualities of water.

Cross-Connection Any physical arrangement whereby a public water supply system is connected, directly or indirectly, with any other water supply system, sewer, drain, conduit, pool, storage reservoir, plumbing fixture, or other assembly which contains or may contain contaminated water, sewage, or other waste or liquid of unknown or unsafe quality, which may be capable of imparting contamination to the public water supply system as a result of backflow. Bypass arrangements, jumper connections, removable sections, swivel or change-over assemblies, or any other temporary

or permanent assembly's through which or because of which backflow could occur are considered to be cross-connections.

Cross-Connection Control Specialist An individual certified by Washington State and approved by the District to administer a cross-connection control program and to conduct cross-connection surveys.

Customer Any person or organization who receives water from the District.

Customer's System The water piping system located immediately downstream from the District's water meter or service connection.

Distribution System The network of pipes and other facilities that are used to distribute water from the source, treatment, and transmission, or storage facilities to the customer.

Double Check Detector Assembly An assembly composed of two double check valve assemblies, set in parallel, equipped with a meter on the bypass line to detect small amounts of water leakage or use.

Double Check Valve Assembly An assembly composed of two single, independently acting check valves, including tightly closing shutoff valves located at each end of the assembly and suitable connections for testing the water tightness of each check valve.

Health Hazard Any conditions, assemblies, or practices in a water supply system or in its operation which create or may create a danger to the health and well-being of the water consumer.

Isolation A method of controlling potential and/or confirmed cross-connections by installation of an air gap separation or a vacuum breaker.

Local Administrative Authority The local official, board, department, or agency authorized to administer and enforce the provisions of the Uniform Plumbing Code, as adopted under Chapter 19.27 Revised Code of Washington.

Mobile Unit A "mobile unit" shall mean any unit connecting to the water system through a hydrant, hose, bib, or other appurtenance of a permanent nature that is part of the District water system or a permanent water service to a premise. Examples can include but are not limited to the following: water trucks, pesticide applicator vehicles, chemical mixing units or tanks, waste hauling trucks or units, sewer cleaning equipment, carpet or steam cleaning equipment other than homeowner use, rock quarry or asphalt/concrete batch plants, or any other mobile equipment or vessel. Uses that are excluded from this definition are recreational vehicles at assigned sites or parked in accordance with District regulations, and homeowner devices that are used by the property owner in accordance with other provisions of this Program pertaining to provision of water service to a premise.

Potable Water Water that is safe for human consumption and free from harmful or objectionable materials.

Public Water Supply Any system or water supply intended or used for human consumption or other domestic use, including source, treatment, storage, and distribution where water is furnished to any community, collection or number of individuals, or is made available to the public for human consumption or domestic use, but excluding supplies serving one single-family residence.

Reduced Pressure Backflow Prevention Assembly An assembly incorporating two or more check valves and an automatically operating differential relief valve located between the two check valves, two shutoff valves and equipped with necessary appurtenances for testing. The assembly shall operate to maintain the pressure in the zone between the two check valves, less than the pressure of the public water supply side of the assembly even at cessation of normal flow. In the case of leakage of either check valve, the differential relief valve shall operate to maintain this reduced pressure by discharging to the atmosphere. When the inlet pressure is two pounds per square inch or less, the relief valve shall open to the atmosphere, thereby providing an air gap in the assembly. This air gap shall also be above the 100-year flood level.

Thermal Expansion The pressure increase due to the rise in water temperature.

1.4 General Policy

1. In order to provide for an orderly and adequate means of backflow prevention, the District has adopted Resolution No. 858, which establishes the requirements herein for the protection of its distribution systems as (see Appendix A). New water service connections will be installed, and existing water service connections will be modified to conform to these requirements where applicable.
2. The District's responsibility for backflow prevention will begin at the water supply source and include all water treatment, storage, and distribution facilities. The District's responsibility ends at the point of delivery to the consumer's water system, which begins at the downstream end of the District's service connection water meter located within the public right-of-way or District-held easement.
3. Under provisions in WAC 246-290-490, the District is not responsible for eliminating or controlling cross-connections within the consumer's water system (plumbing). That responsibility falls under the jurisdiction on of the local administrative authority that is authorized to administer and enforce the Uniform Plumbing Code (Whatcom County).
4. The District's water supply to any premise listed in WAC 246-290-490(4)(b)(iii)(Table 9) will require an approved air gap or an approved reduced pressure backflow assembly (RPBA) at the end of the service connection, prior to any branch connections, on the customer's side of the property line. These premises include, but are not limited to:
    - Agricultural (farms and dairies)
    - Beverage bottling plants
    - Car washes
    - Chemical plants

- Commercial laundries and dry cleaners
- Premises where both reclaimed water and potable water are provided
- Film processing facilities
- Food processing plants
- Hospitals, medical centers, nursing homes, veterinary, medical and dental clinics, and blood plasma centers
- Premises with separate irrigation systems using the purveyor's water supply and with chemical addition (for example, parks, playgrounds, golf courses, cemeteries, estates, etc.)
- Laboratories
- Metal plating industries
- Mortuaries
- Petroleum processing or storage plants
- Piers and docks
- Radioactive material processing plants or nuclear reactors (RPBAs for connections serving these premises are acceptable only when used in combination with an in-plant approved air gap; otherwise the District will require an approved air gap at the service connection)
- Survey access denied or restricted
- Wastewater lift stations and pumping stations
- Wastewater treatment plants (RPBAs for connections serving these premises are acceptable only when used in combination with an in-plant approved air gap; otherwise the District will require an approved air gap at the service connection)
- Premises with an unapproved auxiliary water supply interconnected with the potable water supply (Customers with permit-exempt wells may choose to either decommission the well in accordance with Washington State Department of Ecology standards, or install RPBAs at all service connections where the well, or piping from the well, is interconnected with the District's system. Similarly, customers with direct draw piping from any surface water body shall install RBPAs at all service connections where the direct lake draw piping is interconnected with the District's system.)
- Premises with fire suppression systems that include chemical injection devices and/or booster pumps (flow through systems are exempt)

5. Backflow prevention requirements for single family residences, when applicable, will comply with the following:
    - The type of backflow prevention required will provide a level of protection commensurate with the degree of the cross-connection hazard:

- Backflow prevention assemblies will be installed according to District specifications;
- Assemblies are installed, inspected, and tested in accordance with WAC 246-290-490; and
- Backflow preventer must be installed when outdoor water use (irrigation, etc.) systems are installed.

6. Any mobile unit or apparatus which uses the water from any premise within the District's water system shall first obtain authorization from the District and be inspected annually to assure appropriate backflow protection is installed; backflow assemblies installed on mobile units must also be tested annually by a certified backflow assembly tester
7. All temporary connections will be required to have cross-connection protection; the type of protection required will be determined on a case-by-case basis by the District

2 PROGRAM OBJECTIVES

The objectives of this Program are to:

1. Reasonably reduce the risk of contamination of the public water distribution systems; and
2. Reasonably reduce the District's exposure to legal liability arising from the backflow of any contaminant originating from the customer's plumbing system and then supplied to other customers.

2.1 Summary of Program Decisions

The following table summarizes the major policy and program decisions adopted for the **Lake Whatcom Water and Sewer District** water systems. The items in the table represent cross-connection control program areas that have more than one acceptable approach or option.

Decision Item	Decision
1. Type of Program [General, WAC 246-290-490(2)(e)]	
a. Premises isolation only [WAC 246-290-010]	No
b. Premises isolation and in-premises protection (combination program) [WAC 246-290-010]	Yes
2. Extent of Coordination with Local Administrative Authority [WAC 246-290-490(2)(d)]	
a. Information exchange	Yes
b. Interaction	No
c. Joint program	No

Decision Item	Decision
3. Relationship with Customer [Element 1]	
a. Signed service agreement or contract	No
b. Ordinance/resolution; implied service agreement	Yes
4. Enforcement of Corrective Action [Element 1]	
a. Rely upon shut-off of water service	Yes
b. Rely upon District-installed premises isolation	No
5. Assessment and Re-assessment of Hazard [Element 2]	
a. By District's staff or equivalent	Yes
b. By cross-connection control specialist (CCS) employed by customer; report reviewed by District's CCS	Yes
6. Location and Ownership of Premises Isolation Assembly [Element 3]	
a. On District's service line	No
b. On customer's service line	Yes
7. CCS Option – District's Program Management [Element 4]	
a. District's staff member certified	Yes
b. Inter-agency agreement or use other agency's CCS	No
c. Contract with consultant CCS	No
8. Testing of Assemblies [Element 5]	
a. By District's staff or District-employed backflow assembly tester (BAT)	No
b. By customer-employed (contractor) BAT	Yes
9. Cost Recovery [WAC 246-290-100(4)(h) and -105(4)(p)]	
a. Borne by all customers (general water rates)	Yes
b. Assessed to specific class (commercial meters)	No
c. Each customer directly bears cost	No

3 PERSONNEL

3.1 Program Administrator

The Cross-Connection Control Manager (Administrator) is responsible for organizing and implementing the District's program. The Administrator will hold a valid Washington State Cross-Connection Control Specialist certification, be experienced in water works operations, and have specific training through recognized courses and seminars in cross-connection control and backflow prevention. Duties include the initial screening of all service applications and determination of the need for the proper backflow prevention assembly; issuing correspondence to customers; record keeping for the program; periodic review of customer premises and/or consumption patterns, to assure that all cross-connections are controlled; initiation of enforcement action; response to contamination events; investigation; and communication with state health authorities.

3.2 Cross-Connection Control Specialist

This person must hold a valid Washington State Cross-Connection Control Specialist certification in accordance with WAC 246-290-490. Duties include plan review; initial and repeat survey of facilities; review of tests done by a certified Backflow Assembly Tester (BAT); recommendation of installation standards and procedures required for premise isolation; recommendation of material for public education; input test and assembly data into computer data base; and assist the program administrator. All District operations staff with current Washington State cross-connection control certification serve, as needed, in the role of Cross-Connection Control Specialist.

4 ENFORCEMENT

The District may immediately terminate water service, require disconnection of a cross-connection, and/or impose fines when the District determines that a health hazard, or potential health hazard, exists. An example of a health hazard is an uncontrolled potential, direct or indirect cross-connection, and/or a cross-connection that is not controlled commensurate with the degree of health hazard.

Advanced notification will be provided before any of the above measures are taken, unless the degree of hazard, or potential degree of hazard, is so severe that it could cause immediate contamination and/or health threat. The following circumstances may result in termination of water service, the imposition of a fine, or both:

- Refusal to install a backflow prevention assembly when required by the District, or the Washington State Department of Health (DOH)
- Failure to replace an improper type, and/or failure to replace or repair a defective or improperly installed backflow prevention assembly
- Failure to have the backflow prevention assembly tested and/or inspected per District requirements
- Existence of a high-health hazard cross-connection, to the District's system, that is not protected with the appropriate backflow prevention assembly
- Refusal to allow inspection of the premises

In the case of application for water service, the service will not be granted if the District determines that any of the above conditions exist.

Prior to taking action to disconnect or deny service to a premise, the appropriate local administrative authority (Whatcom County Department of Health) and/or Whatcom County Fire Marshal will be notified.

In the event that the water service is terminated and/or the meter removed, then the service will not be resumed nor the meter reinstalled until the customer has complied with the Program requirements, and paid any then delinquent rates, charges or fines. In addition, the customer will have paid the District's standard turn-on and/or meter re-installation charges. The cost of disconnection by the District, as established in the District's Master Fees and Charges Schedule, will be charged to the property, and payment enforced in the same manner as for other rates and charges.

Customers who remain out of compliance for two (2) months will be subject to disconnection and will remain disconnected until compliance is met. The foregoing remedy for violations will not be exclusive. The District, the DOH, and/or other regulatory agencies will be entitled to enforce this Program and the applicable regulations in any manner available by law.

The District will not be held liable for damages nor will allowances be made for loss of production, sales or services, or any other consequential damages arising from the implementation of any of the measures required by and/or contained in this Program.

4.1 Authority to Abate Cross-Connection

In the event the cross-connection is not abated within the prescribed time, water service to the premises will be discontinued immediately. Or, if the General Manager or designated representative determines that the service should not be interrupted, the District may hire a contractor to abate the cross-connection by means of installing an approved backflow prevention assembly. In such event, the District will bill the property owner for all costs and administration incurred in accordance with the current Master Fees and Charges Schedule.

5 CROSS-CONNECTION CONTROL PROGRAM HEALTH HAZARD EVALUATION

A. Non-residential (commercial/industrial/government) services are considered to have the greatest potential for adverse health hazard cross-connections to exist within their plumbing systems and are therefore, assessed as high health hazard risks. As such, all non-residential customers are required to install RPBAs, at a location just downstream of their service meter, in order to achieve premise isolation. Cross-connection control health hazard surveys (see Appendix B) will only be conducted for residential customers.

   The District will conduct health hazard evaluations at and/or within customer premises, where plumbing systems are mostly visible, to assure that either no direct or indirect cross-connections exist or that if they do exist, they are protected by a backflow prevention assembly commensurate with the assessed degree of health hazard. If, at the sole discretion of District's Program Administrator, plumbing systems are not adequately visible for thorough inspection, even though no apparent cross-connection is visible, protection by a

backflow prevention assembly commensurate with the assessed degree of health hazard will be required.

Upon the initiation of a health hazard evaluation, the District will contact the customer/owner, and an appointment to meet the owner or representative at the premises will be made. At this time, the District's conditions for service, the regulations regarding cross-connections, and the customer's responsibility to install a proper backflow prevention assembly, if needed, will be explained to the customer.

B. The customer should be reminded that the evaluation of the premises is for the sole purpose of establishing the District's minimum requirements for the protection of the public water supply system, commensurate with the District's assessment of the degree of health hazard. It is not to be assumed by the customer or other regulatory agencies, that the District's backflow prevention assembly survey requirements, or other actions by District personnel, constitutes an approval of the customer's plumbing system, or an assurance to the customer of the absence of cross-connections therein.

C. The District's Program Administrator will establish the priority of its health hazard evaluations and/or repeat surveys of premises based on the risk management policies established by the District, and the minimum requirements imposed by DOH.

In accordance with DOH regulations (WAC 246-290-490), and the AWWA's Manual for Backflow Prevention and Cross-Connection Control Recommended Practices (AWWA, 2015), the Administrator will establish standards and procedures governing the application, installation, approval and testing of backflow prevention assemblies, and other related tasks. The Administrator may also establish such other more stringent requirements deemed necessary to reduce the risk of contamination of the public water supply system.

D. The systematic program of health hazard evaluations will be established with priority given on the basis of risk to public health and will be outlined as follows:

New Construction

- Upon application for water service permit, the customer will be informed of the appropriate backflow prevention assembly installation and testing requirements.
- Before water service commences, a completed successful test of the assembly and a proper report from a Washington State-certified BAT must be received by the District.

Existing Premises

- All existing premises will be listed by category, on a priority basis for surveying, as needed, based upon the risk assessment. After the initial prioritizing, a list of repeat surveys will be established, and the list will be followed, except in circumstances that require a special survey such as a response to a water quality complaint.
- An authorized District Cross-Connection Control Specialist will conduct the initial health hazard evaluation of the premise.

- Upon completion of the initial premise health hazard evaluation the Cross-Connection Control Specialist will brief the Program Administrator of the findings.
- The Program Administrator will issue the evaluation report and a compliance letter to the property owner if a backflow prevention assembly is needed.
- Approved backflow prevention assemblies must be installed under the following time frame:
  - Low-Health Hazard - 30 days
  - High-Health Hazard - 10 days
  - Severe-Health Hazard - immediately
- Upon the date that corrective action was to have been completed, the Program Administrator will ensure that corrective actions have been completed in accordance with District requirements. If corrective actions have not been completed, the Administrator will issue a compliance-warning letter with a new corrective action completion date. Upon the final compliance date, the Administrator will ensure the corrective actions have been completed. If they have not been completed, the Administrator will issue a termination door hanger and notify the local administrative authority (Whatcom County Health Department).
- All copies of correspondence, test results, and completed actions will be placed in the cross-connection control file for that premise. Records will be kept for a minimum of five (5) years, or as long as the backflow prevention assembly remains in service.
- Evaluations will be completed at least annually, or more often if the degree of hazard so dictates.

5.1 Hazard Evaluation Procedure

Evaluation of hazards will be conducted as follows:

1. Send the "On Site Cross-Connection Health Hazard Evaluation Scheduling" letter to customer.
   - If customer responds to the letter, schedule an evaluation and proceed with Step No. 3.
   - If no response to this letter, proceed with Step No. 2.
2. Send the "On Site Cross-Connection Health Hazard Evaluation Scheduling – Final Notice" letter.
   - If customer responds to the letter, schedule an evaluation and proceed with Step No. 3.
   - If the customer does not respond to this letter, the customer's service will be subject to disconnection.
3. Meet the customer on-site and conduct the health hazard evaluation of customer's premise. Take notes and if necessary make a sketch. Fill out health hazard evaluation report form. Proceed with Step No. 4.

4. Send confirmation of health hazard evaluation assessment results to customer.
    - If no corrective action is needed, attach letter informing customer.
    - If corrective action is needed, attach a letter informing customer of the requirements and timeline. Proceed with Step No. 5.
5. Obtain the initial backflow prevention assembly test report and enter information into the Program database for annual testing compliance tracking. If the customer fails to have the backflow prevention assembly tested, proceed with Step No. 6.
6. Follow-Up with the "Backflow Prevention Assembly Testing – Second Notice" letter.
    - If customer responds to this letter, schedule a follow-up evaluation. Obtain the backflow prevention assembly test report(s) and enter information into the Program database.
    - If the customer does not respond to this letter, proceed to Step No. 7.
7. Send the "Backflow Prevention Assembly Testing – Final Notice" letter.
    - If customer responds to this letter, schedule a follow-up evaluation. Obtain the backflow prevention assembly test report(s) and enter information into the Program database.
    - If no response to this letter, the customers' service will be disconnected.

When a customer's service is subject to disconnection, a door hanger will be placed at the property, notifying the customer that their water will be shut off in five (5) days. At that time, the customer has the option of complying with the District's direction or having their service disconnected. Water service will remain disconnected until the customer complies with District requirements. As per WAC 246-290-490, the appropriate local administrative authority (Whatcom County Health Department) will be notified prior to taking any action.

6 BACKFLOW PREVENTION ASSEMBLY TESTING

All backflow prevention assemblies will be tested upon installation, after repair or relocation, and at a minimum, at least annually. The District will notify cross-connection customers each year that an annual test of their backflow prevention assembly is required. The test must be completed, and the associated test report must be received at the District.

A. It is the cross connection customer's responsibility to assure that the test report has been received by the District. The District will not acknowledge that a test has been completed until the test report has been received.

B. A BAT, holding a valid Washington State BAT certification is required to complete all testing of backflow prevention assemblies. Testers will be required to furnish current DOH certification and verification of test equipment calibration to the District, prior to the

District's acceptance of backflow prevention assembly test reports. All test reports will be furnished on a form provided by, or one acceptable to the District. Test results will be compared with previous results for the specific assembly, and with statistical results for the type, make and model of assembly.

C. Certified backflow assembly testers must submit, at least annually, written verification of the calibration accuracy of the test equipment and of the calibration equipment.

D. Each customer will have, at least, 30 days after notification in which to complete the test and assure that the District has received the test report reflecting passing results.

E. The customer will be responsible for the replacement or repair of the backflow prevention assembly if the assembly fails to test satisfactorily.

6.1 Previously Installed Assemblies

Backflow prevention assemblies that were approved at the time of installation but are not on the current list of approved assemblies will be permitted to remain in service provided they are maintained; are commensurate with the degree of hazard; are tested at least annually; and perform satisfactorily.

- Backflow prevention assemblies in service but not currently listed, as an approved assembly will be replaced by an assembly on the current list of approved assemblies if the not-currently listed assembly is relocated or requires more than minimum maintenance to successfully pass the annual test.
- If a water system protected by a backflow prevention assembly is modified to include components or additives requiring a higher level of protection against backflow, the backflow prevention assembly will be replaced with an approved assembly appropriate for the degree of hazard.

6.2 Annual Backflow Prevention Assembly Testing Notice Procedure

Annual backflow prevention assembly testing notification will be conducted as follows:

1. Send "Annual Backflow Prevention Assembly Testing" letter two (2) months before due date.
   - As customers complete their tests and test reports are received, enter the test results into the Program database. Ensure that any backflow prevention assembly that has been replaced is on the list of approved assemblies.
   - If no response to this letter, proceed to Step No. 2.
2. Send "Backflow Prevention Assembly Testing – Second Reminder Notice" letter.
   - As customers complete their tests and test reports are received, enter test results into Program database. Ensure that any backflow prevention assembly that has been replaced is on the list of approved assemblies.

- If no response to this letter, proceed to Step No. 3.

3. Send "Backflow Prevention Assembly Testing – Third and Final Reminder Notice" letter.
    - If customer responds to the letter, obtain the test report for the backflow prevention assembly and enter into Program database. Ensure that any backflow prevention assembly that has been replaced is on the list of approved assemblies.
    - If no response to letter, the customers' service will be disconnected.

When a customer's service is subject to disconnection, a door hanger will be placed at the property, notifying the customer that their water will be shut off in five (5) days. At that time, the customer has the option of complying with the District's direction or having their service disconnected. Water service will remain disconnected until the customer complies with District requirements. As per WAC 246-290-490, the appropriate local administrative authority (Whatcom County Health Department) will be notified prior to taking any action.

7 RECORDS AND REPORTS

An adequate record system is essential for the operation of a backflow prevention program. These records form the basis for any enforcement action by or legal defense of the District, as well as giving a basis for comparing test results of different backflow assemblies. The Program Health Hazard Evaluation File will consist of:

A. A separate file will be established for each individual customer that requires the installation of a backflow prevention assembly.

B. The following information will be maintained in each file:
    - Copies of all cross-connection control correspondence with the customer
    - Copy of health hazard evaluation reports complete with field drawings
    - Copies of backflow prevention assembly test reports for all assemblies

C. All backflow prevention assembly test report forms will be entered into the XC2 program that tracks assembly testing and dates of tests.

D. Backflow prevention assemblies that are replaced will be double-checked to ensure that they appear on the list of approved assemblies. If they do not appear on the list, the customer will be issued a letter.

E. A master list of service connections and/or customer's premises where approved backflow prevention assemblies protect the water system from contamination, and the assessed hazard of each connection. These records will be kept for as long as the premise poses a cross-connection hazard to the water system.

F. Inventory information on:

- Approved air gaps installed in lieu of approved assemblies, including exact location, assessed hazard, installation date, history of health hazard evaluations, inspection results, and person conducting inspections
- Approved backflow prevention assemblies including exact location, assembly description (type, manufacturer, model, size and serial number) assessed hazard, installation date, history of health hazard evaluations, tests and repairs, test results, and the BAT performing the tests
- These records will be kept on file for the life of the backflow prevention assembly

G. An annual Cross-Connection Control Summary report and Backflow Incident report will be made available to DOH upon demand. This report will describe the status of the District's backflow prevention program as well as any backflow incidents that occurred. These records will be kept on file for a minimum of five (5) years.

8 PUBLIC OUTREACH

8.1 Consumer Education

Public education is a very important aspect of this Program. Premises with a low priority for a cross-connection control hazard survey (see Appendix B), such as single family residential homes, may never be surveyed. Customers are provided with informational brochures describing cross-connection hazards in homes and the recommended assemblies that are to be installed by the homeowner to reduce the hazards. Public education explains the necessity of the cross-connection control program and prevents misunderstandings.

The District's consumer education will be clear that the information provided is based on its perspective of cross-connection control and the necessary backflow prevention to protect the public water supply, and that the customer has the obligation to comply with these requirements.

8.2 Customer Information Packet

Information on the District's cross-connection control program is available to all customers, both as hard copies and on the District's website. The priority for handing out the packet, including an introductory letter, will be determined from the risk assessment done by the Program Administrator.

Customers applying for water service from the District will be given a New Customer Information Packet, which includes information regarding the District's Program and backflow prevention requirements (Appendix C).

9 BACKFLOW PREVENTION ASSEMBLY INSTALLATION

9.1 General Requirements

All backflow prevention assemblies will be listed on the most current list of approved backflow prevention assemblies published by DOH. Installation of backflow prevention assemblies in existing systems will be accompanied by the necessary upsizing of the system to assure adequate flow capacity for proper operation of the system. Installation requirements include, but are not limited to, the following:

- An assembly more than five (5) feet above the floor or ground level must have a permanent platform under it for the tester or maintenance person to stand on.
- Approved assemblies must be installed at the end of the District's service connection and on the customer side of the property line.
- All approved assemblies installed will be the size, type, and model pre-approved by DOH and the District.
- The model of the assembly and installation plans will be submitted to the District for approval prior to installation.
- When installed in an enclosure, adequate space considerations must be given for proper testing and maintenance as per District specifications.
- Any assembly or assembly with an air inlet or relief port must be installed outside any enclosure or hooded area containing fumes that are corrosive, toxic, or poisonous.
- No part of the approved assembly will be submerged under water, nor installed at a location subject to flooding. If installed in a vault, adequate drainage will be provided. In all cases, whenever access to a vault is required, follow and comply with local, state, and federal safety rules regarding confined space entry. The vault will be large enough for free access for workers to enter for testing and/or repairing the assembly. RPBAs may be installed in a vault only it the relief valve discharge can be drained to daylight through a "bore sight" type drain. The drain will be of adequate capacity to carry the full rated flow of the assembly and will be screened at both ends. An approved air gap will be located on the relief valve.
- Assemblies 2.5 inches and larger will have support blocks to prevent damage to the assembly or piping.
- For installations where 24 hour uninterrupted service is necessary, a parallel assembly shall be provided to permit assembly testing and maintenance. The bypass or parallel backflow prevention assembly must be of the same type as the main line assembly.

- Thoroughly flush the lines before installing the assembly to eliminate debris from the lines that could foul one of the checks or relief port.

9.1.1 Freeze Protection

Backflow prevention assemblies are installed on all types of water services, so it is not always appropriate to shut down a system to drain the assembly to prevent freezing. Backflow prevention assemblies should be protected from freezing and other severe weather, and from accidental physical damage. Experience has shown that freeze damaged assemblies are often damaged beyond repair, so they must be replaced. All backflow prevention assemblies should have provisions for freeze protection.

9.1.2 Thermal Expansion

A backflow prevention assembly placed on a water service can cause thermal expansion. Serious damage could occur to a plumbing system if the pressure and high temperature caused by thermal expansion is not relieved. Excessive water temperature or pressure inside a hot water tank, if not relieved, could cause the tank to explode. The customer's hot water tank and connected plumbing system is normally protected by a temperature/pressure relief valve located at or near the top of the hot water heater. In addition some plumbing codes require a thermal expansion tank to be installed.

9.2 Air Gap Separation Installation Requirements

An air gap separation is designed to prevent backflow caused by both severe and high-health hazard assessments.

An approved air gap is a physical separation between the free flowing discharge end of the District supply line, and the overflow rim of an open or non-pressurized receiving vessel. These separations must be vertically orientated a distance of at least twice the inside diameter of the inlet pipe, but never less than one (1) inch.

An obstruction around or near an air gap may restrict the flow of air into the outlet pipe and nullify the effectiveness in preventing back siphonage. When affected by sidewalls, the vertical separation must be at least three (3) times that of the inside pipe diameter.

9.3 Reduced Pressure Backflow Assembly Installation Requirements

An RPBA is designed to prevent backflow caused by backpressure and back siphonage for both low- and high-health hazard assessments.

The following installation practices are common to all RPBAs and reduced pressure detector assemblies:

1. An RPBA will only be installed in the orientation for which it is approved. Any other configuration may hinder the assembly in preventing backflow.

2. The RPBA must be on the DOH Approved list.
3. The RPBA must be tested upon installation and annually thereafter.
4. The RPBA must be tested if moved or repaired.
5. An RPBA must be installed above ground at a minimum of twelve (12) inches from relief valve opening to ground or flood level.
6. The assembly must be protected from freezing and other severe weather conditions, and from accidental damage.
7. Because of the inherent design of an RPBA, fluctuating supply pressure condition may cause nuisance dripping and potential fouling of the assembly. In a static condition, the zone of reduced pressure between the check valves must be maintained at a pressure of 2.0 pounds per square inch (psi) or greater differential below incoming supply pressure. Depending upon the degree of fluctuating pressure, the assembly may discharge water from time to time.
8. Approved assemblies larger than two (2) inches will have a minimum clearance of twelve (12) inches on the backside and twenty-four (24) inches on the test cock side, twelve (12) inches plus the nominal size of the assembly below the assembly and thirty-six (36) inches above the assembly.

   Assemblies less than two (2) inches will have a minimum clearance of six (6) inches on the backside, twelve (12) inches on the test cock side of the assembly, and twelve (12) inches plus the nominal size of the assembly below the assembly and thirty-six (36) inches above the assembly.

9.4 Double Check Valve Assembly Installation Requirements

A double check valve assembly (DCVA) is designed to prevent backflow caused by backpressure and back siphonage for low health hazard assessments.

The following installation practices are common to all DCVAs:

1. Unless the DCVA has been elevated and approved by the District, it will only be installed in a horizontal configuration. Any other orientation may deter the DCVA from preventing backflow.
2. A DCVA may be installed in a pit below ground. If so, adequate room for testing and maintenance must be provided. Plugs must be installed in the test cocks to reduce the risk of ground water from being siphoned through a leaking test cock. The test cocks must be installed facing up or to one side. Sufficient draining must be provided to prevent the assembly from being submerged.
3. Approved assemblies two (2) inches or larger will have a minimum clearance of six (6) inches on the backside and twelve (12) inches on the test cock side, twelve (12) inches below the assembly and adequate room above the assembly.

Assemblies less than two (2) inches will have a minimum clearance of six (6) inches on the test cock side and (6) inches below the assembly.

4. The DCVA must be on the DOH Approved list.
5. The DCVA must be tested upon installation and annually thereafter.
6. The DCVA must be tested if moved or repaired.
7. The DCVA must be protected from freezing and other severe weather conditions, and from accidental damage.

9.5 Double Check Detector Assembly Installation Requirements

A double check detector assembly (DCDA) is designed to prevent backflow caused by backpressure and back siphonage. They are used for low health hazard assessments on fire lines.

The following installation practices are common to all DCDAs:

1. Unless the DCDA has been elevated and approved by the District, it will only be installed in a horizontal configuration. Any other orientation may deter the DCDA from preventing backflow.
2. A DCDA may be installed in a pit below ground. If so, adequate room for testing and maintenance must be provided. Plugs must be installed in the test cocks to reduce the risk of ground water from being siphoned through a leaking test cock. The test cocks must be installed facing up or to one side. Sufficient draining must be provided to prevent the assembly from being submerged.
3. Approved assemblies larger than two (2) inches will have a minimum clearance of twelve (12) inches on the backside and twenty-four (24) inches on the test cock side, twelve (12) inches plus the nominal size of the assembly below the device and thirty-six (36) inches above the assembly.

   Assemblies less than two (2) inches will have a minimum clearance of six (6) inches on the test cock side and (6) inches below the assembly.
4. The DCDA must be on the DOH Approved list.
5. The DCDA must be tested upon installation and annually thereafter.
6. The DCDA must be tested if moved or repaired.
7. The DCDA must be protected from freezing and other severe weather conditions, and from accidental damage.

10 BACKFLOW INCIDENT INVESTIGATION

When a taste, color, or odor inquiry is received, the person responding should try to gather as much relevant information as possible by using the District's asset management software program. While it is important to get a good description of the problem, the person taking the inquiry should try to refrain from suggesting problems if possible, as people generally tend to agree with a suggestion instead of carefully assessing the real problem.

Once an inquiry has been received and as much information gathered from the person reporting the inquiry, the District will determine what sort of response is appropriate under the certain set of conditions. For instance, if there was only one inquiry, the response would probably be somewhat different than if there are multiple queries from the same area. However, no matter how many people complain, there are certain minimum steps that should be taken:

1. A District employee will visit the site of the complaint to examine the water.
2. The District employee will perform certain minimum tests, such as pH and chlorine residual. The pH and chlorine tests are good immediate indicators of potential problems, and if the results indicate a potential problem, a bacteriological analysis should also be completed.
3. The city of Bellingham, or Edge Analytical, located at 805 W. Orchard Drive, Suite 4, in Bellingham will test samples quickly and on short notice, including weekends or evenings, in the event of an extreme emergency (see Appendix D for water sampling procedures).

REFERENCES

ASSE. 2004. Standard No. 1020, pressure vacuum breaker assembly. Published by the American Society of Sanitary Engineers. 2004.

ASSE. 2011a. Standard No. 1013, reduced pressure principle backflow preventers and reduced pressure principle fire protection backflow preventers. Published by the American Society of Sanitary Engineers. 2011.

ASSE. 2011b. Standard No. 1015, double check backflow prevention assemblies and double check fire protection backflow prevention assemblies. Published by the American Society of Sanitary Engineers. 2011.

ASSE. 2017a. Standard No. 1001, atmospheric type vacuum breakers. Published by the American Society of Sanitary Engineers. 2017.

ASSE. 2017b. Standard No. 1011, hose connection vacuum breakers. Published by the American Society of Sanitary Engineers. 2017.

ASSE. 2017c. Standard No. 1024, dual check backflow preventers. Published by the American Society of Sanitary Engineers. 2017.

AWWA. 2015. Backflow prevention and cross-connection control recommended practices, manual M14, fourth edition. Published by the American Water Works Association. 2015.

AWWA. 2017a. Standard for double check-valve backflow prevention assembly. Published by the American Water Works Association. September 1, 2017.

AWWA. 2017b. Standard for reduced-pressure principle backflow prevention assembly. Published by the American Water Works Association. September 1, 2017.

USC. 2011. Manual of cross connection control. Published by the University of Southern California Foundation for Cross-Connection Control and Hydraulic Research. November 1, 2011.

APPENDIX A

RESOLUTION NO. 858

APPENDIX B

CROSS-CONNECTION CONTROL HAZARD SURVEY REPORT

Cross-Connection Control Hazard Survey Report

Survey date: _____

Customer Information

Customer Name: _____Telephone: _____

Address: _____ZIP: _____

Contact person:_____

Description of premises:_____

Description of water use: _____

Water Service and Backflow Prevention Assembly (BPA) Size/Type

Service Type	**Service Size**	**Meter Size**	**BPA Size**	**BPA Type**
Domestic				
Fire				
Irrigation				
Other				

Cross-Connection Control Specialist (CCS) Information

Name: _____ Telephone: _____

Company name: _____

Address: _____ ZIP: _____

DOH CCS Certification #: _____ Year certified: _____

Survey Results

Note: The CCS's survey shall include an inspection of the premises isolation assembly to verify that it is installed correctly and is a currently listed DOH-approved assembly.

Item	Location & Description of Cross Connection	Backflow Prevention Required

Surveyor's Comments

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Surveyor's Recommendations

I certify that this cross-connection hazard survey accurately reflects the overall risk posed by the customer's plumbing system to the District's distribution system. Based on the above survey, I certify that:

1. I found the following type(s) of premises isolation backflow preventer(s):

    Air Gap ____ RPBA/RPDA ____ DCVA/DCDA _____ None ____.

2. The existing backflow preventer(s) is/are properly installed.

    Yes ____ No ____ N/A ____.

3. The existing backflow preventer(s) is/are commensurate with the degree of hazard:

    Yes ____ No ____ N/A ____.

4. Since no backflow preventer was installed for premises isolation, the premises owner should install a premises isolation backflow preventer of the following type:

    Air Gap ____ RPBA/RPDA ____ DCVA/DCDA ____ N/A ____.

5. The premises owner should replace the existing premises isolation backflow preventer(s) with the following:

    Air Gap ____ RPBA/RPDA ____ DCVA/DCDA ____ N/A ____.

The completed survey report shall be first signed by the CCS conducting the survey, and then countersigned by the owner of the premises or the owner's authorized agent.

CCS Signature: _____Date: _____

As the Owner of the Premises (or Owner's authorized agent), I certify that I have received a copy of this completed Cross-Connection Control Hazard Survey Report.

Signature: _____**Date**: _____

Note: Customers and regulatory agencies should be aware that the District's requirement for this cross connection hazard survey and/or for the installation of a specific backflow prevention assembly on a service pipe ***do not*** constitute an approval of the customer's plumbing system, compliance of the customer's plumbing system with the Uniform Plumbing Code or an assurance of the absence of cross connections in the customer's plumbing system.

APPENDIX C

NEW CUSTOMER PERMIT APPLICATION PACKET

APPENDIX D
WATER SAMPLING PROCEDURES

PWS ID Number	959101 – South Shore (Geneva & Sudden Valley) 081181 – North Shore – Eagleridge 52957B – North Shore – Agate Heights 047828 – Johnson Well

Preparation of the Sample Bottle

1. Select the most appropriate sampling point. Remove any aerators, screens, hoses, or filters from the cold water faucet.
2. Disinfect the tap with liquid chlorine.
3. Let the water run freely for at least five (5) full minutes.
4. Take chlorine residual.

Collection of the Sample

5. Hold the sample bottle near the bottom with one hand and unscrew the cap with the other. Do not rinse out the powder in the sample bottle, it is supposed to be there. Hold the cap near the top edge in one hand and the sample bottle in the other.
6. DO NOT touch any part of the cap that touches the bottle, or set the cap down, or let anything touch the cap.
7. Hold the sample bottle under the stream of water about an inch below the bottom edge of the water spout. DO NOT adjust the flow once you have started filling the sample bottle. Fill the sample bottle to the shoulder or 100 ml fill line but do not let the sample bottle overflow.
8. After the sample bottle is filled to the correct level, remove it from under the flow and immediately place the cap on the bottle and screw it down tightly.

Post Sampling Procedure

9. Shut off the cold water faucet.
10. Replace any attachments that were removed from the faucet.
11. Check to be sure the lab slip is correctly and completely filled out.

    A. Water system ID number

    B. Water system name

    C. Collection date and time the sample was taken

    D. Type of sample: Check ONLY ONE Type:

    i. Compliance

    ii. Investigative

    iii. Raw

iv. Special request

E. Sample location (street address or other type of location identifier)

F. System type (Group A or B)

G. Bottle number and date

H. Write in chlorine residual number

12. Attach the lab slip to the sample bottle with a rubber band.
13. Make a copy of lab slip (on blue paper) and put it in WTPO's box
14. Take a custody sheet with you to the Lab for them to sign
15. Place the sample in a cooler with an ice pack.
16. Transport the sample to the lab within 30 hours of the time of collection.

Water Sample Labs

Edge Analytical Corporate Lab 1620 S. Walnut St. Burlington, WA 98233 800-755-9295 360-757-1400	Edge Analytical 805 Orchard Dr. Suite 4 Bellingham, WA 98225 888-725-1212 360-715-1212 micro@edgeanalytical.com	City of Bellingham Attn. Peg Wendling 778-7850 733-9178 Have Post Point Wastewater Treatment Plant contact Peg Wendling at home and arrange for testing