

# **MANUAL OF CROSS CONNECTION CONTROL**

**PREPARED BY:**

**GAINESVILLE REGIONAL UTILITIES**

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## 1.0 INTRODUCTION

### 1.1 Protecting Our Water Supply Against Backflow

**GRU is committed to protecting the health and safety of its customers.** GRU is responsible for the quality of the potable water supply from the Murphree Water Treatment Plant to each customer's service connection.

The potable water distribution system is designed so that water routinely flows from the distribution system to the customer's water service piping. Under certain conditions water flows in the **opposite direction**, from the customer's service connection back into the City distribution system. This is called **backflow**. In the event of backflow, any potable or non-potable substance within the customer's piping can be drawn back into the distribution system without a properly installed and maintained backflow prevention assembly.

There are two types of backflow called **backsiphonage** and **backpressure**.

**Backsiphonage** occurs during abnormal hydraulic conditions, such as unusually high water usage or a broken water main, causing a drop in distribution system water pressure. In this event, water could flow from the customer's service piping into GRU's distribution system. If the customer's piping is connected to hazardous material and backsiphonage occurs, the distribution system could become contaminated unless a properly installed and maintained backflow preventer is present.

**Backpressure** occurs when a water line is attached to a container or pipes holding pressurized material. If the pressurized material is under more pressure than the pressure in the distribution system then the material can be "pumped" back into the potable water system if a properly installed and maintained backflow preventer is not present. Backpressure may occur through a cross-connection such as a make-up water line that is connected to a recirculating system containing soap, acid, antifreeze or any non-potable substance.

During a backsiphonage or backpressure condition, **any substance** that is in contact with the water on the downstream side of the customer's service connection could be drawn into the City water supply without proper backflow prevention measures. Because of these potential dangers to our customers, it is necessary to control backflow and **protect** the quality of the City drinking water.

### 1.2 REGULATORY REQUIREMENTS

The Florida Administrative Code (F.A.C.), Rule 62-555.360(2), requires permitted drinking water and reclaimed water utilities, such as GRU, to operate effective cross connection control programs to insure the potable nature of water supplies and protect human health.

In accordance with 62-555.360(1), F.A.C., direct connections between the City's potable water system and non-potable systems are prohibited. GRU is responsible for eliminating cross connections between the City's potable water system and non-potable systems. Upon discovery of a prohibited direct connection GRU shall ensure that the direct connection is eliminated either by installation of an appropriate backflow preventer or by termination of service until the contaminant source is eliminated. The customer shall be responsible for all costs to bring the service connection into compliance.

The policies described in this manual may also involve the cooperation of other City and County departments including the City of Gainesville Building Inspection Department, the Alachua County Building Inspection Department and the Alachua County Health Department.

## 2.0 DEFINITIONS

**Air-Gap** - The unobstructed vertical distance through the free atmosphere between the lowest opening from any pipe or faucet supplying water to a tap, plumbing fixture, or other device and the flood level rim of the water-holding vessel. An approved air-gap shall be at least double the diameter of the supply pipe, measured vertically, above the top of the rim of the vessel; and, in no case less than one inch.

**Approved** – Describing an assembly, device, design, installation, or agreement acceptable to Gainesville Regional Utilities.

**Auxiliary Water Supply** - Any water supply on or available to the premises other than the City potable water supply. These auxiliary waters may include water from another purveyor's public potable water or any natural source(s) such as well, spring, river, stream, harbor, etc., or "used waters" or "individual fluids". These waters 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.

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

**Backpressure** - A condition in which the customer's system water pressure is greater than the City potable water system pressure.

**Backsiphonage** - The flow of water or other liquids, mixtures or substances into the distribution pipes of a potable water supply system from any source other than its intended source caused by the sudden reduction of pressure in the potable water supply system.

**Backflow Preventer** – An assembly, device or means designed to prevent backflow.

**Certified Backflow Prevention Tester** - A person who has successfully completed training, acceptable to the General Manager for Water/Wastewater or his/her designee, in testing backflow preventers.

**City** - The City of Gainesville, doing business as Gainesville Regional Utilities (GRU).

**Contamination** – An impairment of the quality of the potable water system by sewage, industrial fluids, liquid wastes, pesticides, auxiliary water sources, or other compounds or materials which creates a hazard or potential hazard to the public health through poisoning, aesthetic degradation, or through the spread of disease.

**Cross Connection** - Any physical connection or arrangement of piping or fixtures between otherwise separate piping systems, one of which contains potable water and the other non-potable water or industrial fluids of questionable quality, through which, or because of which, backflow or back-siphonage may occur into GRU's potable water distribution system and a customer's water distribution system. Types of cross-connections include connectors such as swing connections, removable sections, four-way valves, spools, dummy sections of pipe, swivel or change-over devices, sliding multiport tubes, solid connections, etc.

**Customer** - The person responsible for payment of water service used at a specific location, and further defined as that person who signed the application requesting that services be made available at the specific location and thereby agreeing to pay for all usage of such service occurring at the location.

**Customer's Water System** - All pipes, shutoffs, valves, fixtures, appliances, or apparatus of any kind used in connection with or forming a part of an installation for utilizing water service. The customer's water system is located on the customer's side of the "point of delivery", whether such installation is owned outright by the customer or is used by the customer under lease or otherwise.

**Double Check Valve Assembly (DC or DCVA)** - An assembly of two independently-operating check valves in series with shut off valves on each side of the check valves, and properly located test cocks for the testing of each check valve.

**Double Check Valve Detector Assembly (DCDA)** - Two double check valve assemblies installed in parallel in which one assembly is smaller than the other, contains a flow meter and is installed as a protected by-pass around the larger assembly. The detector check is designed to detect small unauthorized flows which cannot be detected by less-sensitive meters installed on the larger line upstream.

**Hazard** - A potential threat of contamination to the City's potable water system to such a degree or intensity that there could be a danger to public health.

**Imminent Hazard** - A threat of contamination that presents a danger to the public health with consequences of illness or death.

**Industrial Fluids System** - Any system containing fluid or solution which may be chemically, biologically or otherwise contaminated or polluted in a form or concentration such as would constitute a public health, pollution or plumbing hazard if introduced into GRU's water distribution system. This may include, but not be limited to: polluted or contaminated waters; all types of process waters and "used waters" originating from the public potable water system which may have deteriorated in sanitary quality; chemicals in fluid form; plating acids and alkalis, circulated cooling waters connected to an open treated or stabilized with toxic substances; contaminated natural waters such as from wells, springs, streams, rivers, bays, harbors, seas, irrigation canals or systems, etc.; oils, gases, glycerin, paraffin, caustic and acid solutions and other liquids and gaseous fluids used in industrial or other purposes or for fire-fighting purposes.

**Maintenance** – Any repair including cleaning or replacement of parts or of the entire device or assembly.

**Nonpotable Water** - Water which is not safe for human consumption or of questionable or unknown nature.

**Point of Delivery** - The point where the City's water meter is connected with the pipe of the customer, and where water service to the customer begins.

**Pollutant** - Any foreign substance (organic, inorganic, or biological) in water which tends to degrade its quality so as to constitute a hazard or impair the usefulness or quality of the water to a degree which does not create an actual hazard to the public health but which does adversely and unreasonably affect such waters for domestic use.

**Potable Water** - Any water which, according to recognized standards, is safe for human consumption.

**Pressure Vacuum Breaker (PVB)**- An assembly containing a spring loaded check valve and an independently operated air inlet valve located on the discharge side of the check or checks. The assembly includes shut-off valves on each side of the check valves and properly located test cocks for the testing of the check valve(s).

**Reduced Pressure Principle Assembly (RP)** - An assembly of two independently-operating check valves in series with an automatically operating differential relief valve between the two check valves, shut-off valves on either side of the check valves, plus properly located test cocks for the testing of the check and relief valves. The assembly shall operate to maintain the pressure in the zone between the two check valves at a level less than the pressure on the public water supply side of the assembly. At cessation of normal flow, the pressure between the two check valves shall be less than the pressure on the public water supply side of the assembly. In case of leakage of either of the check valves the differential relief valve shall operate to maintain the reduced pressure in the zone between the check valves 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. To operate properly the assembly must be installed in a location where no part of the assembly will be submerged.

**Reduced Pressure Detector Check Assembly (RPDA)** - Two reduced pressure principle assemblies installed in parallel in which one assembly is smaller than the other, contains a flow meter and is installed as a protected by-pass around the larger assembly. The detector check is designed to detect small unauthorized flows which cannot be detected by less-sensitive meters installed on the larger line upstream.

**Residential Dual Check (RDC)** - A device consisting of two (2) spring loaded, independently operating check valves without shut-off valves. RDCs must be replaced at least once every five years.

**Testable Residential Dual Check** - A device consisting of two (2) spring loaded, independently operating check valves with three test cocks but without shut-off valves. Testable RDCs must be field tested at least annually.

**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 point of delivery and is no longer under the sanitary control of the water purveyor.

**Water Purveyor** - The owner or operator of the public potable water system supplying an approved water supply to the public. As used herein, the terms water purveyor and Gainesville Regional Utilities may be used synonymously.

**Water Service Connection** - The terminal end of a service connection from the public potable water system; i.e., where the water purveyor loses jurisdiction and sanitary control over the water at its point of delivery to the customer's water system. If a meter is installed at the end of the service connection, then the service connection shall mean the downstream end of the meter. There should be no unprotected takeoffs from the service line ahead of any meter or backflow prevention assembly located at the point of delivery to the customer's water system. Service connections shall also include water service connections from a fire hydrant and all other temporary or emergency water service connections from the public potable water systems.

## **2.1 REFERENCE DOCUMENTS**

The following documents are incorporated by reference:

- a) City of Gainesville Code of Ordinances, Chapter 27, Utilities
- b) American Water Works Association (AWWA) *Manual of Practice M-14, Recommended Management Practices for Cross Connection Control*, Third Edition.
- c) TREEO Center, University of Florida, *Backflow Prevention, Theory and Practice*, most current edition.
- d) American Society of Sanitary Engineering, *List of Approved Backflow Preventers*
- e) The Florida Administrative Code, 62-555.360.
- f) University of Southern California, Foundation for Cross Connection Control and Hydraulic Research, *Cross-Connection Control Manual*, most current edition.

## **3.0 FACILITIES REQUIRING BACKFLOW PREVENTION**

### **3.1 NON-RESIDENTIAL CUSTOMERS**

Gainesville Regional Utilities shall review all new service connections and modifications to existing service connections to determine the contamination risk. Based on the risk assessment, GRU shall require the installation of appropriate backflow prevention assemblies. The assemblies shall be installed by the customer requesting service prior to GRU making a water service connection. See Appendix A for a partial list of facilities and operations from which the City water distribution system shall be protected.

GRU reserves the right to require appropriate backflow prevention at any existing facility as a condition of providing water service.

Any existing backflow preventer shall be allowed to continue in service unless the degree of hazard is such as to supercede the effectiveness of the present backflow preventer, or result in an unreasonable risk to the public health. Where the degree of hazard has increased any existing backflow preventer shall be upgraded to the appropriate type of backflow preventer as determined by the General Manager for Utilities or his/her designee. The customer shall notify GRU if the nature of property use changes so as to increase the degree of hazard.

Backflow prevention assemblies shall be specified by GRU in accordance with the Florida Administrative Code 62-555.360, the AWWA *Manual of Practice #14 Recommended Management Practices for Cross Connection Control* (Third Edition), the Foundation for Cross Connection Control and Hydraulic Research (FCCC & HR) at the University of Southern California, The American Society of Sanitary Engineering , and other nationally recognized standards setting agencies.

The customer shall be responsible for all costs associated with installation and maintenance of backflow preventers and inspections for cross connections.

### **3.2 RESIDENTIAL CUSTOMERS**

The City potable water supply to any lawn irrigation system shall be protected from backflow by a pressure vacuum breaker or a reduced pressure backflow preventer. Where chemicals are introduced into the irrigation system, a reduced pressure backflow preventer is required.

The City potable water supply to a customer provided with reclaimed water shall be protected by a backflow preventer of a type specified by GRU. Customers with an irrigation meter who will be provided with reclaimed water are required to complete an agreement form (Appendix B).

The customer shall be responsible for all costs associated with the installation and maintenance of backflow preventers and inspections for cross connections.

### **3.3 AUXILIARY WATER SUPPLY**

The City potable water supply to a customer with access to an auxiliary water supply (e.g. well) shall be protected against backflow by a backflow preventer of a type specified by GRU (Appendix A). This requirement may be waived if the well has been abandoned in accordance with Chapter 40C-3, Florida Administrative Code (abandonment by a licensed well driller by filling the well shaft with grout).

Customers with an auxiliary water supply applying for City water service are required to complete an agreement form (Appendix B).

### **3.4 FIRE SPRINKLER SYSTEMS**

All unmetered fire sprinkler systems without booster facilities or chemical additives shall have a double check detector check assembly as the minimum containment assembly.

All unmetered fire sprinkler systems with a booster facility or chemical additive (food-grade glycerin is the only substance allowed) shall have a reduced pressure principle-detector assembly as a minimum containment assembly.

A registered professional engineer or certified fire-protection system contractor must certify the adequacy of the hydraulics of a fire sprinkler system before the approved backflow prevention assembly is installed.

## **4.0 INSTALLATION OF BACKFLOW PREVENTION ASSEMBLIES**

### **4.1 GENERAL**

The customer shall install backflow preventers in a manner approved by GRU. Installation specifications may be obtained from GRU upon request.

The customer shall only install backflow preventers that are approved by GRU. All backflow prevention assemblies shall be those approved by The American Society of Sanitary Engineering (A.S.S.E.) and adhere to applicable ANSI and ASTM standards.

All installations shall comply with applicable state and local plumbing codes.



The customer shall not install a by-pass around any backflow preventer unless there is a backflow preventer of the same type on the bypass. Customers who cannot shut down operation for testing of the assembly(s) must supply additional assemblies (installed in parallel) necessary to allow testing to take place.

The customer must be aware that installation of a residential dual check valve results in a potential closed plumbing system within his/her facility. As such, the customer must make provisions, at the customer's expense, for thermal expansion within his/her closed loop system, i.e., the installation of thermal expansion devices and/or pressure relief valves.

## **4.2 INSTALLATION BELOW GRADE**

All backflow prevention assemblies shall be installed above ground with the following exception: A double check valve assembly (DCVA) may be installed below ground if it is installed in a vault capable of withstanding all dead and live loads imposed by direct burial. The vault shall have drainage to free atmosphere. If positive drainage cannot be accomplished, the DCVA shall be installed above ground. If the DCVA is installed in a vault, it must be easily accessible for testing and maintenance. The length and width shall be so that the entire assembly may be removed. There shall be a minimum of 12" + 3 x pipe diameter clearance on each side of the DCVA. The DCVA shall be installed with a minimum of 12" and a maximum of 30" clearance between the bottom surface of the body and the gravel base. The vault shall be open bottom and shall have enough sidewall to contain 6" of gravel base. Standard construction details are provided in Appendix C.

## **5.0 HAZARDOUS CONDITIONS**

The customer shall immediately notify GRU if there is reason to believe that backflow has occurred from the customer's private water system to the City potable water system.

The customer shall inform GRU of any existing cross-connections between a customer's private water system and the City potable water system of which the customer is aware and may not be known by GRU.

If GRU determines that a customer's water system poses an imminent hazard to the City potable water system, the customer shall install a backflow prevention assembly of a type specified by GRU within 24 hours after notification. If the customer fails to take corrective measures in a timely manner or refuses to install the specified backflow preventer, the customer's water service may be terminated. If GRU is unable to give notice to the customer within 24 hours after the determination that an imminent hazard exists despite reasonable efforts to provide notice, GRU may terminate water service to the customer until the specified corrective measures are taken.

GRU reserves the right to immediately terminate City water service to a customer whose private water system poses a serious threat to public health.

## **6.0 SURVEY AND INSPECTION OF CUSTOMER FACILITIES**

### **6.1 GENERAL**

If in the opinion of the General Manager for Utilities or his/her designee a customer's facility constitutes a possible risk to contaminate the City potable water system, GRU shall retain the right to make an on-site cross connection control survey and inspection. Appropriate notice shall be given to the customer and such inspections shall be during normal business hours. Refusal of a customer to provide reasonable access to

the premises by GRU staff shall be treated as non-compliance and subject to the provisions of Section 8.

Upon completion of an inspection, the customer shall be made aware of any corrective measures that may be required. Written notification shall also be sent to the customer indicating the corrective measures to be completed. Corrective measures (including installation of a backflow preventer) shall be made within 30 days of the date of inspection.

Should the installation of a backflow prevention assembly be required, Gainesville Regional Utilities may arrange a meeting with the customer to discuss the installation requirements. Construction drawings of the proposed installation may be required at the discretion of the General Manager for Utilities or his/her designee. Standard construction details are provided in Appendix C. The customer shall have 30 calendar days from the date GRU issued the notification to complete the required modifications. Additional time may be granted by the General Manager for Utilities or his/her designee if in his/her opinion more time is warranted.

## **6.2 RECLAIMED WATER**

Gainesville Regional Utilities shall perform a detailed site inspection of all customers provided with reclaimed water in accordance with applicable regulations contained in FAC 62-610. This may include, but is not limited to, operation of irrigation systems or excavation of service connections.

A customer shall not maintain a cross connection between the City potable water distribution system and a reclaimed water system without permission from the General Manager for Utilities or his/her designee and without meeting the requirements of FAC 555-360.(1)(b).

## **7.0 FIELD TESTING AND MAINTENANCE OF BACKFLOW PREVENTION ASSEMBLIES**

### **7.1 CUSTOMER RESPONSIBILITY**

Backflow prevention assemblies that are required by GRU for **residential** customers shall be maintained and tested **biennially**. Backflow prevention assemblies that are required by GRU for **non-residential** customers shall be maintained and tested **annually**. GRU may require more frequent testing in cases where there is a history of test failure or due to the degree of hazard involved. The customer shall be responsible for the testing and maintenance of required backflow prevention assemblies, including the payment of any testing fees, past the point of connection at the water meter, and shall be performed as specified by GRU at no cost to GRU.

Backflow preventers that are required by GRU but are not in-line testable (e.g. RDC) shall be replaced or refurbished by a certified tester at a minimum frequency of every five years. The customer shall be responsible for the cost of refurbishment or replacement of such backflow preventers.

The customer shall maintain accurate records of tests and repairs made to backflow preventers and ensure that the results of the tests are provided to the city. Failure on the part of a customer to provide such results shall be treated as noncompliance in accordance with Section 8.

Any required backflow preventer which fails during a periodic test shall be repaired or replaced. When repairs are necessary, upon completion of the repair the assembly shall be re-tested at the customer's expense to insure correct operation. High hazard operations with a failed backflow prevention assembly shall not be allowed to continue until the backflow prevention assembly has been repaired or replaced and retested. In all other cases, the failed backflow prevention assembly shall be repaired or replaced, and

retested within thirty (30) days. Parallel installations of two (2) assemblies is an effective means of the customer ensuring uninterrupted water service during testing or repair of assemblies and is strongly recommended when the customer desires uninterrupted water service.

## **7.2 TESTER RESPONSIBILITY**

Testing and maintenance of required backflow prevention assemblies shall be performed by a certified master plumber, certified backflow prevention tester or other individual with equivalent training acceptable to the General Manager for Utilities or his/her designee, as approved in writing. Testers shall keep certifications and skills current and shall provide proof of certification to GRU.

Minimum training for testers shall include successful completion of a course, acceptable to the General Manager for Utilities or his/her designee, in testing backflow preventers. The course must include at least 32 hours of training, and a written and a practical exam. Testers shall also successfully complete a recertification exam every 2 years.

Gainesville Regional Utilities reserves the right to require testers, on an individual basis, to demonstrate knowledge of test procedures and maintenance or repair methods through written and hands-on field tests. Approved testing procedures for each type of backflow prevention assembly shall be made available for certified testers by Gainesville Regional Utilities.

GRU will maintain and make available a list of certified testers to customers. Certified testers who wish to be included on the list must request in writing to be included in the list and provide proof of certification and contact information. A tester may be suspended from the list without notice at the discretion of the General Manager for Utilities or his/her designee. Testers may be suspended for reasons including, but not limited to, falsifying data, performing work for which the tester is not licensed, and for using the name of the City or GRU to promote their testing services in violation of Gainesville City Ordinance 27-3.

(City of Gainesville Code of Ordinances 27-3, "It shall be unlawful for any firm, person, business or organization to use the name of the city, of Gainesville Regional Utilities, or the city's fictitious names, logos, service marks or trademarks in the promotion, advertisement or guarantee of its business or activity of performing conservation audits or other utility related services without the permission of the General Manager for Utilities or his/her designee.")

Testing of required assemblies shall be performed in accordance with the procedures found in the AWWA *Manual of Practice #14, Recommended Management Practices for Cross Connection Control, Third Edition*.

Testers shall submit results of all testing and repairs by entering the information into the GRU CCC Online database.

Testers shall submit to GRU the results of annual calibrations of field testing equipment by entering the information into the GRU CCC Online database.

Testing of backflow preventers that are part of a fire protection system shall be tested by those licensed by the State of Florida to perform such testing in accordance with Florida Statute 633.541.

Testers shall report to GRU any defects or non-standard installation of backflow prevention assemblies. Testers shall provide GRU with information on conditions which may be hazardous to the City water distribution system including information on existing unprotected cross connections and untested backflow prevention assemblies.

## **8.0 CUSTOMER COMPLIANCE WITH TESTING REQUIREMENTS**

Gainesville Regional Utilities shall maintain records of testing and maintenance of required backflow prevention assemblies including the date each assembly is due to be tested. The customer shall have 30 days after the due date to complete the required testing and provide the test results to GRU.

### **8.1 CUSTOMER NON-COMPLIANCE WITH TESTING REQUIREMENTS**

Should a customer fail to test or maintain a required backflow prevention assembly within the specified time, GRU shall issue a non-compliance notice. The customer shall have 30 days to provide GRU with completed test results that indicate acceptable performance of the backflow prevention assembly.

Should a customer fail to respond to the non-compliance notice, GRU shall issue a final notice. The customer shall have 30 days to;

- a) provide GRU with completed test results that indicate acceptable performance of the backflow prevention assembly or
- b) respond to GRU in writing with a reason, acceptable to GRU, why the assembly has not been tested or
- c) provide GRU with confirmation that the customer will attend a Show Cause Hearing on the date specified in the non-compliance notice

Should a customer fail to respond to the final notice, GRU may, in lieu of the provisions of Section 8.2, perform the required testing and maintenance or arrange to have the work performed by a certified tester. The customer shall pay for the cost of the testing and maintenance including labor, materials, and administrative charges. In instances of non-payment, GRU may assess appropriate charges against the customer's utility bill.

### **8.2 SHOW CAUSE HEARING FOR NON-COMPLIANCE**

Should a customer in non-compliance fail to take satisfactory corrective measures under section 8.1, the customer shall be expected to attend a Show Cause Hearing before the General Manager for Utilities or his/her designee at the date and time specified in the non-compliance notice to show cause why the customer's service should not be disconnected for causing or suffering violation of the ordinance or other applicable law or regulation. If GRU seeks to suspend service, GRU shall notify the customer of the nature of the violation for which suspension of service is sought with sufficient specificity as to the character of the violation and the dates at which such violation occurred to enable the customer to prepare his/her defense. Such notice shall be sent to the customer by certified mail, return receipt request, or personally delivered at least 10 (ten) days prior to the scheduled hearing date.

Following review of the hearing proceedings and evidence submitted, the General Manager for Utilities or his/her designee may issue an order to the customer indicating a specified time, which is dependent on the severity of the violation, when water service may be discontinued unless satisfactory corrective action to permanently remove the offending connection from the public water system is performed by the customer.

Any customer aggrieved by such an order may appeal it to a court of competent jurisdiction within 10 (ten) days from the date the order is delivered by certified mail unless such connection is in the opinion of GRU a

direct threat to public health, welfare or safety. In such a case GRU shall retain the right to immediately discontinue water service.

## **9.0 CORRESPONDENCE**

Address all correspondence to the following address:

Gainesville Regional Utilities  
Cross Connection Control Program  
P.O. Box 147117  
Interoffice Box A-122  
Gainesville, FL 32614-7117  
Fax: 352-334-2752  
Phone: 352-393-1698

<b>APPENDIX A</b>		
<b>Operations from which the City water distribution system shall be protected</b>		<b>Type<sup>1</sup></b>
1	Aircraft or Automotive Repair or Manufacturing	RP
2	Any facility for which it cannot be determined whether or not a cross connection exists due to the complexity of the operation or due to access for inspection being denied	RP
3	Auxiliary Water System, Residential (e.g. well) (not inter-connected with City water distribution system)	RDC
4	Auxiliary Water System, Residential (e.g. well) (inter-connected with City water distribution system)	RP
5	Auxiliary Water System, Non-Residential (e.g. well)	RP
6	Beverage bottling plant, brewery, carbonation system	RP
7	Booster pump	RP
8	Centralized heating/air conditioning systems using make-up water from the City water distribution system	RP
9	Car wash	RP
10	Chemical use (any operation using hazardous chemicals)	RP
11	Cooling tower	RP
12	Commercial Laundry	RP
13	Dairy or cold storage plant	RP
14	Dye works (whether or not the dye represents a health hazard)	RP
15	Film processing	RP
16	Fire hydrant (temporary connection)	RP
17	Fire sprinkler system <sup>2</sup>	DCDA or RPDA
18	Fire sprinkler system containing food-grade glycerin as anti-freeze <sup>3</sup>	RP
19	Food processing, restaurant, convenience store, cannery, packing house, reduction plant	RP
20	Hospital, mortuary, medical, dental, veterinary	RP
21	Irrigation system (including residential)	RP or PVB
22	Irrigation system with dedicated irrigation meter (including residential)	RP
23	Irrigation system with chemical injection	RP
24	Laboratory	RP
25	Manufacturing	RP
26	Multi-story building in which the expected backpressure (as determined by GRU) is equal to or greater than 20 psi	RP
27	Oil or gas storage or production	RP
28	Paper production	RP
29	Pressurized system (operation using liquids or gases under pressure)	RP
30	Radioactive material handling or processing	RP
31	Reclaimed water for single family residence with access to reclaimed water <sup>4</sup>	RP or RDC
32	Reclaimed water for multi-family or commercial facility with access to reclaimed water <sup>4</sup>	RP
33	Sand or gravel plant	RP
34	Sewage or storm drainage system	RP
35	Sewage ejector	RP
36	School or College <sup>5</sup>	RP
37	Solar hot-water system <sup>6</sup>	RP
38	Steam boiler system	RP
39	Swimming pool	RP
40	Water storage including water hauling equipment and portable or non-portable spraying/cleaning unit	RP
41	Waterfront facility with developed use of auxiliary water source	RP
Notes:		
(1)	Type of protection required unless otherwise authorized by the General Manager for Utilities or his/her designee. An air gap may be substituted for an RP for any operation if it is feasible to do so.	
(2)	The General Manager for Utilities or his/her designee may require RPDA instead of DCDA.	
(3)	Food-grade glycerin is the only substance allowed to be used for freeze protection in a fire sprinkler system.	
(4)	Reclaimed water is not allowed to be interconnected with the City potable water system.	
(5)	The General Manager for Utilities or his/her designee may allow a backflow preventer which isolates any specific hazard in lieu of a backflow preventer which protects the City water system from the entire facility.	
(6)	The General Manager for Utilities or his/her designee may waive the RP requirement if the heat exchanger is double walled and has leak protection.	

## **APPENDIX B - FORMS**

CERTIFICATE OF WELL ABANDONMENT OR ACCEPTANCE OF BACKFLOW PREVENTER

CERTIFICATE OF IRRIGATION METER ABANDONMENT AND ACCEPTANCE OF RECLAIMED WATER FOR IRRIGATION USE

TEST AND MAINTENANCE FORM