City of Savannah

PUBLIC WORKS AND WATER RESOURCES BUREAU

CROSS-CONNECTION CONTROL POLICY

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INTRODUCTION

The Georgia Environmental Protection Division of the Department of Natural Resource (EPD-DNR) defines cross-connection as any physical arrangement whereby a public water system is or may be connected directly or indirectly with a non-potable water system or non-permitted water system, sewer, drain, conduit, pool, storage reservoir, plumbing fixture, or other device which contains or may contain contaminated water, liquid, gasses, sewage or other waste of unknown or unsafe quality, which may be capable of imparting contamination to the public water system as the results of backflow, bypass arrangements, jumper connections, removable sections, swivel or changeover devices, or other temporary, permanent or potential connections through which or because of which backflow or backsiphonage could or would occur.

The Rules and regulations for Safe Drinking Water, Chapter 391-3-5-13, also mandate that:

1. A supplier of water or any person having possession or control of facilities which may cause the contamination of a public water system has the responsibility to prevent water from unapproved sources or any contaminants from entering the public water system by such physical arrangements cited in paragraph (1) of this rule.
2. Any person connecting to and purchasing water from a public water system and reselling it to others is considered a supplier of the water so purchased as well as a consumer, and is also responsible for the quality of such water.
3. A supplier shall, when requested by the Division, develop a control program for the elimination and prevention of all cross-connections. A written plan for the program shall be submitted to the Division for review and approval within two years or less in accordance with a written request by the Division. When the plan is approved, the owner shall implement the program immediately.
4. The procedures for backflow and backsiphonage prevention and cross-connection control shall conform to those recommended by the American Water Works Association, Manual 14, and the U.S. Environmental Protection Agency Cross-Connection Manual.

Based on the increased number of incidents of contamination of public water supply systems in Georgia by cross-connections and the increased hazards to the public health, it was apparent to EPD-DNR that a number of public water systems need a more effective Cross-Connection Control Program. Therefore, in March of 1983, EPD-DNR requested all municipal systems in Georgia to prepare a Cross-Connection Control Program to eliminate and prevent cross-connections for public water systems. The plan for the Savannah Water Supply was approved by EPD-DNR in 1984 and immediate implementation of the program was mandated.

In compliance with this State mandate, the City of Savannah, Water and Sewer Bureau (presently the City of Savannah Public Works and Water Resources Bureau) developed this Cross-Connection Control Policy.

The Policy's objective is to prevent contamination of the public water supply. The City of Savannah stands behind this policy and its enforcement and will offer whatever assistance to all who share the responsibilities of providing safe water.

1. OVERVIEW

1.1 OBJECTIVE

The objective of the Cross-Connection Control Policy is to protect the City of Savannah Municipal Water Supply and Water Distribution System from contamination.

As water purveyors, the City of Savannah must plan and diligently execute a program of cross-connection control which either eliminates all cross-connections, or requires the installation and maintenance of a proper type of approved backflow prevention device at the water service connection whenever a potential hazard is determined to exist in the customer system.

The City of Savannah policy on cross-connections does not preclude any inspections or requirements that may be the responsibility of the City of Savannah Development Services Department The Development Services Department will continue to execute existing programs to inspect and prevent plumbing type cross-connection within the establishment.

As mandated by State Law, the City of Savannah will prevent the backflow of contaminants into the public water supply by containing the potential contaminant at the service connection. This policy of containment is necessary due to changes in models or components of equipment, methods of manufacturing and additions to plants, building, etc., which would require changes in water requirements. As a result, new cross-connections may be made and existing internal protection may be by-passed, removed, or otherwise become inefficient. Therefore, containment at the service connection provides continual protection regardless of any water line modification within the establishment.

1.2 CAUSES OF BACKFLOW

The causes of backflow cannot usually be eliminated completely since backflow is often initiated by accidents or unexpected circumstances. However, some causes of backflow can be partially controlled by good design and informed maintenance. Listed below are the major causes of backflow as outlined under the two types of backflow – backsiphonage and backpressure.

A. BACKSIPHONAGE – Backsiphonage is caused by reduced or negative pressure being created in the supply piping. The principal causes of backsiphonage are:

   1. A line repair or break which is lower than the service point. This will allow negative pressure to be created by water trying to flow to a lower point in the system.
   2. If water is withdrawn from an undersized pipe at a very high velocity, the pressure in the pipe is reduced and the pressure differential created can cause water to flow into the pipe from a contaminated source.

3. Lowered pressure in a water main due to a high water withdrawal rate, such as created by firefighting, water main flushing, or water main breaks.
4. Reduced pressure in a supply main on the suction side of a booster pump.

B. BACKPRESSURE – Backpressure may cause backflow to occur where a potable water system is connected to a non-potable system of piping and the pressure in the non-potable system exceeds that in the potable system. The principal causes of back pressure are:

1. Booster pump systems designed without backflow prevention devices.
2. Potable water connections to boilers and other pressure systems without backflow prevention devices.
3. Connections with another system which may, at times, have a higher pressure.
4. Water stored in tanks or plumbing systems which by virtue of their elevation would create head sufficient to cause backflow if pressure were lowered in the public system.

2. RESPONSIBILITY

2.1 CROSS-CONNECTION PROGRAM

The responsibilities of the City of Savannah under the "Cross-Connection Control Policy" in accordance with Georgia State Law, Chapter 391-3-5-13 are as follows:

1. As water purveyors, to protect the City of Savannah from the possibility of contamination by containing, within its consumers' private water systems, contaminants or pollutants which could, under adverse conditions, backflow through uncontrolled cross-connections into the public water system.
2. As plumbing inspectors, to eliminate, control, and isolate existing cross-connections, actual or potential, between the consumer's in-plant potable water system(s) and non-potable water system(s) plumbing fixtures, and industrial piping systems.
3. As both water purveyors and plumbing inspectors, to provide a continuing inspection program of cross-connection control, which will systematically and effectively control all actual or potential cross-connections which may be installed in the future.

2.2 CUSTOMERS

Any person having control or possession of water supply or distribution facilities which may cause the pollution or contamination of a public water system shall prevent water from unapproved sources or any pollutant or contamination from entering the public water system by such physical arrangements which may cause backflow.

If the City of Savannah Sewer Conveyance and Water Distribution Department determines that a pollutant or contaminant on the premises or property of the water customer constitutes a hazard to the public water system, the water customer must install a backflow prevention device approved by the City on all water lines entering the premises from the City water main. The type of backflow prevention device required will be determined by the nature of the customer's system and the degree of hazard it represents. The installation must be completed according to City specifications and must be inspected by the City.

The customer's responsibility will start at the point of delivery (typically following the water meter discharge) from the public potable water system and includes all of his water systems. The customer, at his own expense, shall install, operate, test and maintain approved backflow prevention devices, as directed by the City of Savannah. The customer shall maintain accurate records of tests and repairs made to backflow prevention devices and provide the City of Savannah with copies of such records. The records shall be on forms approved or provided by the City. In the event of accidental pollution or contamination of the public or consumer's potable water system due to backflow on or from customer's premises, the owner shall promptly take steps to confine further spread of pollution or contamination within the customer's premises, and shall immediately notify the City of Savannah of the hazardous condition.

2.3 BACKFLOW PREVENTION DEVICE INSTALLERS

The installer's responsibility is to make proper installation of backflow prevention device assemblies in accordance with the manufacturer's installation instructions and any additional instructions approved by the City of Savannah. The installer will also be responsible to ensure that the device is working properly when it is installed and will be required to furnish to the City of Savannah Cross-Connection Control staff the following information:

1. Service address
2. Owners name
3. Type of device and size
4. Description of location
5. Date of installation
6. Manufacturer
7. Model number
8. Serial number
9. Generic names of contaminant(s) or pollutant(s) used on premises
10. Completed copy of test report by a certified tester (See Appendix I)

NOTE: All Reduce Pressure Zone (RPZ), Double-Check Assembly (DCA), and Pressure Vacuum Breaker (PVB) devices will be required to be tested following installation by a certified Backflow Prevention Device Technician recognized by the City.

3. INSPECTIONS

3.1 FREQUENCY

Due to changes in models or components of equipment, methods of manufacturing and additions to plants, buildings, etc., water use requirements undergo continual changes. As a result, new cross-connections may be installed and existing protection may be by-passed, removed, or otherwise be made ineffective; therefore, an annual or biennial detailed inspection by the customer of all water usage is required.

3.2 PROPOSED CONSTRUCTIONS

All new construction plans and specifications for industrial commercial facilities shall be reviewed by the City of Savannah to determine the degree of possible cross-connection hazards. All commercial and industrial establishments will require backflow prevention devices. In addition, two story or more residential projects will also require backflow prevention devices. Other requirements will be presented during the initial plan review.

3.3 NEW AND EXISTING FACILITIES

In order to determine the degree of hazard to the public potable water system, the owner or owner's representative shall provide information about the water uses on the premises, the existence of cross-connections, the availability of auxiliary or used water supplies, and the degree of hazard that the customer's system presents. If additional information is needed, it shall be supplied to the City upon request. Once inspections are made of new and existing facilities; should any devices or plumbing changes be required, a follow-up inspection will be made of the same facilities at a later date.

3.4 RIGHT OF ENTRY

Whenever it is necessary for the purposes of compliance or enforcement of this Policy, the City, through its authorized representative, may enter upon any property or premises at reasonable times for the purpose of: 1) reviewing any records required to be kept under the provisions of this Policy, 2) inspecting any equipment or water lines or 3) sampling of any water suspected of any cross-connection. The City may enter upon the property at any hour under emergency circumstances to perform an inspection or investigation required to enforce this policy.

3.5 INSPECTION AND TESTING

The customers shall have each backflow prevention device tested on an annual basis by a certified tester recognized by the City. The City will inspect the water customer's backflow prevention device annually for compliance with local ordinances. The customer shall maintain accurate records of tests and repairs made to backflow prevention devices and copies must be made available to the City within 12-months from date of installation. All records will be reviewed during the annual inspection. All records shall be

on forms approved by the City. Following any repair, overhaul, re-piping, or relocation of the device, the customer shall have the device tested to insure that it is in good working condition and will prevent backflow. However, this testing may be more often in those instances where successive inspections indicate repeated failure to properly repair and maintain such device or devices, and to keep adequate records of each test and subsequent maintenance and repair, including materials or replacement parts.

4. DEFINITIONS

4.1 ABSOLUTE PRESSURE

Pressure measured on a scale where a perfect vacuum is zero. Absolute pressure is the sum of gage pressure and atmospheric pressure.

4.2 ACCESSIBLE

Capable of being reached for testing and maintenance, when referring to a backflow prevention assembly. However, it first may require the removal of an access panel, door or similar obstruction (see 4.54, Readily Accessible).

4.3 ADMINISTRATIVE AUTHORITY

The individual official, board, department, or agency established and authorized by a state, county, city or other political entity created by law to administer and enforce the provisions of the cross-connection control program.

4.4 AIR GAP

A physical separation between the free flowing discharge end of a potable water supply pipeline and an open or non-pressure receiving vessel. An “approved air gap” shall be at least twice the diameter of the supply pipe measured vertically above the overflow rim of the receiving vessel; in no case less than 1 inch (2.54 cm). Additional reference: ASME A112.1.2 -2004 Air Gaps in Plumbing Systems.

4.5 APPROVED BACKFLOW PREVENTION ASSEMBLY

An assembly that has been investigated and approved by the administrative authority having jurisdiction. The approval of backflow prevention assemblies by the administrative authority shall be on the basis of a favorable laboratory and field evaluation report by an approved testing laboratory recommending such approval (see 4.7, Approved Testing Laboratory).

4.6 APPROVED CHECKED VALVE

A check valve that is drip-tight in the normal direction of flow when the inlet pressure is at least 1.0 psi (pound per square inch) and the outlet pressure is zero. The check valve shall permit no leakage in a direction reverse to the normal flow. The closure element (e.g., clapper or poppet) shall be internally loaded to promote rapid and positive closure. An approved check valve is only one component of an approved backflow prevention assembly [i.e., pressure vacuum breaker (PVB and SVB), Double Check Valve Assembly (DC) or reduced pressure principle assembly (RP)].

4.7 APPROVED TESTING LABORATORY

The Foundation for Cross-Connection Control and Hydraulic Research of the University of Southern California or other laboratory having equivalent capabilities for both the laboratory and field evaluation of backflow prevention assemblies.

4.8 APPROVED WATER SUPPLY

Any public potable water supply which has been investigated and approved by the health agency having jurisdiction. The system must be operating under a valid health permit. In determining what constitutes an approved water supply, the health agency has final judgment as its safety potability.

4.9 ASPIRATOR

A device used for creating suction, specifically by flowing water through a venture or restricted area of flow. At this restricted area of flow the pressure drops to sub-atmospheric, thus suction is created. Usually a tube is attached at this location for aspiration or suction purposes.

4.10 ASPIRATOR EFFECT

The effect created by an aspirator, restricted area of flow or undersized piping.

4.11 ATMOSPHERIC PRESSURE

The pressure (or weight per unit area) exerted by the atmosphere on a surface. At sea level the atmospheric pressure is 14.7 psia (pounds per square inch, absolute).

4.12 ATMOSPHERIC VACUUM BREAKER BACKSIPHONAGE PREVENTION ASSEMBLY (AVB)

An assembly containing an air inlet valve, a check seat and an air inlet port(s). Also known as the non-pressure type vacuum breaker. The flow of water into the body causes the air inlet valve to close the air inlet port(s). When the flow of water stops the air inlet valve falls and forms a check valve against backsiphonage. At the same time it opens the air inlet port(s) allowing air to enter and satisfy the vacuum. A shutoff valve immediately upstream may be an integral part of the assembly, but there shall be no shutoff valve or obstructions downstream. The assembly shall not be subjected to operating pressure for more than twelve (12) hours in any twenty-four (24) hour period. An atmospheric vacuum breaker is designed to protect against a non-health hazard (i.e., pollutant) or a health hazard (i.e., contaminant) under a backsiphonage condition only.

4.13 AUXILIARY WATER SUPPLY

Any water supply on or available to the premises other than the water purveyor's approved public potable water supply. These auxiliary waters may include water from another purveyor's public potable water supply or any natural source such as a well, spring, river, stream, harbor, etc. They may be polluted or contaminated or they may be objectionable and constitute an unacceptable water source over which the water purveyor does not have sanitary control.

4.14 BACKFLOW

The undesirable reversal of flow of water or mixtures of water and other liquids, gases or other substances in the distribution pipes of the potable supply of water from any source or sources (see related terms - 4.16, Backpressure, and 4.17, Backsiphonage).

4.15 BACKFLOW PREVENTION ASSEMBLY

Any effective assembly used to prevent backflow into a potable water system. The type of assembly used shall be based on the existing or potential degree of hazard and backflow condition. The types of backflow prevention assemblies are:

- Atmospheric Vacuum Breaker Backsiphonage Prevention Assembly (see 4.12)
- Double Check Valve Backflow Prevention Assembly (see 4.29)
- Double Check Detector Backflow Prevention Assembly (see 4.30)
- Double Check Detector Backflow Prevention Assembly-Type II (see 4.31)
- Pressure Vacuum Breaker Backsiphonage Prevention Assembly (see 4.52)
- Reduced Pressure Principle Backflow Prevention Assembly (see 4.57)
- Reduce Pressure Principle Detector Backflow Prevention Assembly (see 4.58)
- Reduce Pressure Principle Detector Backflow Prevention Assembly-Type II (see 4.59)
- Spill – Resistant Pressure Vacuum Breaker Backsiphonage prevention Assembly (see 4.64)

4.16 BACKPRESSURE

Any elevation of pressure in the downstream piping system (by pump, elevation of piping, steam pressure, air pressure, etc.) above the supply pressure at the point of consideration, which would cause or tend to cause a reversal of the normal direction of flow.

4.17 BACKSIPHONAGE

A form of backflow due to a reduction in system pressure, which cause a sub-atmospheric pressure to exist in the water system.

4.18 CERTIFIED BACKFLOW PREVENTION ASSEMBLY TESTER

A person who has proven ability in field testing backflow prevention assemblies to the satisfaction of the administrative authority having jurisdiction, either directly or through a third party certification program. Each person who is certified to perform field tests and prepare reports on backflow prevention assemblies shall be conversant in applicable laws, rules and regulations and have had experience in plumbing or pipe fitting or have other equivalent qualifications in the opinion of the administrative authority having jurisdiction.

4.19 COLUMN OF WATER

A vertical tube of water usually used to create a specific pressure or used to measure pressure by the elevation of water in the tube. A column of water 27 ¾ inches (2.31 feet) high generates a pressure of one pound per square inch.

4.20 CONSUMER

The owner or operator of an on-site water system(s) having a service from a public potable water system.

4.21 CONSUMER'S PORTABLE WATER SYSTEM

The portion of the privately owned potable water system lying between the point of delivery and the point of use. This system includes all pipes, conduits, tanks, receptacles, fixtures, equipment and appurtenances used to produce, convey, store or utilize the potable water.

4.22 CONSUMER'S WATER SYSTEM(S)

Any water system located on the consumer's premises whether supplied by a public potable water system or an auxiliary water supply. The system or systems may be either a potable water system or an industrial piping system.

4.23 CONTAINMENT

See Service Protection, 4.63.

4.24 CONTAMINANT

Any substance that shall impair the quality of water, in such a way as to create an actual hazard to the public health through poisoning, the spread of disease, etc.

4.25 CRITICAL LEVEL

The minimum elevation above the flood level rim of the fixture or receptacle served, downstream piping and water uses on atmospheric vacuum breakers, pressure vacuum breakers and spill-resistant vacuum breakers, at which the unit may be installed. This is indicated by the marking "C-L" or "C/L." When an AVB, PVB, or SVB does not bear a critical level marking, the bottom of the assembly shall constitute the critical level.

4.26 CRITICAL SERVICE

A water service that can never be interrupted due to the critical nature of facility involved.

4.27 CROSS-CONNECTION

Any actual or potential connection or structural arrangement between a public or a consumer's potable water system and any other source or system through which it is possible to introduce into any part of the potable system any used water, industrial fluid, gas, or substance other than the intended potable water with which the system is supplied. Bypass arrangements, jumper connections, removable sections, swivel or change-over devices and other temporary or permanent devices through which or because of which backflow can occur are considered to be cross-connections.

- A direct cross-connection is a cross-connection which is subject to both backsiphonage and backpressure.
- An indirect cross-connection is a cross-connection which is subject to backsiphonage only.

4.28 DEGREE OF HAZARD

Either a pollutant (non-health hazard) or contaminant (health hazard); derived from the assessment of the materials, which may come in contact with the distribution system through a cross-connection.

4.29 DOUBLE CHECK VALVE BACKFLOW PREVENTION ASSEMBLY (DC)

An assembly composed of two independently acting, approved check valves, including tightly closing resilient seated shutoff valves attached at each end of the assembly and fitted with properly located resilient seated test cocks. See Chapter 10 for additional detail. This assembly shall only be used to protect against a non-health hazard (i.e., pollutant). See City of Savannah standard construction details W14A and W14B.

4.30 DOUBLE CHECK DETECTOR BACKFLOW PREVENTION ASSEMBLY (DCDA)

A special designed assembly composed of a line-size approved double check valve assembly with a bypass containing a specific water meter and an approved double check valve assembly. The meter shall register accurately for rates of flow up to 2 gpm (gallons per minute) and shall show a registration for all rates of flow. This assembly shall only be used to protect against a non-health hazard (i.e., pollutant). The DCDA is primarily used on fire sprinkler systems. See City of Savannah standard construction details W14C and W21.

4.31 DOUBLE CHECK DETECTOR BACKFLOW PREVENTION ASSEMBLY – TYPE II (DCDA-II)

A specially designed assembly composed of a line-sized approved double check valve assembly with a bypass around the second check containing a specific water meter and a check valve. The meter shall register accurately for rates of flow up to 2 gpm and shall show a registration for all rates of flow. This assembly shall only be used to protect against a non-health hazard (i.e., pollutant). The DCDA-II is primarily used on fire sprinkler systems. See City of Savannah standard construction details W14C and W21.

4.32 GAGE PRESSURE

The pressure above atmospheric pressure.

4.33 GRAY WATER

Wastewater other than toilet contaminated waste. Wastewater generated by kitchen sinks and dish-washers are not considered gray water.

4.34 HEALTH HAZARD

See Contaminant, 4.24.

4.35 HEALTH AGENCY

The health authority having jurisdiction.

4.36 HOSPITAL

Any institution, place, building, or agency which maintains and operates facilities for one or more persons for the diagnosis, care and treatment of human illness, including convalescence and care during and after pregnancy or which maintains and operates organized facilities for any such purpose, and to which persons may be admitted for overnight stay or longer. The term hospital includes sanitarium, nursing home and maternity home.

4.37 INDUSTRIAL FLUIDS

Any fluid or solution, which may be chemically, biologically or otherwise contaminated or polluted in a form or concentration, which would constitute a hazard if introduced into an approved water supply.

4.38 INDUSTRIAL PIPING SYSTEM

Any system used for transmission of or to confine or store any fluid, solid or gaseous substance other than an approved water supply. Such a system would include all pipes, conduits, tanks, receptacles, fixtures, equipment and appurtenances used to produce, convey or store substances which are or may be polluted or contaminated.

4.39 INTERNAL PROTECTION

The appropriate type or method of backflow prevention within the consumer's potable water system at the point of use, commensurate with the degree of hazard.

4.40 ISOLATION

See Internal Protection, 4.39.

4.41 MANIFOLDED ASSEMBLY

An assembly comprised of backflow prevention assemblies (DC or RP) of the same manufacturer, model and size. Manifold adaptor fittings on both the inlet and outlet of the manifold assembly are considered integral components. The size of the manifold assembly is determined by the inlet and outlet connections of the manifold adaptor fittings.

4.42 NEGATIVE PRESSURE

Any pressure below atmospheric pressure.

4.43 NON-HEALTH HAZARD

See Pollution, 4.47.

4.44 PARALLEL INSTALLATION

Two or more backflow prevention assemblies of the same type installed in parallel, i.e. - having a common inlet, outlet and direction of flow.

4.45 PLUMBING HAZARD

An internal or plumbing type cross-connection in a consumer's potable water system with either a pollutant or contaminant.

4.46 POINT OF DELIVERY

See Service Connection, 4.62.

4.47 POLLUTION

An impairment of the quality of the water to a degree which does not create a hazard to the public health but which does adversely and unreasonably affect the aesthetic qualities of such waters for domestic use.

4.48 POTABLE WATER

Water from any source which has been investigated by the health agency having jurisdiction, and which has been approved for human consumption.

4.49 PRESSURE

A uniform force applied over a surface, measured as a force per unit area. Typically water pressure is measured in pounds per square inch, or psi.

4.50 PRESSURE FLUCTUATION

The changes of pressure within a system.

4.51 PRESSURE GRADIENT

A description of the direction and rate of change of pressure over time.

4.52 PRESSURE VACUUM BREAKER BACKSIPHONAGE PREVENTION ASSEMBLY (PVB)

An assembly containing an independently operating internally loaded check valve and an independently operating loaded air inlet valve located on the discharge side of the check valve. The assembly is to be equipped with properly located resilient seated test cocks and rightly closing resilient seated shutoff valves attached at each end of the assembly. This assembly is designed to protect against a non-health hazard (i.e., pollutant) or a health hazard (i.e., contaminant) under a backsiphonage condition only. See City of Savannah standard construction detail W17.

4.53 PUBLIC PORTABLE WATER SYSTEM

Any publicly or privately owned system operated as a public utility under a valid health permit to supply water for domestic purposes. This system will include all sources, facilities and appurtenances between the source and the point of delivery such as valves, pumps, pipes, conduits, tanks, receptacles, fixtures, equipment and appurtenances used to produce, convey, treat or store potable water for public consumption or use.

4.54 READILY ACCESSIBLE

Capable of being reached for testing and/or maintenance, without the need of removing any access panel, door, or similar obstruction.

4.55 RECLAIMED WATER

Water which, as a result of treatment of wastewater, is suitable for a direct beneficial use or a controlled use that would not otherwise occur. Reclaimed water is not safe for human consumption.

4.56 RECYCLED WATER

See Reclaimed Water, 4.55.

4.57 REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTION ASSEMBLY (RP)

An assembly containing two independently acting approved check valves together with a hydraulically operating, mechanically independent pressure differential relief valve located between the check valves and at the same time below the first check valve. The unit shall include properly located resilient seated test cocks and tightly closing resilient seated shutoff valves at each end of the assembly. This assembly is designed to protect against a non-health hazard (i.e., pollutant) or a health hazard (i.e., contaminant). This assembly shall not be used for backflow protection of sewage or reclaimed water (Note: Check with local administrative authority for acceptable uses). See City of Savannah standard construction details W15, W16, W18 and W19.

4.58 REDUCED PRESSURE PRINCIPLE DETECTOR BACKFLOW PREVENTION ASSEMBLY (RPDA)

A specially designed assembly composed of a line-size approved reduced pressure principle backflow prevention assembly with a specific bypass containing a specific water meter and an approved reduced pressure principle backflow prevention assembly. The meter shall register accurately for rates of flow up to 2 gpm and shall show a registration for all rates of flow. This assembly shall be used to protect against a non-health hazard (i.e., pollutant) or a health hazard (i.e., contaminant). The RPDA is primarily used on fire sprinkler systems. See City of Savannah standard construction details W20 and W22.

4.59 REDUCED PRESSURE PRINCIPLE DETECTOR BACKFLOW PREVENTION ASSEMBLY –TYPE II (RPDA-II)

A specially designed assembly composed of a line-size approved reduced pressure principle backflow prevention assembly with a specific bypass around the second check valve containing a specific water meter and an approved check valve. The meter shall register accurately for the rates of flow up to 2 gpm and shall show a registration for all rates of flow. This assembly shall be used to protect against a non-health hazard (i.e., pollutant) or a health hazard (i.e., contaminant). The RPDA-II is primarily used on fire sprinkler systems. See City of Savannah standard construction details W20 and W22.

4.60 REUSED WATER

See Reclaimed Water, 4.55.

4.61 SANITARY SEWER

The piping system that carries sewage, either by gravity flow or pressure. Includes clean-outs, manholes and sanitary lift stations.

4.62 SERVICE CONNECTION

The terminal end of a service connection from the public potable water system, (i.e., where the water purveyor may lose jurisdiction and sanitary control of the water at its point of delivery to the consumer's water system). If a water meter is installed at the end of the service connection, then the service connection shall mean the downstream end of the water meter.

4.63 SERVICE PROTECTION

The appropriate type or method of backflow protection at the service connection, commensurate with the degree of hazard of the consumer's potable water system.

4.64 SPILL RESISTANT PRESSURE VACUUM BREAKER BACKSIPHONAGE PREVENTION ASSEMBLY (SB)

An assembly containing an independently operating internally loaded check valve and independently operating loaded air inlet valve located on the discharge side of the check valve. The assembly is to be equipped with a properly locate resilient seated test cock, a properly located resilient seated test cock, a properly located bleed / vent port, and be equipped with a properly located resilient seated test cock, a properly located bleed / vent port, and tightly closing resilient seated shutoff valve attached at each end of the assembly. See Chapter 5, for additional details. This assembly is designed to protect against a non-health hazard (i.e., pollutant) or a health hazard (i.e., contaminant) under a backsiphonage condition only.

4.65 STATIC PRESSURE

The water pressure in any system under non-flowing conditions.

4.66 SYSTEM HAZARD

An actual or potential threat of severe danger to the physical properties of the public or the consumer's potable water system or of a pollution or contamination, which would have a protracted effect on the quality of the potable water in the system.

4.67 THERMAL EXPANSION

The resulting effect when water in a closed system, such as a piping system downstream of a backflow preventer heats up. In effect, the heat causes the water volume to expand, but since the system is closed, the pressure increases.

4.68 USED WATER

Any water supplied by a water purveyor from a public potable water system to a consumer's water system after it has passed through the service connection and is no longer under the control of the water purveyor.

4.69 VENTURI

A piping apparatus with a constricted region designed to increase the velocity and thus decrease the pressure of an incompressible fluid in the constricted region.

4.70 VENTURI EFFECT

When an incompressible fluid's velocity increases as a result of flowing through a constricted area of piping, the pressure will decrease.

4.71 WATER SUPERVISOR

The consumer or a person on the premises appointed by the consumer charged with the responsibility of maintaining the consumer's water system(s) on the property free from unprotected cross-connections and other sanitary defects, as required by regulations and laws.

4.72 WATER SUPPLIER

The public or private owner or operator of the potable water system supplying an approved water supply to the public.

5. TYPICAL FACILITIES, CROSS-CONNECTIONS OR WATER USES WHICH MAY ENDANGER THE PUBLIC WATER SYSTEM

The following conditions and problems would be reviewed in cases where the City is requiring that the "degree of hazard" be based on a complete inspection of the consumer's water-using facilities. For convenience, these conditions have been divided into three groups. Group I includes cross-connections typical to certain industries or uses. Group II includes potential cross-connections involving water-using fixtures, equipment, facilities, etc., and grouped in associated categories. Group III lists chemicals and chemical compounds used in water treatment, hydraulically distributed in the consumer's water system or used in conjunction with water by industry. The following are intended to be representative but not all inclusive.

5.1 GROUP I INCLUDES CROSS-CONNECTIONS TYPICAL TO CERTAIN INDUSTRIES OR USES

Hazards normally to be found in connection with the operation of an average water system include:

5.1.1 SEWERAGE SYSTEMS

Cross-connections to sewage or surface water pumps for priming, cleaning, flushing or unclogging purposes;

Water-operated sewage sump ejectors for operational purposes;

Sewers for the purpose of disposing of filter, softener backwash water, water from cooling systems, for the purpose of providing for a quick drain for the building water lines, of flushing or blowing out obstructions in the sewer lines, etc.

5.1.2 RESERVOIRS, COOLING, TOWERS, ETC.

Reservoirs, cooling towers, and circulating systems which may be heavily contaminated either with bird droppings, vermin, algae, bacterial slimes or with toxic water treatment compounds such as pentachlorophenol, copper, chromates, metallic glycosides, compounds of mercury, quaternary ammonium compounds, etc.

5.1.3 INDUSTRIAL FLUID SYSTEMS

Industrial fluid systems and lines containing cutting and hydraulic fluids, coolants, hydrocarbon products, glycerol, paraffin, caustic and acid solutions, etc.

5.1.4 FIRE FIGHTING SYSTEMS

Fire-fighting systems, including storage reservoirs which may be treated for prevention of scale formation, corrosion, algae, slime growths, etc.;

Fire systems which may be subject to contamination with anti-freeze solutions, “foamite” or other chemicals or chemical compounds used in fighting fire.

Fire systems which are subject to contamination with auxiliary, used water supplies or industrial fluids.

5.1.5 PLATING FACILITIES

Plating facilities involving the use of highly toxic cyanides, heavy metals in solution (such as copper, cadmium, chrome, nickel, etc.), acids and caustic solutions;

Plating solution filtering equipment with pumps and circulating lines.

Tanks, vats or other vessels used in painting, descaling, anodizing, cleaning, stripping, oxidizing, etching, passivating, pickling, dipping, rinsing operations.

Other lines or facilities needed in the preparation or finishing of the products.

5.1.6 STEAM GENERATING FACILITIES

Steam generating facilities and lines which may be contaminated with boiler compounds such as pentachlorophenol, hydrazine, cyclohexylamine, etc. (NOTE: very particular hazard is the possibility of steam getting back into the domestic system, causing either a system or health hazard.)

5.1.7 PLUMBING HAZARDS

Inadequately protected (improperly installed, improperly maintained or without vacuum breakers) flush valve toilets, urinals, aspirators, retorts, pipet tube washers and similar contaminated and/or sewer connected facilities.

Laboratory equipment which may be chemically or bacteriologically contaminated such as steam sterilizers, autoclaves, specimen tanks, autopsy and mortuary equipment. (NOTE: These hazards are critical because little or no attention is given to the maintenance of the vacuum breaker often supplied with such equipment.)

5.1.8 COOLING SYSTEMS-SINGLE PASS

Compressors, heat exchangers, air-conditioning equipment and other water-cooled equipment which may be sewer-connected.

5.1.9 IRRIGATION SYSTEMS

Irrigation systems which may be equipped with pumps, injectors, pressurized tanks or vessels, or other facilities for injecting into the irrigation system agricultural chemicals such as fungicides, pesticides, soil conditioning and other similar noxious, toxic or objectionable substances;

Irrigation systems subject to contamination from submerged inlets, auxiliary water supplies, ponds, reservoirs, swimming pools and other sources of stagnant, polluted or contaminated waters.

5.1.10 PLUMBING – HOSPITALS

Contaminated or sewer-connected equipment such as bed pan washers, flush valve toilets and urinals, autoclaves, specimen tanks, sterilizers, pipet tube washers, cuspidors, aspirators, autopsy and mortuary equipment, etc. (NOTE: It has been found that in this type of facility little or no attention is given to the maintenance of air-gaps or vacuum breakers.)

5.1.11 PLUMBING – MULTI-STORIED BUILDINGS

Multi-storied buildings where the upper floors are above the reach of the water purveyor's system pressure and it is necessary to use booster pumps. Considerable care must be exercised to prevent the use of the suction side line to these pumps from also being used as the take-off for domestic, sanitary, laboratory or industrial uses on the lower floors. Pollutants or contaminants from equipment supplies by take-offs from the suction side line may be easily pumped throughout the upper floors. (NOTE: All installations requiring a booster pump must be protected with a reduced pressure zone back flow preventer assembly (RPZ)).

5.1.12 INDUSTRIAL SYSTEMS – CHEMICAL CONTAMINATION

Tanks, can and bottle washing machines and lines where caustic, acids, detergents, and other compounds are used in cleaning, sterilizing, and flushing.

5.1.13 PHOTO PROCESSING EQUIPMENT

Tanks, automatic film processing machines or other facilities used in processing films, which may be contaminated with chemicals such as acetic acid, potassium ferricyanide and/or one of the many different types of aromatic series of organic chemicals.

5.1.14 LAUNDRIES AND DYE WORKS

Laundry machines having under-rim or bottom inlets.

Dye vats in which toxic chemicals and dyes are used.

Wash water storage tanks equipped with pumps and re-circulating systems.

Retention and mixing tanks.

Shrinking, bluing and dyeing machines with direct connections to circulating systems. (NOTE: Some of these machines are equipped with pumps capable of forcing contaminated fluids through cross-connections into the public water supply.)

5.1.15 INDUSTRIAL FACILITIES

Tanks, lines, valves, fittings, and other equipment being subjected to hydraulic test.

Hydraulically operated equipment where the City water pressure is used directly and may be subject to back pressure.

Equipment under hydraulic tests where pumps, rams, pressure cylinders or other hydraulic principles are used to provide pressures for testing purposes. (NOTE: In such cases air, gas or hydraulic fluids may be forced back into the public system.)

5.1.16 MOTION PICTURE STUDIOS

Open reservoirs, lagoons, tanks or similar facilities, used as props in the making of motion pictures. (NOTE: These facilities may be heavily contaminated with body wastes, dyes, biological or chemical contaminants used in the prevention of algae and slime growths and to color the waters for color picture purposes)

Automatic film processing machines, tanks, vats and other facilities used in processing films. (NOTE: Toxic chemicals such as acetic acid, potassium ferricyanide and different types of organic chemicals may be used in these facilities).

Special effects equipment in which chemicals and other materials may be injected into the water supply for special effects;

5.1.17 PETROLEUM PROCESSING

Steam boilers, steam lines, mud pumps and mud tanks, hydraulically operated Tretolite tanks, oil well casings (for dampening gas pressures) dehydration tanks, outlet lines from storage and dehydration tanks (for purging purposes), oil and gas tanks (to create hydraulic pressures and to hydraulically raise the oil and gas levels), gas and oil lines (for testing, evaluating and slugging purposes).

5.1.18 PAPER PROCESSING

Pulp, bleaching, dyeing and other processing equipment which may contaminate with toxic chemicals.

5.1.19 CANNERY EQUIPMENT

Pressure cookers, autoclave, retorts and other similar steam-connected facilities washers, cookers, tanks, line flumes, and other equipment used for storing, washing, cleaning, blanching, cooking, flushing, fluming, or for transmission of foods, fertilizers or wastes.

5.1.20 AUXILIARY WATER SYSTEMS

Most state regulations require that the service connection from an approved water supply, be protected by a suitable backflow prevention device where there is an auxiliary water supply system on the premises even though there are no overt cross-connections.

5.1.21 SOLAR ENERGY SYSTEM

Solar Energy Systems for domestic hot water heating, space heating or cooling, industrial process water heating, swimming pool heating which may have cross-connections with the domestic water system. The Solar energy system may employ anti-freeze solutions or chemical corrosion inhibitors.

5.2 GROUP II INCLUDES POTENTIAL CROSS-CONNECTIONS INVOLVING WATER-USING FIXTURES AND EQUIPMENT

Situations which should be considered in evaluating the degree of hazard to the public potable water system include:

5.2.1 AUXILIARY, FIRE FIGHTING, IRRIGATION, SWIMMING POOLS, ETC., WATER SUPPLIES

- Fire-fighting systems – booster pumps to tank systems, storage facilities and Siamese connections;
- Fish ponds with pump connected;
- Hot water system – drainage and flushing facilities;
- Irrigation systems – parks, golf courses, playgrounds, schools, etc.;
- Jumper connections;
- Lawn sprinklers under pressure;
- Ocean water for fire protection;
- Fountain – display, public and private;
- Public and private water companies;
- Private wells for domestic, commercial, irrigation, and industrial use;
- Swimming pool inlets, recirculation systems, chlorinators, and drains;

5.2.2 PROCESS WATERS RECIRCULATED

- Air conditioning – refrigerated, air wash, make-up and drains;
- Ball mills;
- Cooling's systems-refrigeration, Diesel engines, compressors;
- Any industries practicing water conservation;
- Ink mills;
- Paint mills

5.2.3 WATER TREATMENT FACILITIES

- Addition of chemicals;

- Boiler feed treatment;
- Compound feeders;
- Scale, corrosion, slime control;
- Water filtration and water softening

5.2.4 SITUATIONS WHERE TOXIC OR OBJECTIONABLE CHEMICALS ARE OR MAY BE TRANSMITTED, STORED OR USED IN A MANNER WHICH MAY ENDANGER THE WATER SYSTEM

- Brine Lines
- Oil Systems
- Photo Processing & Washing
- Mixing Tanks
- Foamite Line
- Pickling Tanks
- Glycerol Lines
- Plating Works
- Laboratory Equipment
- Refrigerants

5.2.5 PRIMING LINES – THAT HAVE BEEN FOUND CONNECTED TO:

- Acid Pumps
- Cyanide Pumps
- Air Conditioner Pumps
- Gasoline Lifts
- Air Pumps
- Glycerol Pumps
- Booster Pumps
- Hydraulic Elevator Pumps
- Cadmium Solution Pumps
- Sewer Pumps
- Caustic Pumps
- Sump Ejectors
- Chromic Acid Pumps
- Venturi Float Lines

5.2.6 DIRECT WATER CONNECTIONS TO STEAM SYSTEMS AND HYDRAULIC ELEVATORS AND AIR LINES, ETC.

- Boilers – high and low pressure
- Cold and hot water return to steam systems
- Compressors
- Direct-connected hydraulic elevators
- Elevator air lines

- Return and surge tank hydraulic elevator systems
- Steam Ejectors
- Steam lines
- Suction tees
- Turbo burners
- Vacuum systems

5.2.7 INDUSTRIAL LINES

- Laboratories
- All types of industries

5.2.8 INTERSTREET SERVICES - LOW PRESSURE AND FRINGE AREA

- Elevation and pressure conditions
- More than one service to a premise

5.2.9 INDUSTRIAL WATER – USE CONNECTIONS

- Box Plants - glue pots, soaking vats, steaming process
- Canneries - pressure cookers, retorts, wash lines, salt wash lines
- Creameries - distilled water, ice water, tap water, hot water, steam, milk, and other products
- Laundries - caustic soap solutions, hot and cold water, softened hot and cold water, chlorinated water, and boiler room equipment
- Metal Works - testing lines, cooling systems, plating solutions, metal processing lines, cutting oil, lubricant lines, and welding machines
- Oil Companies - flushing oil lines, tanks and systems - to dehydrators heating and cooling systems
- Packing houses - rendering vats, pressure reduction vats and hide soaking and pickling vats
- Rubber and rubber goods plants - roll cooling machines, cookers, water transmission systems, brine and styrene solutions
- Shipyards - salt water systems, tank testing facilities, ship line testing, pier head outlets, fire systems, prestolite systems
- Tanneries - Chemical solution and dye lines, lanolin lines and soaking tanks
- Hospitals - All types

5.2.10 CROSS-CONNECTIONS INVOLVING SEWAGE OR SEWAGE DISPOSAL FACILITIES

- Fire sprinkler drain lines
- Compressors - cooling systems with direct connection
- Diesel engines - cooling systems with direct connection
- Direct water lines to sewers for drains or flushing

- Flush manholes - water supply to flush tanks
- Holding tanks - camper or trailer toilet flushing facilities
- Various blow offs or drains to sewers
- Reservoir by - passes and drains to sewer or storm drains
- Sewage chlorinators - direct injection
- Sewer flushing equipment- water connection
- Sewage sump pumps and ejectors - water operated
- Water street mains drain to sewer or storm drains
- Priming lines
- Water operated pumps
- Baptismal founts
- Brewery vats
- Brine tanks
- Cheese tank
- Culture vats
- Dipper vats
- Dye tanks
- Food Mixing tanks
- Kitchen Equipment
- Mortician's aspirators
- Photographic tanks
- Pickling tanks
- Plating tanks
- Therapeutic baths
- Water jacketed tanks, vats, and pots
- Potato Peelers
- Shrinking tanks
- Sinks
- Soaking tanks
- Spring-loaded glass
- Washers
- Steam soap washing device
- Steam table
- Connections
- Sewage sump ejectors
- Swimming pool gutter
- Drains
- Tanks
- Vats

5.2.11 SPECIAL USES WHERE CROSS-CONNECTIONS ARE USUALLY FOUND

- Baptismal tanks
- Blood plasma equipment
- Blueprint machines
- Car washing equipment - caustic and soap guns, mixers and boiler equipment
- Chillers
- Commercial vacuum cleaning equipment
- Construction equipment lines
- Deaerators
- Garbage washing with steam and cold water connections
- Humidity Controls
- Hydraulic fertilizer applications
- Mortuaries
- Oil well leases
- Pest control equipment - orchard spray
- Pressure and steam cookers
- Roof and house tanks
- Soap mixing layouts
- Solar heating systems
- Steamer supply equipment
- Storage reservoirs
- Veterinary hospitals
- Water-operated siphonage, all types
- Weed control equipment
- X-ray equipment

5.2.12 PLUMBING AND WATER PIPING CROSS-CONNECTIONS

- Aspirators
- Autoclaves
- Auto shampoo
- Basins
- Bathtubs
- Bedpan washers
- Bidets
- Blueprint machines
- Bottle washers
- California washers (below flood level)
- Carbonators
- Can washers
- Coffee urns

- Colonic irrigators
- Cuspidors - water operated
- Grease traps
- Hoppers (utility)
- Hose bibs - (certain types)
- Hydraulic vacuum cleaners
- Insecticide sprayers - water operated
- Instrument sterilizers
- Integral tank and closet bowls
- Laundry trays
- Laboratory operated vacuum pumps
- Lawn sprinklers (at last control valve)
- Overflow tanks
- Cooking kettles
- Drinking fountains
- Laundry washers
- Pasteurizers
- Plumber's enemy (identical gadgets)
- Plumber's friend (removable hose connection between bib and lavatory or sink drain)
- Pressure cookers
- Dishwasher
- Refrigeration units
- Shampoo units
- Soda fountain
- Turbo burner drains
- Toilets - flush valves
- low tanks
- Overhead exposed
- leaking sewage
- Fish ponds
- frost proof toilets
- garbage grinding devices
- Urinals
- Yard outlets - submerged
- Washing machines
- Watering troughs
- Yard sprinkling nozzles

5.3 GROUP III LISTS CHEMICAL COMPOUNDS USED IN WATER TREATMENT

Chemicals or chemical compounds which may create a hazard to the public system when infected or otherwise introduced into the consumer's system include:

5.3.1 AGRICULTURE

Solutions of chemicals are used by agriculture for many purposes. The following are some of the chemical compounds which may be injected into irrigation systems for spreading purposes. All of them are toxic and concentrated solutions.

Fertilizers

- Ammonium Salts
- Phosphates
- Ammonia Gas Potassium Salts

Weedicides

- 2.4.D
- Sodium Chlorate
- Dinitrophenol
- Borax
- Karmex
- Sodium Arsenite
- 2.4.5. T
- Methyl bromide
- Pentachlorophenol

Pesticides

- DDT
- Parathion
- TDE
- Malathion
- BHC
- Nicotine
- MH
- Lindane
- TEPP

5.3.2 COOLING SYSTEMS - OPEN OR CLOSED

Cooling systems, including cooling towers, usually require some treatment of the water for algae, slime or corrosion control.

Chemicals frequently used for this purpose may include the following toxic chemicals:

- Quaternary ammonium compounds
- Pentachlorophenol
- Mercury

- Chromium

Or the following chemicals which are toxic in higher concentrations:

- Chlorine
- Permanganate
- Bromine
- Glucosides
- Copper

5.3.3 PLATING PLANTS

In plating work, materials are first cleaned in acid or caustic solutions at concentration that are highly toxic, which they are immersed in plating solutions which are highly toxic. Such solutions may contain:

- Cyanides
- Fluorides

Or such metals in solution as:

- Copper
- Chromium
- Nickel
- Cadmium
- Antimony
- Silver
- Salts, etc.

5.3.4 STEAM BOILER PLANTS

Most boiler plants will use some form of boiler feed water treatment. The chemicals normally used for this purpose include highly toxic compounds such as:

- Cyclohexylamine
- Hydrazine
- Morphine
- Benzylamine

Or the less toxic compounds such as:

- Acids
- Sodium hydroxide
- Sodium sulphate
- Sodium phosphate
- Sodium nitrate
- Sodium illuminate
- Sodium alginate

5.3.5 DYE PLANTS

Most solutions used in dyeing are highly toxic. The toxicity depends on the chemicals used and their concentrations. The following types or chemical groups of dyes that are generally used are:

- Vat Dye
- Nitro Dye
- Mordant Dye
- Metallized Dye
- Chrome Dye
- Thiazol Dye

5.4 TYPE OF BACKFLOW PROTECTION REQUIRED

An approved backflow prevention device of the type designated shall be installed on each water service connection to the following types of facilities. This list is presented for when as a guideline, in lieu of a complete inspection of the consumer's water-using facilities, and should not be construed as being complete.

Abbreviations used are as follows:

- AG - Air Gap Separation
- RPZ - Reduced Pressure Zone Backflow Preventer
- RDCA - Residential Dual Check Assembly
- PVB -Pressure Vacuum Breaker
- AVB - Atmospheric Vacuum Breaker
- DCA- Double Check Assembly

Type of Facility	Minimum Type of Protection
○ Breweries, distillers, bottling plants	RPZ
○ Car wash with recycling system and/or wax eductor	RPZ
○ Chemical plants	RPZ
○ Dairies	DCA
○ Dentist office	RPZ
○ Fertilizer plants	RPZ
○ Film laboratory or processing plant	RPZ
○ Food or beverage plant	RPZ
○ Hospitals, clinics, medical buildings	RPZ parallel
○ Irrigation systems with chemical injection and/or booster pump	RPZ
○ Laboratories	RPZ
○ Laundries & dry cleaning plants	RPZ
○ Machine tool plants	RPZ
○ Metal processing plant	RPZ

○ Metal plating plant	RPZ
○ Morgues or mortuaries	RPZ
○ Nursing homes	RPZ
○ Packing houses or rendering plants	RPZ
○ Paper products plant	RPZ
○ Pesticides (exterminating companies)	PVB
○ Overhead fill petroleum processing plant	RPZ
○ Petroleum storage yard	RPZ
○ Pharmaceutical or cosmetic plant	RPZ
○ Piers, docks, or waterfront facilities	RPZ
○ Power plants	RPZ
○ Radioactive material plants	RPZ
○ Restaurants, with soap ejector industrial type disposal	RPZ
○ Sand and gravel plants	DCA
○ Schools with laboratories	RPZ
○ Single family buildings one and two stories only	RDCA
○ Swimming pools with piped fill line	AG or RPZ at pool
○ Sewage treatment plant	RPZ
○ Sewage pumping stations	RPZ
○ Tall Buildings requiring a booster pump	RPZ
○ Veterinary establishments	RPZ

In addition to and including those types of facilities previously listed, an approved backflow prevention device of the type designated shall be installed on each domestic water service connection to any premises containing the following real or potential hazards:

○ Premises having an auxiliary water system not connected to public water system	RPZ
○ Premises having a water storage tank, reservoir pond, or similar appurtenance	RPZ
○ Premises having a steam boiler, cooling system or hot water heating system where chemical water conditioners are used	RPZ
○ Premises having submerged inlets to equipment	RPZ
○ Premises having self-draining yard hydrants, fountains, hose boxes of similar devices presenting a health or system hazard (i.e., chemical storage plants, tank farms, bulk storage yards)	RPZ
○ Premises having self-draining yard hydrants, fountains, hose boxes, or similar devices presenting a pollution hazard (i.e., parks, playfields, cemeteries)	DCA
○ Others specified by the City if Savannah	DCA

Note: Any Commercial establishment not delineated above will be required to install a double check valve assembly.

5.5 INSTALLATIONS REQUIRING CONTINUOUS SERVICE: PARALLEL INSTALLATION

All backflow prevention devices with test cocks are required to be tested with a minimum frequency of once per year. For facilities that require an uninterrupted supply of water, and when it is not possible to provide water service from two separate meters, provisions shall be made for a "parallel installation" of backflow prevention devices.

Multi-story buildings which have a number of flushometer toilets should be equipped with parallel devices. Experience has shown if the water supply is shut off to this type of building, flushometers may have to be manually reset.

During testing one device is left on while the other is being tested. Usually the two devices are sized one device size smaller than the service line. For example, one 2 inch device service line shall be equipped with two 1 ½ inch devices; one 8 inch device service line shall be equipped with two 6 inch devices.

The City of Savannah will not accept an unprotected bypass around a backflow preventer when the device is in need of testing, repair or replacement.

5.6 HEALTH HAZARD; SYSTEM HAZARD; POLLUTION HAZARD

"Health Hazard" means any condition, device, or practice in a water system or its operation that creates, or may create, a danger to the health and well-being of users. The word "severe", as used to qualify "health hazard", means a hazard to the health of the user that could reasonably be expected to result in significant morbidity or death. "System Hazard" means a condition posing an actual or potential threat of damage to the physical properties of the public water system or a potable consumer's water system. "Pollution Hazard" means a condition through which an aesthetically objectionable or degrading material not dangerous to health may enter the public water system or a potable consumer's water system.

5.7 EXTERMINATING COMPANIES

All tanks, tank trucks, and spraying apparatus used to convey pesticides or herbicides in an exterminating process are required to use only overhead (air gap) piping arrangements. All filling locations will consist of over-head piping arrangements with correctly installed pressure vacuum breakers. If for any reason an overhead piping arrangement cannot be used, a reduced pressure zone backflow preventer must be installed on the fill line.

5.8 CROSS-CONNECTION-CONTROL REQUIREMENTS FOR FIRE PROTECTION SYSTEMS

For purposes of cross-connection control, fire protection systems shall be classified as sprinkler, standpipe, or combined. Sprinkler systems shall be further classified as follows:

- Class 1 - directly supplied from public water mains only; no pumps, tanks, or reservoirs; no physical connection from other water supplies; no antifreeze or additives of any kind; all sprinkler drains discharging to atmosphere, dry wells, or other sage outlets.

- Class 2 - directly supplied from public mains, same as Class 1, except that booster pumps may be installed in supply lines.
- Class 3 - directly supplied from public mains, same as Class 1, plus one or more of the following: Elevated storage tanks or pressure tanks; fire pumps taking suction from above-ground covered reservoirs or tanks. All storage facilities shall be filled from the potable water supply and maintained in a potable condition.
- Class 4 - directly supplied from public mains similar to Classes 1 and 2, and with an auxiliary water supply on or available to the premises; or an auxiliary water supply located within approximately 1700 ft. of the pumper connection.
- Class 5 - directly supplied from public mains, and interconnected with auxiliary supplies, such as: pumps taking suction from reservoirs exposed to contamination, or rivers and ponds; driven wells; mills or other industrial water systems; or where antifreeze or other additives are used.
- Class 6 - directly supplied from public water mains only, with or without gravity storage or pump suction tanks, and interconnected with industrial systems.

Standpipe systems shall be further classified as Non-hazardous (impurities equal to Class 3 or lower sprinklers).

Fire Protection systems shall be contained from the public water mains as follows:

- Tall buildings that require a booster pump shall be contained by the installation of a reduced pressure zone detector check.
- Class 1 and Class 2 sprinkler systems shall include the following checking device in the water supply lines from the public mains: an approved double detector check backflow preventer with detector by-pass.
- By-pass shall be equipped with appropriate checking device. Provision shall be made to test all devices, including shut-off valves, as required. All devices shall be listed or classified for fire protection service by Underwriters Laboratories in accordance with UL Standard 312. The Georgia code requires at least one of the checking devices to be internally loaded.
- Class 3 sprinkler systems, and non-hazardous standpipe systems, shall be contained by the installation of double detector check backflow preventers. In addition, all Underwriters Laboratories in accordance with UL Standard 312. Class 4 and Class 5 sprinklers systems, and Hazardous standpipe systems, shall be contained by reduced pressure zone backflow preventer that are classified I accordance with UL 312.
- Class 6 sprinkler systems, and standpipe systems of similar degree of hazard, shall be contained by procedures determined after a survey of the premises.
- Combined sprinkler and standpipe systems shall be contained from the public mains by procedures applicable to the component that represents the higher degree of hazard.

The purpose of certain checking devices used, or likely to be used, with fire protection systems is outlined in the following section to call attention to those approved for cross-connection control and those that are not:

A. Double detector check - To prevent backflow of polluted water from fire protection systems into the potable water system; to detect leaks in fire protection systems; and to provide directional flow.
B. Reduced pressure detector check - To prevent backflow of contaminated water from fire protection systems in to the potable water system; to detect unauthorized use of water; to detect leaks in the fire protection system; and to provide a directional flow.

The two OS&Y Resilient Seat shut off valves that are necessary for periodic testing of backflow preventer must be attached directly to the inlet and outlet flanges of the device and need to be in addition to any valve(s) already required in the water supply piping.

The shut-off valves required for periodic testing of a backflow preventer, shall be supplied by the backflow preventer manufacturer and shall be listed for fire protection service by a nationally recognized testing laboratory, such as FM or UL, and the inlet valve shall include an approved test cock on the upstream side.

The City of Savannah requirements for Cross-Connection Control for fire systems do not preclude any requirements that may be the responsibility of the Fire Marshall of the City of Savannah Fire Department.

PRIVATE FIRE HYDRANTS

On private property where there are private fire hydrants, the following requirements are necessary:

1) UL, FM approved fire line meter and strainer to be installed and sized for designed fire flow.
2) University of Southern California (USC) approved backflow prevention assembly to be installed downstream of the fire line meter.

CITY FIRE HYDRANT USE

Contractors or any person using a City Fire Hydrant for any purpose must post a bond with the City of Savannah and install a fire hydrant meter and backflow preventer supplied by the City of Savannah. Upon return to the City in good condition, the bond will be returned, once all payments for water use have been completed.

5.9 FIRE PROTECTION GUIDELINES

Prior to any connection of new or renovated fire sprinkler systems to the City of Savannah, the following procedures are required:

1. Plans and hydraulic design data must be submitted for review to the Development Services Department. All plans must be prepared or reviewed by a professional engineer registered in the State of Georgia and plans must be stamped with the engineers seal.

2. Any Booster pump installations will be designed to insure that pressure in the distribution system does not fall below 20 psi residual. A minimum of 20 psi residual must be maintained in the distribution system at all times. Detailed specifications on any fire pump are required for review for installation. No anti-freeze or similar chemical will be allowed in fire Sprinkler Systems unless approved by the Public Works and Water Resources Bureau.

BACKFLOW PREVENTION REQUIREMENTS

All new, renovated or existing Fire Sprinkler Systems are private and will be required to have an approved backflow prevention assembly with an approved by-pass meter. The by-pass line is also required to have a line size backflow prevention assembly. The meter must register in cubic feet. The backflow prevention assembly must meet all requirements of AWWA Standard C-506-78 and the Foundation for Cross Connection Control and Hydraulic Research at the University of Southern California.

INSTALLATION OF DEVICES

Installations of the Fire Line backflow prevention assembly, valve, and all appurtenances are the owner's responsibility. The backflow prevention assembly valve and by-pass meter will in all cases be installed so that they are readily accessible for maintenance and inspections. Wet taps to the city water main will be scheduled accordingly with the City of Savannah Water Distribution Department after all plans and hydraulic data have been reviewed and approved by the City of Savannah and the appropriate Fire Department (i.e., City of Savannah or Chatham County) and the inspection of the installed underground system has been approved by City of Savannah. At least one week's advance notice will be given to the Water Distribution Department prior to any wet tap of the City main. The Water Distribution Department will provide one man, air compressor, and the tapping machine. The owner will be responsible to coordinate all street cuts and traffic obstructions with the City Traffic Engineering and all other appropriate agencies (e.g., GDOT, Chatham County Engineering). Any construction activity on or near City owned trees and shrubs will be coordinated with the Park and Tree Department. The owner will be responsible to provide all hardware, men and equipment required to perform the wet tap and to provide adequate safety measures to protect the workmen and the public.

All tapping sleeves will be ductile or cast iron mechanical joint fittings in accordance with AWWA Standard C-500 or C-550. All installations requiring retaining glands will be the responsibility of the owner. Adequate design and installation procedures must be taken to prevent leakage of the system. The developer or owner shall provide to the City, a statement from the Project Engineer certifying that the materials and workmanship including pipe, bedding, valves, manholes, and other related materials meet the City of Savannah specifications and standards. Upon request by the City of Savannah, the certification shall be substantiated by material affidavits from the supplier.

All underground fire systems will be pressure tested from the City main to backflow prevention assembly and appurtenances. Any fire line less than 60 feet from the main to the backflow prevention assembly will not be required to disinfect provided that the underground system was thoroughly flushed

and protected from foreign materials during installation. Any fire line in excess of 60 feet will be required to be disinfected and sampled for bacteriological analysis.

It will be the responsibility of the owner to adequately pressure test the underground system from the backflow prevention assembly to the building. No connection will be made to the City of Savannah system until the testing requirements have been met and observed by the City of Savannah. For installation requirements (location), see Section 9 of the Policy Manual.

MAINTENANCE REQUIREMENTS

It will be the responsibility of the owner to maintain the Fire System from the valve at the City water main to the inside of the building including the back flow prevention assembly. The owner/client is required to provide a signed declaration delineating maintenance responsibilities of the fire system (Exhibit 5). This owner/client declaration must be on file in the Public Works and Water Resources Bureau.

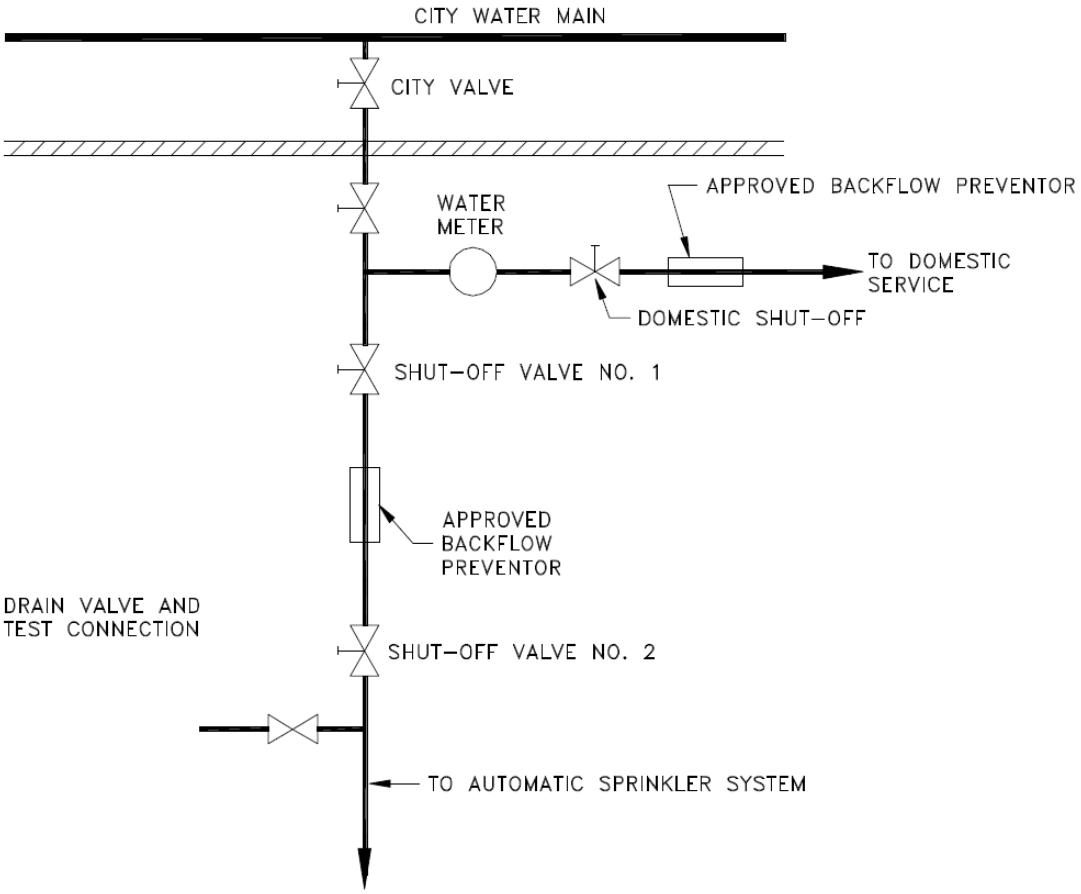
RESTRICTIONS

A fire line shall have a separate connection to the water main. No fire line shall be allowed to share a common connection with a domestic water line except as outlined in the following section for a fire system meeting the requirements of National Fire Protection Association (NFPA) Standard 13D. It shall be the responsibility of the consultant and/or owner to provide total water demand requirements of the system with the plans and hydraulic data. Any unauthorized use of water except for fire protection is prohibited.

NFPA 13D FIRE SPRINKLER SYSTEMS

Domestic water services and domestic fire sprinkler systems installed at one and two family dwellings and manufactured homes may be allowed to share a single connection to a water main provided prior approval has been issued by the City of Savannah Public Works and Water Resource Bureau. Domestic fire sprinkler systems are defined as those systems that protect one and two family dwellings and manufactured homes meeting the requirements of NFPA 13D.

The domestic water service and the fire sprinkler system shall operate independently of each other from the point of separation. The systems shall be designed to insure that pipe sizes, flows, and pressures are adequate for the combined fire protection system demand and the domestic service peak demand. The discharge and calculations for the fire protection system shall be in accordance with NFPA 13D. A City of Savannah water meter shall be installed on the domestic water system service line downstream of the separation point. An approved double check valve shall be installed on the fire sprinkler system supply line. The installation shall meet the following arrangement:



NOTE: All fire sprinkler systems meeting NFPA 13 or NFPA 13R shall be supplied by independent connections to the water mains and shall meet all other requirements that apply to those respective standards.

INSPECTIONS

When installation of the fire system is completed, notification shall be given to the City of Savannah. An inspection of the system from the water main to the backflow prevention assembly valve shall be scheduled after notification. Appropriate follow-up inspections shall be scheduled accordingly.

VIOLATIONS: NEW SYSTEMS

No water shall be made available to the building until the system is in compliance. The owner shall be notified in writing of any violations found during the initial inspection. A follow up inspection shall be scheduled giving adequate time for the proper connections to be made. If no corrective action is taken to correct the efficiencies, notification in writing shall be given to the owner that water service shall not be made available to the building.

VIOLATIONS: EXISTING SYSTEMS

Existing systems, not in compliance, shall have six months from notification by the City of Savannah to make necessary correction to the fire system.

5.10 OTHER CROSS-CONNECTION HAZARDS

FIXTURE INLETS OR VALVED OUTLETS with hose attachments, which constitute a cross-connection, shall be protected by the proper approved vacuum breaker installed at least six inches above the highest point of usage and located on the discharge side of the last valve. Fixtures with integral vacuum breaker manufactured as a unit may be installed in accordance with their approved requirements.

AIR CONDITION COOLING TOWER - Potable water inlet shall have an AG Type separation of twice the inside diameter of the inlet or a minimum of two inches above the flood level rim.

ASPIRATORS AND EJECTORS - Shall have an AVB or PVB, depending upon the degree of hazard, on the faucet from which these devices are attached or operated.

BOOSTER PUMPS - All booster pumps shall be provided with a low pressure cut off or approved throttling valve unless other acceptable provisions are made to prevent the creation of low or negative pressures in the piping system.

PRIVATE WELLS - Shall not be interconnected to the public supply.

PORTABLE SPRAY AND CLEANING EQUIPMENT - Any portable pressure spray or cleaning units that have the capability of connecting to any potable water supply and do not contain a built-in approved air gap, should be fitted with a reduced pressure backflow device or double check valve assembly depending on the degree of hazard.

MISCELLANEOUS USES OF WATER FROM FIRE HYDRANTS - The operation of fire hydrants by other than authorized personnel is prohibited. The Department may permit the use of water from a fire hydrant for construction and other purposes provided the applicant shall properly apply for, and adhere to backflow and metering requirements.

TEMPORARY METERS FOR CONSTRUCTION - All temporary meters for construction will be equipped with an approved backflow prevention device.

NOTE: Any device, equipment, or situation not covered by this cross-connection policy, which may constitute a potential health hazard, shall be examined for appropriate treatment by the Water Distribution Department or authorized agent.

6. THERMAL PROTECTION

OWNER RESPONSIBILITY

All water systems that have been closed or contained by the installation of backflow preventer or similar checking device must make necessary alterations to the plumbing system to protect against thermal expansion.

If water is heated and stored in a consumer's system, in which any branch or all of the system has been closed by the installation of a backflow preventer, a pressure reducing valve, or any other checking device, an approved auxiliary relief valve shall be installed in accordance with the edition of the International Plumbing Code adopted by the State of Georgia and the Georgia State Amendments to the International Plumbing Code.

The installation of a device to control thermal expansion will be the responsibility of the owner and plumbing official having jurisdiction.

7. PLAN REVIEW

7.1 DRAWING SUBMITTALS

Plans and specifications for the backflow prevention installation must be submitted to the City of Savannah for approval prior to the installation of the device.

7.2 DESIGN SPECIFICATIONS

Any backflow prevention device required shall be a model and size approved by the City. The term "Approved Backflow Prevention Device" shall mean a device that has been manufactured in full conformance with the standards established by the American Water Works Association entitled AWWA-0506-78 Standards for Reduced Pressure Principles Devices and Double Check Valve Backflow Prevention Devices and has completely complied with the laboratory and field performance specifications of the Foundation for Cross Connection Control and Hydraulic Research of the University of Southern California. Refer to the foundation website for the list of the approved backflow assemblies (http://fccchr.usc.edu). A copy of the approved backflow prevention assemblies shall be maintained by the City of Savannah Water Distribution Department and may be revised or supplemented by order of the Director.

8. NON-COMPLIANCE – ENFORCEMENT PROCEDURES

8.1 ENFORCEMENT PROCEDURES

Non-compliance and enforcement procedures will fall into three (3) categories:

A. Existing water customers with no cross-connection control device on their water service system at present will be required to install such a device under this ordinance. Where contaminants on their property have been determined by the Director of Conveyance and Water Distribution Department to represent a severe health hazard or system hazard to the public water system notification will be given from the City for immediate correction. Customers will be required to install approved backflow prevention devices within 30 days of notification when the Director has determined that a health hazard exists. If the Director has determined non-health hazard conditions, corrections would be required within 6 months.

B. Any new water customer after the effective date of the cross-connection control policy will be required to install an approved backflow prevention device prior to connection to the City of Savannah water systems whenever the Director has determined that contaminants or pollutants on the customer's property represent a hazard to the public water system.

C. Those existing water customers which are required and have backflow prevention devices in their system which do not meet City of Savannah standards or have been found to be malfunctioning will be required to replace the existing backflow prevention devices. Malfunctioning backflow preventers for non-health hazard conditions must be repaired or replaced by the customers with an approved backflow prevention device within 6 months after notification by the City of Savannah. For health hazard sites, the malfunctioning backflow device must be replaced or repaired within 30 days.

8.2 TERMINATION OF WATER SERVICE

A. The City of Savannah reserves the right to terminate the water services at any property where conditions of severe health hazard or system hazard exist as determined by the Director of Conveyance and Water Distribution Department. Water service will not be restored until such conditions or defects are corrected.

B. Service of water to any premises will be discontinued by the City if a backflow prevention device required by law, rules, or regulation is not installed, tested, and maintained; or if it is found that a backflow prevention device has been removed or by-passed; or if unprotected cross-connection exists on the premises and there is inadequate backflow protection at the service connections. Water service will not be restored until such conditions or defects are corrected.

C. Water services will be terminated for water customers who do not comply with Cross-Connection Policy. A written notice shall be served to the offending party that water services will be terminated within ten (10) days if the requirements of this policy are not met.

D. The water customer shall notify the City of Savannah in writing within 10 days to appeal termination action. The City of Savannah shall convene a hearing within ten 10 days of receipt of the written notice (unless a later date is mutually agreed to) to hear the appeal of the water customer. Failure to appeal will result in entry of an order directing termination of water service.

8.3 LEGAL ACTION

After the evidence has been reviewed by the hearing authority and a decision entered with a copy to the customer, the City may terminate water service and/or pursue any available legal remedy.

8.4 PENALTY COSTS

The penalty for violating this Policy shall not be more than one-thousand dollars for each violation. Each day on which a violation shall occur or continue shall be deemed a separate and distinct offense.

9. INSTALLATION REQUIREMENTS

9.1 INSTALLATION AT CITY RIGHT-OF-WAY OR EASEMENT

All backflow prevention devices will be installed on private property next to the right-of-way or easement. Any deviation from this directive must have prior approval under special conditions, from the Director of Sewer Conveyance and Water Distribution Department.

9.2 INSTALLATION WITHIN THE BUILDING ESTABLISHMENT

Under special conditions, approved backflow prevention devices will be allowed within the building establishments. Cross-Connection control staff must approve the installation. These conditions include:

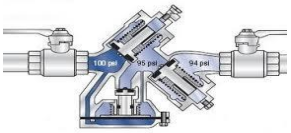
1. No connection between the tap at the City main and the backflow preventer is allowed.
2. Backflow preventer will not be installed in an area where discharge can cause damage. A small, occasional discharge from the vent is normal. Heavy discharge may occur if the devices malfunction. An approved drain must be installed to collect any water discharged from the backflow preventer.
3. Any approved drain must have free air space between the vent port and the drain conduit (air gap).
4. Backflow prevention device must be installed in an area which is readily accessible for testing and maintenance. Installation in any confined area which is not conducive to normal maintenance activities is prohibited.

9.3 RESPONSIBILITY OF OPERATION AND MAINTENANCE

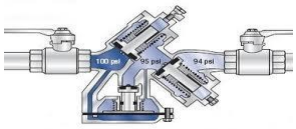
The owner will be responsible for operation and maintenance of the backflow preventer in addition to maintaining all appurtenances down-stream of the water meter.

Appendix I

Backflow Prevention Assembly Test / Maintenance / Repair Report



CITY OF savannah



Backflow Prevention Assembly
Test / Maintenance / Repair Report

File Code:	
Line PSI:	

PERMIT #

Name of Premises (company, Person, Etc.)	**Person to Contact:**
Service Address:	**Mailing Address:**

Location of Device:

Type of Service: ( ) Fire ( ) Fire Bypass ( ) Domestic ( ) Irrigation ( ) Other **Meter Number:** _____**Meter Reading:**_____

Device Type	Manufacturer	Size	Model No.	Serial No.	Installation Date

	Check Valve No. 1	Check Valve No. 2	Diff. Pressure Relief Valve	Pressure Vacuum Breaker
Initial Test	( ) Closed Tight at _____ PSI ( ) Leaked	( ) Closed Tight at _____ PSI ( ) Leaked	( ) Opened at _____ PSI Reduced Pressure ( ) did Not Open	( ) Opened at _____ PSI Reduced Pressure ( ) Did Not Open
Repairs	( ) Cleaned Replaced: ( ) Valves ( ) C.V. Assembly ( ) Seat Disc. ( ) O-Rings ( ) Springs ( ) Gaskets ( ) Retainer ( ) Stem / Guide ( ) Poppet ( ) Other, Describe	( ) Cleaned Replaced: ( ) Valves ( ) C.V. Assembly ( ) Seat Disc. ( ) O-Rings ( ) Springs ( ) Gaskets ( ) Retainer ( ) Stem / Guide ( ) Poppet ( ) Other, Describe	( ) Cleaned Replaced: ( ) Valves ( ) C.V. Assembly ( ) Seat Disc. ( ) O-Rings ( ) Springs ( ) Gaskets ( ) Retainer ( ) Stem / Guide ( ) Poppet ( ) Other, Describe	( ) Cleaned Replaced: ( ) Valves ( ) C.V. Assembly ( ) Seat Disc. ( ) O-Rings ( ) Springs ( ) Gaskets ( ) Retainer ( ) Stem / Guide ( ) Poppet ( ) Other, Describe
Final Test	( ) Closed Tight at _____ PSI	( ) Closed Tight at _____ PSI	Opened At ----------PSI Reduced Pressure	( ) Satisfactory

Note: ALL REPAIRS MUST BE COMPLETED WITHIN TEN (10) DAYS.

Test Kit Mfg.	T-Kit Model No.	Serial No.	Expiration Date	Company

Comments:

NOTE: ALL TEST REPORTS MUST BE E-MAILED OR HAND DELIVERED "WITHIN TEN (10) DAYS OF BACKFLOW TEST"

Initial Test Performed By:	**Affiliation:**	**B.F.D.T. Cert. No.:**	**Date:**
Repaired By:	**Affiliation:**	**License No.:**	**Date:**
Final Test Performed By:	**Affiliation:**	**B.F.D.T. Cert. No.:**	**Date:**

I, hereby, certify that the above data is accurate to the best of my knowledge and reflects the proper operation and maintenance of the assembly.

Print Name:	**Signature:**