CLINTON UTILITIES BOARD

CROSS-CONNECTION CONTROL PROGRAM

A. BACKGROUND AND PURPOSE

In order for Clinton Utilities Board (CUB) to serve the public and to comply with the regulations of the Environmental Protection Agency and the Tennessee Department of Environment and Conservation (TDEC) and other state and federal regulations, CUB must establish a Cross-Connection Control Program (Program) to protect the public's water supply.

By the authority of the City of Clinton Municipal Code and as provided by the general laws of the State of Tennessee, CUB has general control, supervision, management, etc., of the public water and sewer systems, and operates these systems for the benefit of all present and future customers. While no customer shall intentionally be treated unfairly, no customer shall be treated in a way that compromises the interests of other current and future customers.

B. TENNESSEE CROSS-CONNECTION REGULATION

The TDEC Division of Water Resources Rule 0400-45-01-.17(6) states the following:

> *Pursuant to Section 68–221–711(6) the installation, allowing the installation, or maintenance of any cross–connection, auxiliary intake, or bypass is prohibited unless the source and quality of water from the auxiliary supply, the method of connection, and the use and operation of such cross–connection, auxiliary intake, or bypass has been approved by the Department. The arrangement of sewer, soil, or other drain lines or conduits carrying sewage or other wastes in such a manner that the sewage or waste may find its way into any part of the public water system is prohibited.*
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> *All community water systems must adopt an ordinance or policy prohibiting all of the above and submit a copy of the executed ordinance or policy to the Department for approval. All community water systems shall develop a written plan for a cross–connection control program to detect and eliminate or protect the system from cross–connections. The written plan must be approved by the Department.*
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> *After adoption and approval of the cross–connection ordinance or policy and plan, each community water system must establish an ongoing program for the detection and elimination of hazards associated with cross–connections. Records of the cross–connection control program must be maintained by the water supplier and shall include such items as date of inspection, person contacted, recommendations, follow–up, and testing results.*
>
> *(a) Public Water systems must develop and implement an ongoing cross-connection program. Cross-connection plans and policies shall present all information in conformance with the "Design Criteria for Community Public Water Systems" as published by the Department.*

(b) The public water system shall ensure that cross-connections between the distribution system and consumer's plumbing are surveyed and/or inspected and determined not to exist or contain a significant *risk or are eliminated or controlled by the installation of an approved backflow preventer commensurate with the degree of hazard.*

C. PROGRAM GOALS & OBJECTIVES

The goal of CUB is to provide safe water to every customer under all foreseeable circumstances. Each instance where water is used improperly so as to create the possibility of backflow due to a cross-connection threatens the health and safety of customers and chances of realizing this goal. The possibility of backflow due to improper use of water within the customer's premises is especially significant because a cross-connection may result in the contamination of the water supply mains. Such situations may result in the public water system becoming a transmitter of diseased organisms, toxic materials, or other hazardous substances that may adversely affect a significant amount of customers. The only protection against such occurrences is the elimination of such cross-connections or the isolation of such hazards from the water supply lines by properly installed approved backflow prevention assemblies. CUB will continue maintenance of a continuing cross-connection control program to systematically and effectively prevent the contamination or pollution of all potable water systems. All records regarding cross-connections shall be kept indefinitely.

CUB is determined to take every reasonable precaution to ensure that cross-connections are not allowed to contaminate the water being distributed to its customers. This Cross-Connection Control Program outlines a course of action designed to control cross-connections within our service area through Premises Isolation, such that, the customer's premises is isolated from the public water supply by means of a backflow prevention assembly. Premises isolation is the only sure or practical way of protecting the public water supply from potential hazards. This Program is intended to be a practical guide for safeguarding the quality of water distributed from becoming contaminated or polluted through backflow.

This Program sets forth uniform requirements for the protection of CUB's public water system from possible contamination, and enable CUB to comply with all applicable local, State and Federal laws, regulations, standards or requirements, including the Safe Drinking Water Act of 1996, Tennessee Code Annotated (T.C.A.) 68-221-701 to 68-221-720 and the Rules and Regulations for Public Water Systems and Drinking Water Quality issued by the TDEC.

D. LIMITATIONS & OMISSIONS

CUB is subject to various city, county, state, federal or other governmental agency requirements and has no discretion to provide service in a manner which would violate such regulations or requirements. In the absence of specific rules or policies, CUB in accordance with its usual and customary practices shall make the disposition of situations involving service.

E. DEFINITIONS

The following words, terms and phrases shall have the meanings ascribed to them in this section, when used in the interpretation and enforcement of this Program:

Air-gap: A vertical, physical separation between a water supply and the overflow rim of a non-pressurized receiving vessel. An approved air-gap separation shall be at least twice the inside diameter of the water supply line, but in no case less than one (1") inch. Where a discharge line serves as receiver, the air-gap shall be at least twice the diameter of the discharge line, but not less than one (1") inch.

Atmospheric vacuum breaker: A device, which prevents backsiphonage by creating an atmospheric vent when there is either a negative pressure or sub-atmospheric pressure in the water system.

Auxiliary intake: Any piping connection or other device whereby water may be secured from any sources other than from the public water system.

Auxiliary Water Supply: Any water supply on or available to the premises other than water supplied by the public water system.

Backflow: The undesirable reversal of the intended direction of flow in a potable water distribution system as a result of a cross-connection.

Backpressure: Any elevation of pressure in the downstream piping system (caused by pump, elevated tank or piping, steam and/or air pressure) above the water supply pressure at the point which would cause, or tend to cause, a reversal of the normal direction of flow.

Backsiphonage: The flow of water or other liquids, mixtures or substances into the potable water system from any source other than its intended source, caused by the reduction of pressure in the potable water system.

Board: The Board of Directors of Clinton Utilities Board.

Bypass: Any system of piping or other arrangement whereby water from the public water system can be diverted around a backflow prevention device.

Certificate of Competency: The certification issued by the Tennessee Department of Environment & Conservation (TDEC), which allows one to test backflow prevention assemblies. Anyone testing backflow prevention assemblies must have a valid Certificate of Competency in Testing and Evaluation of Backflow Prevention Assemblies issued by TDEC. A valid certificate is defined as a Certificate (Basic or Renewal) issued by the state of Tennessee that has not surpassed the three-year time limit from issuance.

Contaminant: Any substance introduced into the public water system that could cause illness or death.

Closed System: The installation of a backflow prevention assembly or residential single or dual checks will make the customer's plumbing a "closed system". A closed system can create problems due to thermal expansion.

Cross-connection: Any physical connection or potential connection whereby the public water system is connected, directly or indirectly, with any other water supply system, sewer, drain, conduit, pool, storage reservoir, plumbing fixture or other waste or liquid of unknown or unsafe quality, which may be capable of imparting contamination to the public water system as a result of backflow or backsiphonage. Bypass arrangements, jumper connections, removable sections, swivel or changeover devices, through which or because of which backflow could occur, are considered to be cross-connections.

CUB: An acronym for the Clinton Utilities Board.

Customer: Any natural or artificial person, business, industry, or governmental entity that obtains water, by purchase or without charge, from the water provider.

Device: The equipment used for backflow prevention as defined, specified or used in context

Director: The Director of CUB's Water & Sewer Department

Failed: The status of a backflow prevention assembly determined by a performance evaluation based on the failure to meet all requirements set forth by the approved testing procedure.

Double Check Detector Assembly (DCDA): A specially designed assembly composed of line size approved double check valve assembly, with a bypass containing a water meter and approved double check valve assembly specifically designed for such application. The meter shall register accurately for very low flow rates up to 3 gallons per minute and shall show a registration for all rates of flow. This assembly shall only be used to protect against a low hazard or pollutant. This assembly is designed primarily for fire sprinkler systems.

Double Check Valve Assembly (DCVA): An assembly composed of two independently operating, approved check valves, including tightly closing shutoff valves located at each end of the assembly and fitted with properly located test cocks. This assembly is designed to protect against a low hazard or pollutant.

Fire System Protection Classifications: The classes of fire protection systems, as designated by the American Water Works Association (AWWA) "M14" for cross-connection purposes are as follows:

Class 1: Direct connections from public water mains only; no pumps, tanks or reservoirs; no physical connection from other water supplies; no antifreeze or other additives of any kind; all sprinkler drains discharging to the atmosphere, dry wells or other safe outlets.

Class 2: Same as Class 1, except that booster pumps may be installed in the connections from the street mains.

Class 3: Direct connection from public water supply mains, plus one or more of the following: elevated storage tanks, fire pumps taking suction from above ground covered reservoirs or tanks, and/or pressure tanks (all storage facilities are filled from or connected to public water only, and the water in the tanks is to be maintained in a potable condition).

Class 4: Directly supplied from public water supply mains, similar to Class 1 & Class 2, with an auxiliary water supply dedicated to fire department use and available to the premises, such as an auxiliary supply located within 1,700 ft. of the pumper connection.

Class 5: Directly supplied from public water 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: Combined industrial and fire protection systems supplied from the public water mains only, with or without gravity storage or pump suction tanks.

General Manager: The General Manager of CUB or its duly authorized Director, deputy, agent, or representative.

Hazard (Health): A cross-connection or potential cross-connection involving any substance that could if introduced in the public water supply, cause death, illness, and spread disease. Also known as a "High Hazard".

Hazard (Non-health): A cross-connection or potential cross-connection involving any substance that would not be a health hazard, but would constitute a nuisance or be aesthetically objectionable if introduced into the public water supply. Also known as a "Low Hazard".

In-house Isolation: Protection of the occupants or users of the water supply within a customer's premises. In-house Isolation is not recommended or allowed in-lieu of Premises Isolation due to lack of control of activities within a premises by the water system. The water customer is responsible for the protection of the in-house piping system and the occupants of the premises from contamination.

Inspection: An on-site evaluation of an establishment to determine if backflow prevention assemblies are needed by the customer to protect the public water system from actual or potential cross-connections.

Interconnection: Any system of piping or other arrangements whereby the public water supply is connected directly with a sewer, drain, conduit, pool, storage reservoir, or other device, which contains or may contain sewage or other waste or liquid which would be capable of imparting contamination to the public water system.

Parallel Installation: At premises where backflow preventer assemblies are required and the public interest requires continuous uninterrupted service, two approved backflow assemblies may be installed in parallel and properly valved to permit continuous operation, or service to the premises must be from two separate service lines protected by approved backflow prevention devices.

Passed: The status of a backflow prevention assembly determined by a performance evaluation in which the assembly meets all minimums set forth by the approved testing procedure.

Performance Evaluation: An evaluation (test) of an approved backflow device/assembly using the latest approved testing procedures in determining the status of the assembly.

Person: Any and all persons, natural or artificial, including any individual, firm or association, and any municipal or private corporation organized or existing under the laws of this or any other state or country.

Pollutant: A substance in the public water system that would constitute a non-health hazard and would be aesthetically objectionable if introduced into the public water supply.

Potable Water: Water that is safe for human consumption as prescribed by the Tennessee Department of Environment and Conservation and the United States Environmental Protection Agency.

Premises Isolation: Protection is of CUB's distribution system only. A premises is isolated from the public water supply by means of a backflow prevention assembly. Premises isolation is the only sure and practical way of protecting the public water supply. This method does not offer protection to the on-premises personnel from internal cross-connection hazards.

Pressure Vacuum Breaker: An assembly consisting of a device containing one or two independently operating spring loaded check valves and an independently operating spring loaded air inlet valve located on the discharge side of the check valve(s), with tightly closing shut-off valves on each side of the check valves and properly located test cocks for the testing of the check valves and relief valve.

Public Water Supply: CUB's water supply system, which furnishes potable water to the public for general use and which is recognized as the public water supply by the Tennessee Department of Environment and Conservation.

Program: The CUB's approved Cross-Connection Control Program

Reduced Pressure Principle Assembly (RPA): An assembly consisting of two independently acting approved check valves together with a hydraulically operating, mechanically independent, pressure differential relief valve located between the check valves and below the first check valve. These units shall be located between two tightly closing resilient seated shut-off valves as an assembly and equipped with properly located resilient seated test cocks. This assembly is designed to protect against a health hazard or contaminant. However, one may be used to protect against non-health hazards as well.

Reduced Pressure Principle Detector Assembly (RPDA): A specially designed assembly composed of a line-size approved reduced pressure principle backflow prevention assembly with a bypass containing a water meter and approved reduced pressure principle backflow prevention assembly specifically designed for such application. The meter shall register accurately for very low flow rates of flows up to 3 gallons per minute and shall show registration for all flow rates. This assembly is designed to protect against a health hazard or contaminant. However, one may be used to protect against non-health hazards as well.

State: The Tennessee Department of Environment and Conservation (TDEC).

Survey: An evaluation of a premise by CUB or its authorized agent performed for the determination of actual or potential cross-connection hazards and the appropriate backflow prevention needed.

TDEC: An acronym for the Tennessee Department of Environment and Conservation

Thermal Expansion: Thermal expansion refers to the characteristic of water to expand when it is heated. Unlike air, which can be compressed, water grows in volume, and must be accommodated.

Water System: Shall be considered as made up of two (2) parts, the utility's system and the customer's system.

(a) CUB's system shall consist of the facilities for the storage and distribution of water and shall include all those facilities of the water system under the complete control of the utility system, up to the point where the customer's system begins (i.e. the water meter),

(b) The customer's system shall include those parts of the facilities beyond the termination of the utility system distribution system that are utilized in conveying domestic water to points of use.

F. PROGRAM REQUIREMENTS

The requirements contained in the Program shall apply to all customers and premises of CUB's public water system, and is hereby made a condition required to be met before water service is provided to any customer. This Program shall be strictly enforced since it is essential for the protection of CUB's public water supply against potential contamination and pollution.

(1) Compliance with Tennessee Code Annotated (T.C.A)

(1.1) CUB shall be responsible for the protection of the public water system from contamination or pollution due to the backflow of contaminants through the water service connection. CUB shall comply with Section 68-221-711 of the Tennessee Code Annotated, as well as the Rules and Regulations for Public Water Systems and Drinking Water Quality, legally adopted in accordance with this Code, which pertain to cross-connections, auxiliary intakes, bypasses and interconnections; and shall establish an effective, on-going program to control these undesirable water uses.

(1.2) This Program prohibits cross-connections with CUB's water supply system, authorizes CUB to make inspections of the customer's premises, requires that cross-connection hazards be corrected, and provides for enforcement. This Program expresses clear determination on the part of the Board of Directors that the water system is to be operated free of cross-connections that endanger the health and safety of those depending upon the public water supply. This Program is considered to be a sound basis for the control of cross-connection hazards by the operating staff and management of CUB. The provisions, contained within this ordinance, are in keeping with the requirements set forth in Section 68-

221-711 (6) of Tennessee Code Annotated and Section 0400-45-01-.17(6) of TDEC's Rules governing Public Water Systems.

(2) Isolation

In providing protection against cross-connections, there are two separate and distinct areas of concern, which closely relate to one another. They are:

(a) Protection of distribution system by **"Premises Isolation**".

(b) Protect the occupants or users of the water supply within a customer's premises by "**In-house Isolation**".

(2.1) The TDEC's scope of protection concerns the water treatment plant and distribution system. The TDEC regulations concerning cross-connections and cross-connection control are designed to protect the utilities distribution system. Regulations, restrictions, and codes concerning internal cross-connections are usually promulgated through the Health Department, occupational health officer, or other similar group. **In-house Isolation is not recommended or allowed in-lieu of Premises Isolation due to lack of control of activities within a premises by the water system.** Since CUB is responsible for seeing that each customer receives safe water under all foreseeable circumstances, CUB is primarily concerned with preventing backflow from entering the public water supply lines and being distributed to other customers. The water customer, on the other hand, is primarily concerned with the protection of the in-house piping system and the occupants of the premises from contamination.

(2.2) The theory of premises isolation is utilized to provide protection to the general public where cross-connections (actual or potential) exist. Under this philosophy, a premise is isolated from the public water supply by means of a backflow prevention assembly. Premises isolation is the only sure or practical way of protecting the public water supply in cases where industrial, institutional, and commercial complexes subject the water system to a high hazard. Such customers may make frequent plumbing changes, restrict access to portions of premises, and/or utilize hazardous materials in such a way as to threaten the water system. Under such conditions, isolation of the entire premises is the only way a water system can adequately fulfill its responsibility of protecting its other customers from the hazards located within another customer's premises. CUB practices Premises Isolation of the customer's entire premises. This method does not offer protection to the on-premises personnel from internal cross-connection hazards. The customer has responsibility starting at the point of delivery from the public water supply and continuing throughout the private water distribution system. It is the customer's obligation and responsibility to protect its in-house piping system and the occupants of its premises from contamination. Therefore, the customer must practice in-house isolation by installing backflow devices where necessary to protect the occupants and users of the water supply within the customer's premises. The Occupational Safety and Health Association (OSHA) Standard Section 1910-141(b)(2)(ii) requires employers to provide a safe water for the occupants of the premises and specifically states that, "…the construction of nonpotable water systems or system carrying other nonpotable substances shall be such as to prevent backflow or backsiphonage into the potable water system".

(3) Program Regulations

(3.1) No water service connection to any premises shall be allowed or installed by CUB unless the water supply system is protected as required by state laws and this Program. Service of water to any premises shall be discontinued by CUB if a backflow prevention device required by this Program is not properly installed, regularly tested, and/or maintained; or if it is found that a backflow prevention device is not fully operational, or has been removed or bypassed, or if an unprotected cross-connection exists

on the premises. Service shall not be restored until such conditions or defects are corrected to the extent required by CUB.

(3.2) Prior to execution any work order for a new customer, or for any change in service to an existing customer, notification shall be given to CUB's Director - Water and Sewer Department.

For new installations, CUB or its authorized agent shall inspect the site and/or review plans in order to assess the degree of hazard and to determine the type of backflow prevention device, if any, that will be required, and to notify the owners of the required device and installation criteria. All required devices shall be installed and operational prior to the initiation of water service. No new installation of a backflow prevention device to the public water supply for water service, fire protection or any other purpose shall be made without first contacting CUB for approval.

For existing premises, personnel from CUB and/or its contractor shall conduct inspections and evaluations, and shall require correction of violations in accordance with the provisions of this Program. CUB may cause water service to be discontinued until such time as the customer complies with all requirements of state law and this Program. No alteration, repair, testing or change shall be made of any existing backflow prevention device connected to the public water supply for water service, fire protection or any other purpose without first securing the appropriate approval from CUB.

(3.3) It shall be unlawful for any person to cause a cross-connection to be made or allow one to exist for any purpose whatsoever, unless the construction and operation of same have been approved by the TDEC, and the operation of such cross-connection is at all times under the direction of CUB or its designated agent.

(3.4) If, in the judgment of CUB, an approved backflow prevention device is required at the water service connection to a customer's premises, or at any point(s) within the premises, to protect the potable water supply, CUB shall compel the installation, testing and maintenance of the required backflow prevention device(s) in a timely manner and at the customer's expense.

(3.5) A CUB-approved backflow prevention device shall be installed on each water service line to a customer's premises at or near the property line or immediately inside the building being served; but in all cases, before the first branch line leading off the service line. RPA will be required, regardless of the hazard potential. Double Check Valve Assemblies (DCVA) and Double Check Detector Assemblies (DCDA) are only approved by TDEC for non-chemical Class 1, 2, and 3 fire lines. Water service shall not be established or maintained until all necessary backflow prevention assemblies are properly installed by owner or owner's agent and then inspected, tested and approved by CUB or its authorized agent.

(4) <u>Cross-Connection Surveys/Inspections</u>

(4.1) Surveys - CUB will survey the distribution for all customers, both residential and nonresidential, for possible cross-connections. If it determined from the surveys that possible cross-connection may exist, the premise will be inspected. The need for backflow protection will be determined based on the results from the inspection. Notification of the type of backflow prevention assembly required and a date of compliance will be sent to the affected customer in writing by CUB.

(4.2) Inspections - CUB shall inspect all properties served by the public water supply where cross-connections with the public water supply are deemed possible. The frequency of inspections and re-inspection shall be based on potential health hazards involved, and shall be established by CUB in accordance with guidelines acceptable to the TDEC.

(4.3) Right of Entry for Inspections - CUB or its authorized representative shall have the right to enter, at any reasonable time, any property served by a connection to CUB water system for the purpose of inspecting the piping system therein for cross-connection, auxiliary intakes, bypasses or interconnections, or for the testing of backflow prevention devices. Upon request, the owner, lessee, or occupant of any property so served shall furnish any pertinent information regarding the piping system(s) on such property. The refusal of such information or refusal of access, when requested, shall be deemed evidence of the presence of cross-connections, and shall be grounds for disconnection of water service.

(4.4) An on-site inspection does not guarantee that all cross-connections will be identified or that they will not be created at a future date. The owner/customer is advised and encouraged to either self-survey or inspect at frequent intervals, or have their premises inspected by a qualified person. An assembly providing greater protection may be required if a current inspection determines the present or potential hazard is of a higher degree than determined during previous inspections.

(5) Correction of Violations

(5.1) Any person found to have cross-connections, auxiliary intakes, bypasses or interconnections in violation of the provisions of this Program may be allowed a reasonable time within which to comply with the provisions outlined within this Program. After a thorough investigation of the existing conditions and an appraisal of the time required to complete the work, CUB shall assign an appropriate amount of time. The time period for correction will be determined by CUB, based on the seriousness of the hazard and risk of contamination, ranging from **immediate correction**, or a time period of up to **ninety (90) days**. The maximum allowable time for correction will be no more than ninety (90) days.

(5.2) **Where cross-connections, auxiliary intakes, bypasses or interconnections are found that constitute an extreme hazard, with the immediate possibility of contaminating the public water system, CUB shall require that immediate corrective action be taken to eliminate the threat to the public water system**. Expeditious steps shall be taken by the affected customer to disconnect the public water system from the on-site piping system unless the imminent hazard is immediately corrected, subject to the right to a due process hearing upon timely request. The time allowed for preparation for a due process hearing shall be relative to the risk of hazard to the public health and may follow disconnection when the risk to the public health and safety, in the opinion of CUB, warrants disconnection prior to a due process hearing.

(5.3) The failure of the customer to correct conditions threatening the safety of the public water system as prohibited by this Program and Tennessee Code Annotated, Section 68-221-711, to the extent and within the time limits established by CUB, shall be grounds for denial of water service. If proper protection has not been provided after a reasonable time, CUB shall give the customer legal notification that water service is to be discontinued, and shall physically separate the public water system from the customer's on-site piping in such a manner that the two systems cannot again be connected by an unauthorized person, subject to the right of a due process hearing upon timely request. The due process hearing may follow disconnection when the risk to the public health and safety, in the opinion of CUB, warrants disconnection prior to a due process hearing.

In the case of backflow prevention devices on fire systems, the Fire Marshall will be contacted before water services is discontinued as to prevent potential harm to anyone in case a fire occurred in a public building. The Fire Marshall has the authority to condemn the building, which would prevent anyone from entering the building.

(6) Required Protective Assemblies/Devices

(6.1) Backflow assemblies shall be of the reduced pressure zone type **(RPA or RPDA) unless the application is for a Class 1, 2, and 3 Fire Protection Systems that allow for the use of a DCDA** (See Section (6.3) for exceptions where Class 1, 2, and 3 Fire Protection System require a reduced pressure zone type). Devices must be on the University of Southern California's List of Approved Backflow Prevention Assemblies, approved by the TDEC and CUB, as to manufacture, model, size and application. The method of installation of backflow prevention devices shall be approved by CUB prior to installation and shall comply with the criteria set forth in this Control Program. **The installation and maintenance of backflow prevention devices shall be at the expense of the owner or occupant of the premises.**

(6.2) An approved backflow prevention assembly shall be installed downstream of the water meter on each service line to a customer's premises at or near the property line or immediately inside the building being served, but in all cases before the first branch line leading off the service line, when any of the following conditions exist:

(a) The nature of the premises is such that the use of the structure requires a backflow prevention device;

(b) It is impractical to provide an effective air-gap separation;

(c) The owner/occupant of the premises cannot or is not willing to demonstrate to CUB that the water use and protective features of the plumbing are such as to pose no threat to the safety or potability of the water;

(d) The nature and mode of operation within a premises are such that frequent alterations are made to the plumbing;

(e) There is likelihood that protective measures may be subverted, altered or disconnected;

(f) The nature of the premises is such that the use of the structure may change to a use wherein backflow prevention is required;

(g) The plumbing from a private well or other water source enters the premises served by the public water system.

(6.3) Applications requiring backflow prevention devices shall include, but shall not be limited to, domestic water service and/or fire flow connections for all medical facilities, all fountains, lawn irrigation systems, wells, water softeners and other treatment systems, swimming pools and on all fire hydrant connections other than those by the fire department in combating fires. RPA's will be required in all commercial and industrial properties deemed by CUB as needing protection.

(a) Class 1, Class 2 and Class 3 fire protection systems generally shall require a DCDA. Class 1, Class 2, and Class 3 Fire protection systems will require a reduced pressure backflow prevention device where:

i. Underground fire sprinkler lines are parallel to and within ten (10) feet horizontally of pipes carrying sewage or significantly toxic materials;
ii. Premises have unusually complex piping systems;
iii. Pumpers connecting to the system have corrosion inhibitors or other chemicals added to the tanks of the fire trucks.

(b) Class 4, Class 5 and Class 6 fire protection systems shall require reduced pressure backflow prevention devices.

(c) Wherever the fire protection system piping is not an acceptable potable water system material, or chemicals such as foam concentrates or antifreeze additives are used, a reduced pressure backflow prevention device shall be required.

(6.4) Installation Criteria - The minimum acceptable criteria for the installation of backflow prevention assemblies requiring regular inspection or testing shall include the following:

(a) All required devices shall be installed in accordance with the provisions of this Cross-Connection Control Program by a person approved by CUB who is knowledgeable in the proper installation. **Only Tennessee-licensed fire sprinkler contractors may <u>install or make modifications</u> to backflow prevention devices on fire protection systems.**

(b) All devices shall be installed in accordance with the manufacturer's instructions and shall possess appropriate test cocks, fittings and caps required for the testing of the device. All fittings shall be of brass construction, unless otherwise approved by CUB, and shall permit direct connection to department test equipment.

(c) The entire device, including valves and test cocks, shall be easily accessible for testing and repair.

(d) All devices shall be placed in the upright position in a horizontal run of pipe, unless the device is used on a fire line and has USC approval for vertical installation.

(e) Device shall be protected from freezing, vandalism, mechanical abuse and from any corrosive, sticky, greasy, abrasive or other damaging environment.

(f) Devices shall be located in an area free from submergence or flood potential.

<u>RPA and RPDA assemblies should never be located in a pit or other area subject to flooding.</u> Above ground installations are also highly preferred for DCVA and DCDA assemblies; however, where above ground installation is not practical, below ground installations may be approved at the discretion of CUB for DCVA and/or DCDA devices only. Permission must be obtained from CUB prior to installation. If approved, the following general requirements are to be followed for pit or vault installations: (1) watertight construction; (2) constructed so that it will not flood; (3) must be well drained. Drains should be discharged to the atmosphere above the flood plain; (4) designed with a sump and pump if subject to groundwater accumulation; (5) provided with access ladder and adequate lighting to permit maintenance, inspection and testing; (6) test cocks should be protected with water tight plugs; (7) all safety practices should be followed when entering confined spaces. Consult with a safety professional before entering any confined space.

(g) All devices shall be adequately supported to prevent sagging.

(h) Reduced Pressure Backflow Prevention devices shall be located a minimum of twelve (12") inches plus the nominal diameter of the device above either; (1) the floor, (2) the top of opening(s) in the enclosure, or (3) maximum flood level, whichever is higher. Maximum height above the floor surface shall not exceed sixty (60") inches.

(i) Clearance from wall surfaces or other obstructions shall be at least six (6") inches. Devices located in non-removable enclosures shall have at least twenty-four (24") inches of clearance on each side of the device for testing and repairs.

(j) Devices shall be positioned where a discharge from the relief port will not create undesirable conditions. The relief port must never be plugged, restricted or solidly piped to a drain.

(k) An approved air-gap shall separate the relief port from any drainage system. An approved air-gap shall be at least twice the inside diameter of the supply line, but never less than one (1") inch.

(l) An approved strainer shall be installed immediately upstream of the backflow prevention device, **except in the case of a fire protection system.**

(m) Adequate drainage shall be provided for all devices. Reduced Pressure Backflow Prevention devices shall be drained to the outside whenever possible.

(n) Fire hydrant drains shall not be connected to the sewer, nor shall fire hydrants be installed such that backflow/backsiphonage through the drain may occur.

(o) Enclosures for outside installations shall meet the following criteria: Enclosures should meet American Society of Sanitary Engineering for Plumbing and Sanitary Research (ASSE) Standard 1060 as required by TDEC.

1. All enclosures for backflow prevention devices shall be as manufactured by a reputable company or an approved equal.
2. For backflow prevention devices up to and including two (2") inches, the enclosure shall be constructed of adequate material to protect the device from vandalism and freezing and shall be approved by CUB. The complete assembly, including valve stems and hand wheels, shall be protected by being inside the enclosure.
3. To provide access for backflow prevention devices up to and including two (2") inches, the enclosure shall be completely removable. Access for backflow prevention devices 2-1/2" and larger shall be provided through a minimum of two access panels. The access panels shall be of the same height as the enclosure and shall be completely removable. All access panels shall be provided with built-in locks.
4. The enclosure shall be mounted to a concrete pad in no case less than four (4") inches thick. The enclosure shall be constructed, assembled and/or mounted in such a manner that it will remain locked and secured to the pad even if any outside fasteners are removed. All hardware and fasteners shall be constructed of 300 series stainless steel.
5. Heating equipment, if required, shall be designed and furnished by the manufacturer of the enclosure to maintain an interior temperature of $+40^{o}F$ with an outside temperature of $-30^{o}F$ and a wind velocity of 15 miles per hour.

(7) <u>Dual Devices/Parallel Installations</u>

Duplicate backflow prevention devices may be installed to avoid the necessity of discontinuing water service to test or repair a protective device where the use of water is critical to the continuance of normal operations or the protection of life, property or equipment. Parallel installation of two devices is an effective means of the owner insuring that uninterrupted water service during testing or repair of devices and is strongly recommended when the owner desires such continuity.

Where it is found that only one device has been installed and the continuance of service is critical, CUB shall notify, in writing, the occupant of the premises of plans to interrupt water services and arrange for a mutually acceptable time to test the device. CUB may require the installation of a duplicate device if the customer cannot readily accommodate interruptions of water service for periodic testing and repairs

and/or is unwilling to cooperate in scheduling a facility shutdown within a reasonable time period for testing during normal hours worked by CUB personnel and its contractor(s).

(8) Testing of Backflow Prevention Assemblies/Devices

Devices will be tested at least annually on a 12 month basis by CUB or by its qualified contractor who possesses a valid Certificate of Competency in Testing and Evaluation Backflow Prevention Assemblies issued by the TDEC, Division of Water Resources. Any backflow prevention device, whether on a fire protection system or a domestic water supply line, may be repaired or tested by any qualified contractor who possesses a valid certification. **However, only Tennessee-licensed fire sprinkler contractors may install or make modifications to backflow prevention devices on fire protection systems.** Repairs and Testing do not have to be performed by licensed fire sprinkler contractors. Where applicable, an allowance will be given for fire sprinkler contractors to test in accordance to Division of Fire Prevention Regulations. Those with fire sprinkler license will also be required to have a Valid Certificate of competency and all other requirements set forth by this Program. Records of all tests will be kept on file with CUB, and a copy of this report will be supplied to the customer. Water service shall not be disrupted to test a device without the advance knowledge of the occupant of the premises.

(9) Repair of Devices

CUB shall require the occupant of the premises to keep any backflow prevention devices working properly, and to make all indicated repairs promptly. Repairs shall be made by qualified contractors or personnel acceptable to CUB. All expenses associated with such repairs shall be borne by the owner or occupant of the premises. The failure to maintain a backflow prevention device in proper working condition shall be grounds for discontinuance of water service to premises. Likewise the removal, bypassing or alteration of a backflow prevention device or the installation thereof, so as to render a device ineffective shall constitute a violation of this Program and shall be grounds for discontinuance of water service. Water service to such premises shall not be restored until the customer has corrected or eliminated such conditions or defects to the satisfaction of CUB.

Should a device be found defective or have a status of "Failed" from the annual test, CUB will require the device to be repaired promptly with the manufacturer's specified parts, in accordance to manufacturer's suggested procedure, and placed in proper operating condition within a specified time limit to **not exceed ninety (90) days**. Following repairs, the assembly is to be tested again to verify that it is meeting performance standards and have a status of "Passed". The owner of an assembly needing repairs or maintenance will be permitted to do the work if the owner is properly qualified and certified, or the owner may elect to secure the services of a business experienced in and qualified to perform the repair of backflow assemblies. All assemblies must be tested by backflow prevention assembly tester possessing a valid Certificate of Competency in Testing and Evaluation Backflow Prevention Assemblies issued by the State of Tennessee. Records of repairs shall be supplied to CUB for retention.

(10) Non-potable Supplies

The potable water supply made available to a premises served by the public water system shall be protected from contamination as specified in the provisions of this Program. Any water pipe or outlet which could be used for potable or domestic purposes and which is not supplied by the potable water system must be labeled in a conspicuous manner such as:

The minimum acceptable sign shall have black letters at least one (1") inch high located on a red background. Color-coding of pipelines, in accordance with OSHA guidelines, shall be required in locations where in the judgment of CUB, such coding is necessary to identify and protect the potable water supply.

(11) Statement Required for Auxiliary Water Source or Private Wells

(11.1) Any person whose premises are supplied with water from the public water system, and who also has on the same premises a well or other auxiliary water source, or who stores water in an uncovered or unsanitary storage reservoir from which the water is circulated through a piping system, shall file with CUB a statement of the nonexistence of unapproved or unauthorized cross-connections, auxiliary intakes, bypasses or interconnections. This Agreement (See Appendix F of this Program) shall state that no cross-connections, auxiliary intakes, bypasses or interconnections will be permitted upon the premises. This Agreement shall also include a listing and location of all additional water sources utilized on the premises and how they are used. Maximum backflow protection shall be required on all public water sources supplied to the premises.

(11.2) Private wells drilled on properties that are supplied by a public water system, particularly those designed for chemigation and fertigation, will be inspected to ensure separation or the premises will require an approved assembly. Any well system that is connected directly or indirectly to the water system is required to disconnect or install a reduced pressure principle assembly. The customer will be required to sign a well user agreement if no assembly is required

(12) Public Education and Awareness

(12.1) CUB recognizes that it is important to inform its customers of the health hazards associated with cross-connections and to acquaint them with the program being pursued to safeguard the quality of water being distributed. Use of customer notification letters, reminders in bills, annual consumer confidence report, CUB's website, and brochures may all be used to acquaint the customers with the health hazards associated with cross-connections in an effort to obtain cooperation. Whenever possible, any such potential customer will be informed of needed cross-connection measures in the initial design or construction stage.

(12.2) The installation of a backflow prevention assembly or residential single or dual checks will make the customer's plumbing a "closed system". A closed system can create problems due to thermal expansion. Customers required to have backflow prevention assemblies will be informed on how to ensure protection from thermal expansion by the installation of a thermal expansion tank. These products are available from most plumbing supply stores. Failure by the customer to address this problem within a private premise may result in serious damage to the water heater, plumbing fixtures, as well as any problem normally associated with water damage. CUB is not responsible for any damage to private property due to thermal expansion.

(13) Inspection and Testing Fees

(13.1) The customer has the responsbility for protecting the water being distributed within his or her premises as well as protecting the public water supply system against contamination through cross-connections. Protection of the community water supply often necessitates the installation and maintenance of approved backflow prevention assemblies at the water service connection. The customer is responsible for the installation, operation, and maintenance of such backflow prevention assemblies as may be necessary to protect the community water system. Therefore, the customer shall bear the expense of providing necessary backflow protection and for maintaining the protective devices in good

working order. This includes the expense for inspections, installation, performance evaluations/testing, and repairs.

(13.2) A customer is responsible for the installation and repairs of devices, and may contract with an approved contractor for device repairs. CUB and/or its contractors will conduct the inspections and testing. A fee shall be charged for initial testing and annual testing, and all subsequent re-tests. The amount of this fee shall be set and adjusted as necessary by CUB's Board based upon the recommendations of the General Manager. The fee shall be assessed each time a device is tested and re-tested by CUB or its contractor. Where repeated re-inspection and/or re-testing is required to correct violations or deficiencies, the fee shall be assessed each time the inspection/test is repeated.

(14) Penalty/Discontinuance of Water Supply

(14.1) Any person or company who neglects or refuses to comply with any of the provisions of this Program shall be in violation of CUB's Program and its RULES and REGULATIONS, and therefore subject to fines and penalties.

(14.2) Independent of and in addition to any fines or penalties imposed, CUB may discontinue the public water supply service to any premises upon which there is found to be a cross-connection, auxiliary intake, bypass or interconnection. Service shall not be restored until such cross-connection, auxiliary intake, bypass or interconnection has been eliminated.

(15) Provision Applicable

The requirements contained in this Program shall apply to all premises served by CUB are hereby made part of the conditions required to be met for CUB to provide water services to any premises. The provisions of this Program shall be rigidly enforced since it is essential for the protection of the public water distribution system against the entrance of contamination. Any person aggrieved by the action of the Program is entitled to a due process hearing upon timely request.

If any provision of this Cross-Connection Control Program is found to conflict with any provision of any other ordinance/policy, then the provision of this Program shall control. That should any part or parts of this Program be declared invalid for any reason no other part or parts of this Program shall be affected thereby.

(16) Modifications to Program

This Cross-Connection Control Program may be modified from time to time to meet the needs of the utility and to meet TDEC's requirements. The Program will be reviewed by CUB's Director of Water & Sewer every five (5) years to determine if it meets the requirements set forth by the TDEC and that it promotes an on-going cross-connection program. The Director is authorized to modify this Cross-Connection Control Program as may be necessary to comply with the requirements of TDEC, except for changes to the Program's fees charged to customers, without the approval of the Board. CUB will advise TDEC's Knoxville Field Office of any changes to this Program for their review and comments.

(17) Effective Date

CUB's Cross-Connection Control Program shall take effect from and after its passage and publication as the law directs, the public welfare requiring it.

Approved this _____ day of _____, 20_____

Approval Signatures

Clinton Utilities Board Chairman:

Signed: _____ Date: _____

TDEC Division of Water Resources Approval:

Name (Printed): _____ Title: _____

Signed: _____ Date: _____

APPENDIX A

CUB's COMPLIANCE WITH TDEC's REQUIREMENTS

FOR

APPROVED BACKFLOW PREVENTION ASSEMBLIES

CUB's COMPLIANCE WITH TDEC's REQUIREMENTS FOR APPROVED BACKFLOW PREVENTION ASSEMBLIES

All assemblies, used to protect the public water supply, must be approved by the TDEC, Division of Water Resources. New installation and replacement assemblies required by a public water system must be included on the latest listing of the Approved List maintained by the Division of Water Resources. A backflow prevention device will qualify as an assembly, if it is consistent with the following definitions:

DOUBLE CHECK DETECTOR ASSEMBLY (DCDA)

A specially designed unit composed of a line size approved double check valve assembly with a specific bypass line equipped with a small water meter and a ¾ inch approved double check valve assembly. The meter shall register accurately for only very low rates of flow and shall show a registration for all rates of flow. The meter will detect small leakage or theft of water for unmetered fire lines. This assembly is designed for fire service lines and is recommended for unmetered fire lines. This assembly is designed to protect against a **low hazard or pollutant.**

DOUBLE CHECK VALVE ASSEMBLY (DCVA)

An assembly composed of two independently acting, approved check valves, including tightly closing shutoff valves located at each end of the assembly and fitted with properly located test cocks. This assembly is designed to protect against a **low hazard or pollutant.**

REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTION ASSEMBLY (RPA)

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 test cocks and tightly closing shutoff valves at each end of the assembly. This assembly is designed to protect against a **health hazard (i.e. contaminant).**

REDUCED PRESSURE PRINCIPLE DETECTOR BACKFLOW PREVENTION ASSEMBLY (RPDA)

A specially designed assembly composed of a line-size approved pressure principle backflow prevention assembly with a bypass containing a specific water meter and an approved reduced pressure principle backflow prevention assembly. The meter shall register accurately for only very low rates of flow up to 3 gpm and shall show a registration for all rates of flow. This assembly shall be used to protect against a non-health hazard or a health hazard. The RPDA is primarily used on fire sprinkler systems. This assembly is designed to protect against a **health hazard (i.e. contaminant).**

The following assemblies will meet recommendations and requirement for protection of CUB's public water system:

1. Reduced Pressure Principle Assembly
2. Reduced Pressure Principle Detector Assembly
3. Double Check Valve Assembly*
4. Double Check Valve Detector Assembly*

*** <u>DCDA and DCVA devices are permissible on non-chemical fire lines Class 1-3 only. CUB requires DCVAs for Class 1-3 fire lines.</u>**

Atmospheric Vacuum Breakers, Pressure Vacuum Breakers, and Spill-Resistant Pressure Vacuum Breakers are **not** approved by TDEC for premises isolation.

EXISTING ASSEMBLIES NOT ON TDEC'S APPROVED LIST

Assemblies not listed on the Approved List may be accepted by the TDEC as an approved assembly under very strict guidelines. CUB may elect, at its discretion, to accept only assemblies listed on the "Approved List" in order to establish the utmost confidence in backflow protection and prevention.

The Division of Water Resources highly recommends the use of assemblies listed only on the Approved List. Approval of assemblies not listed on the Approved List will be considered on a case-by case basis by CUB with fulfillment of these requirements:

1. Approved Ordinance and Program of CUB at the time of installation did not address or require assemblies from Approved List. CUB's Program shall be amended and approved, if needed, to allow unapproved existing assemblies that meet the following requirements.

2. Assembly must meet all installation criteria required by TDEC and CUB.

3. Must meet the definition of assembly and is annually tested. The assembly must be deemed "**Passed"** to remain as an acceptable and approved backflow prevention assembly for the protection of the water system.

4. Installation, operation, and maintenance of the assembly will provide adequate protection against backflow.

5. Assembly must be repaired using manufacturer-specified parts in accordance to procedures outlined by manufacturer.

6. A written plan must be reported by CUB concerning the assembly not shown on the latest Approved List. The plan will specify all conditions and information concerning the assembly including manufacturer, model, serial number, installation, repair information (if available), time line of replacement (depending on type of hazard and risk of contamination) if assembly cannot be repaired in accordance with manufacturer procedures. All plans and worksheets shall be completed and kept on file by CUB.

7. If assembly cannot be repaired according to the manufacturer-specified procedures, it must be replaced with an assembly listed on the latest Approved List. The replacement assembly will be installed, operated, and maintained in accordance with CUB's Program.

TABLE 1:
BACKFLOW PREVENTION ASSEMBLY REQUIREMENTS

CUSTOMER CLASSIFICATOIN	TYPE OF SERVICE CONNECTION	ASSEMBLY TYPE			
		DCVA	DCDA	RP	RPDA
RESIDENTIAL	Domestic Main Line	-	-	-	-
	Irrigation/Hard-piped Pool, Auxiliary Supply, etc.	*	-	X	**
COMMERCIAL	Domestic Main Line	*	-	X	
	Irrigation	*	-	X	**
	Fire Class 1-3 (No Chemicals)	*	X	-	**
	Fire Class 4-6	*	-	-	X
INDUSTRIAL	Domestic Main Line	*	-	X	
	Irrigation	*	-	X	**
	Fire Class 1-3 (No Chemicals)	*	X	-	**
	Fire Class 4-6	*	-	-	X

Notes:

DCDA = Double Check Detector Assembly

DCVA = Double Check Valve Assembly

RP = Reduced Pressure Assembly

RPDA = Reduced Pressure Detector Assembly

*TDEC allows DCVA on Class 1-3 Firelines. CUB requires DCDAs that have meters on Class 1-3 Firelines (No Chemicals)

DCVA can be used "in-house" at the discretion of customer for low hazard or pollutant situations.

** RPDA not required in this situation, but allowed if customer chooses and a meter is not installed to monitor water usage

Devices are not currently required on residential domestic lines. CUB can modify this policy if State or Federal regulations are updated to require devices on residential domestic lines.

APPENDIX B

TDEC INSTALLATON CRITERIA

FOR

BACKFLOW PREVENTION ASSEMBLIES

INSTALLATION CRITERIA FOR A REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTION ASSEMBLY (RPA or RPDA)

General: All backflow prevention assemblies will be inspected to verify that the units meet the following requirements and tested to verify that the installed units meet the performance requirements as set forth in the latest Edition of the **"Manual for Cross-Connection Control" published by the Foundation for Cross-Connection Control and Hydraulic Research – University of Southern California.**

A. The assemblies should never be subject to flooding and therefore should:

   1. Never be located in a pit or other area subject to flooding
   2. Avoid piped drains for enclosures housing the units. Provision should be made for discharging water (maximum design discharge) directly through the wall of the enclosure housing the unit at a slightly higher elevation than surrounding ground level or maximum flood level.
   3. The lowest part of the relief valve discharge port should be a minimum of 12 inches plus the nominal size of the discharge opening of the assembly above either:
      A. The ground
      B. Top of the opening(s) in enclosure wall
      C. Maximum flood level

      Whichever is highest, in order to prevent any part of the assembly from becoming submerged.

B. Reduced Pressure backflow prevention assemblies being installed in Tennessee for the protection of a public water system should be included on the latest listing of "Approved Backflow Prevention Assemblies" maintained by The Foundation for Cross-Connection Control and Hydraulic Research. This list is available through Tennessee Department of Environment and Conservation, Division of Water Resources.

C. The assemblies should be installed where the units can be easily tested and repaired. Assemblies should be installed in accordance with manufacturer's installations.

   1. Installation of assemblies 2" and less there must be a minimum of six inch clearance from all walls. Assemblies over 2" must be a minimum of twelve inches from all walls.
   2. Assemblies installed in stationary enclosures should have at least a 2 ft. clearance on each side of the assembly to facilitate testing and servicing. Adequate drainage must be provided.
   3. Assemblies should not be installed higher than 5 ft. from the floor/ground to the center line of the assembly unless safe permanent access is provided for testing and servicing

D. The pipelines should be thoroughly flushed to remove foreign material and debris. A strainer should be added on the inlet side of the assembly before installation except for fire protection service lines.

E. Reduced Pressure Backflow Preventers should be installed with unions and isolation valves on both ends of the assembly to allow removal of the assembly for repair or replacement.

F. Provisions should be made to protect the assemblies from freezing. Insulating materials should not restrict the relief valve discharge or accessibility to test cocks or name plate of the unit. All enclosures should be designed to provide for adequate draining for the relief valve.

G. The relief valve should never be plugged, restricted, or solidly piped to a drain, ditch or pump. Rigidly secured air-gap funnels may be used to direct discharges away from the unit provided an approved air-gap separation is provided at the relief valve discharge and again at the discharge end of the drainpipe. An adequate area drain is recommended to handle the maximum relief valve flow to prevent flooding.

H. The test cocks, valve stems, or name plates should not be painted and their accessibility, operation of legibility should not be hampered nor the relief valve discharge passage be restricted by insulation or other coverings.

I. The assemblies should be placed in the upright position in a horizontal run of the pipe and special supports added if needed, unless the assemblies are approved for other orientations.

J. For applications where water temperatures exceed 110°F (43°C) only approved hot water devices are to be used.

K. Prior to the installation of an assembly, ensure that the temperature-pressure relief valves on heating vessels are properly installed and are in good working condition. **It is recommended that the customer install thermal expansion tanks or other devices used to relieve pressure buildup instead of relying on the temperature-pressure valve on the heating vessel.**

L. The assembly should be adequately supported to prevent the unit from sagging. Special supports are needed for units in the 4" to 10" size range.

INSTALLATION CRITERIA FOR DOUBLE CHECK VALVE BACKFLOW PREVENTION ASSEMBLY (DCDA or DCVA)

General: All backflow prevention assemblies should meet the following requirements and recommendations as set forth in the latest Edition of the **Manual for Cross-Connection Control published by the Foundation for Cross-Connection Control and Hydraulic Research-University of Southern California**

Note: Double check-detector check and double check valve assemblies have only been approved by the Division of Water Resources for commercial or residential fire service lines that are Classes 1-3 and do not contain any contaminants.

A. A Double Check Valve Assembly (DCVA) should be installed in an accessible location with adequate space to facilitate maintenance and testing.

B. Above ground installations are highly preferred. Where above ground installation is not practical prior approval should be obtained from the water system on details of installation. The following general requirements are to be followed for pit or vault installations:

- Pit or vaults are to be of watertight construction.

- Constructed so that it will not flood.
- Must be well drained. Drains should be discharged to the atmosphere above the flood plain.
- Design with a sump and pump if subject to ground water accumulation.
- Provided with access ladder and adequate natural or artificial lighting to permit maintenance, inspection and testing.
- Test cocks should be protected with watertight plugs.
- All safety practices should be followed when entering confined spaces. Consult with a safety professional before entering any confined space.

C. A strainer may be required ahead of the assembly in some localities. **No strainer should ever be installed until approval is received by the fire official having jurisdiction and/or the Insurance Underwriters.**

D. Pipelines should be thoroughly flushed to remove foreign material and debris before installing the assembly.

E. Prior to the installation of a DCVA, insure that the temperature-pressure relief valves on heating vessels are properly installed and are in good working condition. **It is recommended that the customer install thermal expansion tanks or other devices used to relieve pressure buildup instead of relying on the temperature-pressure valve on the heating vessel.**

F. Double Check Valve Assemblies should be installed with unions and isolation valves on both ends of the assembly to allow removal of the assembly for repair or replacement.

G. Prior to the installation of DCVA, ensure that the temperature-pressure relief valves on heating vessels are properly installed and are in good working condition.

H. All DCVA's should be installed in a horizontal position unless otherwise approved for other orientations.

I. The assembly should be installed at least 12 inches above ground or maximum flood level, whichever is highest, in order to prevent any part of the assembly from becoming submerged.

J. Assemblies 2" and less should be a minimum of six inch clearance from all walls. Assemblies over 2" should be a minimum of twelve inches from all walls.

K. Assemblies installed in stationary enclosures should have at least a 2 ft. clearance on each side of the assembly to facilitate testing and servicing.

L. The assembly should be adequately supported to prevent the assembly from sagging. Special supports are usually needed for 4" to 10" assemblies.

M. Assemblies to be installed should be on the latest Approved List and installed in the approved orientation.

N. Prior to installation, refer to the Manufacturer's literature for temperature ranges. DCVA must be protected from freezing temperatures. For temperatures in excess of 43°C (110°F), consult manufacturer's literature for recommendations. For the above condition only approved hot water devices may be used.

APPENDIX C

TYPICAL CROSS-CONNECTION HAZARDS

TYPICAL CROSS-CONNECTION HAZARDS

Actual or potential cross-connection hazards may be present within almost every water-using premise. To better understand and become aware of these hazards, the following examples are provided.

A. Common Facilities and Systems Likely to have Cross-Connection Hazards:

1. Auxiliary Water Systems

   Any premise or facility with an alternate water supply on or available to the premise. Water stored in reservoirs that are not properly protected or circulated.

2. Food Processing

   Pressure cookers, autoclaves, retorts, and other steam connected facilities.

3. Cooling Systems Single Pass

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

4. Farming Operations

   Poultry houses, chicken houses with automatic proportioning pumps or feeder barrels for supplying water with live virus or other medication, livestock watering troughs with below the rim filling outlet, diluting and mixing of pesticides and insecticides, mixing and spray equipment, greenhouses, dilution of liquid fertilizers, dairies, unprotected hose bibbs.

5. Fire Protection Systems

   Piping systems and storage reservoirs that may be treated for prevention of scale formation, corrosion, algae, or slime.

   Piping systems that contain non-potable plumbing materials.

   Booster pumps without suction pressure sustaining valves or low suction pressure cutoff switches.

   Sprinkler systems filled with antifreeze solutions. Piping systems filled with chemical compounds used in fighting fires.

   Fire systems with an auxiliary source of supply or which are located within 1700 ft. of streams, lakes, ponds, reservoirs, or other non-potable waters that could be utilized in emergencies.

6. Film Processing

   Automatic film processing machines, tanks, vats, and other facilities used in processing film.

7. Hydraulic Test Facilities

   Hydraulic test equipment using pumps, rams, pressure cylinders, or other hydraulic principles, which may force liquids back into the public water system.

   Piping systems, tanks, and other equipment where the public water system pressure is used directly and which may be subject to backpressure.

8. Industrial Piping Systems

   Industrial piping systems containing chemicals, gases, cutting or hydraulic fluids, coolants, antifreeze, hydrocarbon products, glycerin, paraffin, caustic or acid solutions and other substances.

9. Industrial Systems – Chemical Contamination

   Tanks, can and bottle washing machines, and piping systems where caustics, acids detergents, and other compounds are used in cleaning, sterilizing, and flushing.

10. Residential or Commercial lawn irrigation systems.

    Irrigation systems equipped with pumps, injectors, pressurized tanks, or other facilities for injecting agricultural chemicals, such as, fungicides, pesticides, herbicides, and other toxic or objectionable substances, require immediate protection.

11. Laundry and Dyeing Facilities

    Laundry machines having under rim or bottom inlets, dry cleaning equipment, and solvent reclaim facilities.

    Wash water storage tanks equipped with re-circulating pumps.

    Dye vats in which toxic chemicals and dyes are used.

    Shrinking, bluing, and dyeing machines directly connected to re-circulating systems.

    Boilers, steam lines, and heat exchangers.

12. Paper Processing

    Pulp, bleaching, dyeing, and processing facilities that may be contaminated with toxic chemicals.

13. Petroleum Processing

    Steam boilers, steam lines, mud pumps and mud tanks, oil well casing used for dampening gas pressures, dehydration tanks, oil and gas tanks in which hydraulic pressures are used to raise oil and gas levels, gas and oil lines used for testing, excavating, and slugging.

14. Plating Facilities

    Plating facilities using highly toxic cyanides, heavy metals, such as, copper, cadmium, chrome, 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, pickling, dipping, and rinsing operations and lines used for transferring fluids.

15. Storage Tanks, Cooling Towers, and Circulating Systems

Storage tanks, cooling towers, reservoirs, and circulatory systems contaminated with bird droppings, algae, slimes, or with water treatment compounds, such as copper, chromate, phenols, and mercury.

16. Sewerage Systems

Cross-connections to sewage pumps for priming, water seal lubrication, cleaning, flushing, or unclogging.

Water-operated sewage pump ejectors.

Sewer lines used for disposing of filter or softener backwash, water from cooling systems, or for providing a quick drain for building lines and lines used for flushing or blowing out obstructions in sewer lines.

17. Steam Generation Facilities

Steam generating facilities and lines which may be contaminated with boiler compounds, heat exchangers, single wall steam heated water heating equipment.

18. Hospital-Medical Facilities

Unprotected connections to bedpan washers, hydrotherapy tubs, toilets, urinals, autopsy and mortuary equipment, aspirators, x-ray and photo processing equipment, vacuum pump seals.

Unprotected connections to laboratory equipment which may be chemically or bacteriologically contaminated, such as, steam sterilizes, autoclaves, specimen tanks, and pipette washers.

B. Equipment posing significant risk of creating cross-connections include:

Establishments with the equipment list below will normally require premises isolation with a RPA or DCDA (Fire Line Only) depending on hazard unless otherwise found to have an appropriate air gap.

Many devices or equipment may be designed and constructed with approved air gaps that would adequately protect the water system. However, the amount of risk that the establishment poses to the distribution will be considered, and not solely on the presence or absence of the devices, situations, or equipment listed below.

The following is an incomplete list of equipment normally requiring backflow prevention assemblies, it is to be noted that any connection with piping, equipment, or devices that contain or may contain substances that are pollutants or contaminants will require premises isolation.

Air-conditioning systems (using water for processing)

Aspirators

Air lines

Autoclaves and sterilizers

Auxiliary systems

Baptismal tanks

Bathtubs (Hard Piped)

Bedpan washers

Bidets
Booster pumps
Brine tanks, softeners
Boilers
Car wash equipment
Chemical feeders
Chillers
Chlorination equipment
Coffee urns
Commercial cookers
Condensers
Compressors
Cooling systems
Cooling towers
Culture vats
Cuspidor, dental
Developing equipment
Dishwashers
Display fountains
Drinking fountains
Ejectors, steam or water
Extractors
Fire protection systems, standpipes, sprinkler systems and drain lines
Fish tanks, ponds
Floor drains
Food mixing tanks
Frost-free toilets, hydrants, and fountains
Garbage grinders
Garbage can washers
Garden sprayers
Heat exchangers
Humidity controls
Hydraulic equipment

Hydraulic insecticide or fertilizer applicators
Hydraulic lifts
Ice makers
Irrigation systems, lawn sprinklers
Kitchen equipment
Laboratory equipment
Laundry equipment
Lavatories
Lawn sprinklers
Liquid handling systems
Lubrication, pump bearings
Medical equipment
Pest control equipment
Photo laboratory sinks
Potato peelers
Pressure cookers
Process water circulation systems
Pump, priming systems
Sewer flush tanks
Shampoo sinks, basins
Showers, telephone type shower heads
Sinks, slop sinks
Soda fountains
Solar water and space heating equipment
Steam boilers
Steam tables
Stop and waste vales
Swimming pools, ponds, fountains
Tank and vats
Therapeutic tanks, spas, and hot tubs
Threaded hose bibbs
Toilets, flushometer, flush tank, ballcock, flush valve siphon jet
Vegetable peelers

Vacuum systems

Urinals (siphon set blowout)

Vacuum systems (water operated with water seals)

Water treatment devices

Water troughs

Water-using mechanical equipment

Water Jacketed tanks, vats, cookers

C. <u>Premises, facilities or establishments that pose a significant risk of cross-connection include</u>:

Reduced Pressure Backflow Prevention Assemblies required for premises isolation

Agricultural processing facilities

Aircraft and missile plants

Amusement parks

Animal hospitals and clinics

Automotive plants

Auxiliary water systems

Autopsy facilities

Beverage bottling plants

Breweries

Buildings (multistory) – hotels, apartment houses, public and private buildings, or structures having unprotected cross-connections

Campgrounds

Canneries

Car washes

Chemical plants – manufacturing, processing, compounding, treatment, packing, storage

Chemically contaminated water systems

Civil works

Clinics

Cold storage plants

Dairies, creameries

Dry cleaners

Dental buildings

Dye works

Extermination Companies

Fertilizer plants
Fertilizer (liquid) and spray distributors
Film laboratories
Fire sprinkler systems
Funeral homes
Hospitals
Laboratories
Laundries and dye works
Lawn irrigation systems
Medical buildings
Metal manufacturing, cleaning, processing, and fabricating plant
Mortuaries
Morgues
Motion picture studio
Nursing home or convalescent homes
Greenhouses, plant nurseries
Oil and gas production, storage, or transmission facilities
Oil refineries
Packing houses
Paper and paper product plants
Plating plants
Power plants
Private wells
Radioactive materials or substances – plants or facilities that process or use radioactive materials
Reduction plants
Restricted, classified, or other closed facilities
Rubber plants
Sand and gravel plants
Schools and colleges
Sewage pumping stations
Storm water pumping stations
Hard plumbed swimming pools, ponds, and fountains
Tanneries of all kinds

Therapeutic tanks, spas, and hot tubs

Vegetable and food processing facilities

Waterfront facilities and industries

Water treatment plants

Wastewater treatment plants

Water using recreational facilities (swimming pools, water slides)

D. **Other situations or conditions that pose a significant risk of contamination include:**

- The degree of hazard involved.
- The likelihood of frequent and/or unapproved plumbing changes.
- The probability of frequent modification of water using equipment.
- The complexity of the internal piping system.
- The difficulty in making frequent inspections to verify that the internal protection provided is being adequately maintained.
- The likelihood of protective assemblies being rendered ineffective.
- The ease of access to premises.
- The time necessary to inspect all water outlets not protected by a backflow prevention assembly.
- The time needed to inspect the facility at least annually to determine if new cross-connections have been created.

NOTES:

1. CUB requires an RPA device regardless of the hazard potential where a backflow prevention device is necessary. DCVA and DCDA are only approved by TDEC for non-chemical Class 1, 2, and 3 fire lines. See Section (6.3)(a) for more information on fire system requirements.
2. CUB practices Premises Isolation. This method does not offer protection to the on-premises personnel from internal cross-connection hazards. The customer has responsibility starting at the point of delivery from the public water supply and continuing throughout the private water distribution system. It is the customer's obligation and responsibility to protect its in-house piping system and the occupants of its premises from contamination. Therefore, the customer must practice In-house isolation by installed backflow devices where necessary to protect the occupants and users of the water supply within the customer's premises. The Occupational Safety and Health Administration (OSHA) Standard Section 1910-141(b)(2)(ii) requires employers to provide a safe water for the occupants of the premises and specifically states that, "…the construction of nonpotable water systems or system carrying other nonpotable substances shall be such as to prevent backflow or backsiphonage into the potable water system".

APPENDIX D

TDEC GUIDANCE FOR

CERTIFICATE OF COMPETENCY FOR TESTING

AND

EVALUATING BACKFLOW PREVENTION ASSEMBLIES

TDEC GUIDANCE FOR CERTIFICATE OF COMPETENCY FOR TESTING AND EVALUATING BACKFLOW PREVENTION ASSEMBLIES

The information listed below is guidance concerning Certificate of Competencies:

- Anyone testing backflow prevention assemblies for the purposes outlined in the water system's Cross-Connection Control Ordinance or Ordinance must have a **valid** Certificate of Competency in Testing and Evaluation of Backflow Prevention Assemblies issued by the Division of Water Resources.

- A valid certificate is defined as a Certificate (Basic or Renewal) issued by the state of Tennessee that has not surpassed the three-year time limit from issuance. After certificates have been granted by the State of Tennessee, a Certificate No. is assigned to the applicant. Certificates are valid for three (3) years after certificates are granted. All Certificates are no longer valid, if the Renewal Certificate is not attained within three (3) years from the date the certificate was issued. A 1 year grace period is allowed to attend the renewal class however, the person must not be allowed to test after the 3 year expiration.

- The applicant must complete and satisfy all requirements set forth by the Division of Water Resources to attain and renew the Certificate of Competency.

- Applicant must successfully complete a State-approved Basic Cross-Connection Control training session, written exam, and practical exam to attain an initial Certificate of Competency. The student must successfully complete a State-approved Renewal Cross-Connection Control training session and practical exam to renew the Certificate of Competency.

- Certificate of Competency must be valid in order to perform assembly evaluations.

- In order to renew the Certificate of Competency, a Renewal Course and Exam must be taken within three years after the issuance date to remain valid.

- If the Certificate of Competency is not renewed three years after issuance, the certificate is no longer valid, but does not expire.

- A one year grace period to renew the Certificate of Competency is allowed once the three year time limit has passed.

- Water providers will not accept a test report from a tester whose certificate is in the grace period or has expired.

- If the tester does not renew during the one year grace period, the certificate expires and the tester must take the Basic Course and Basic Exam in order to attain the Certificate of Competency.

- The Certificate of Competency is not transferable and no one may work "under" the certificate.

- A Plumber Certificate in Testing and Evaluating Backflow Prevention Devices issued by Division of Water Resources cannot be substituted and will not be accepted in place of the Certificate of Competency.

- Certificates of Competency in Testing and Evaluation of Backflow Prevention Assemblies from other states or entities will only be accepted if approved by the Division of Water Resources. No entities or states presently have an approved Certificate of Competency.

- Water providers may elect to impose additional restrictions on testers within their systems, as long as the State's statutes, regulations, and policies are met.

Minimum Testing Requirements in Cross-Connection Control Program:

Anyone testing backflow prevention assemblies for the purposes outlined in CUB's Cross-Connection Control Program must possess a **valid** Certificate of Competency in Testing and Evaluation of Backflow Prevention Assemblies issued only by the TDEC, Division of Water Resources.

APPENDIX E

TDEC GUIDANCE

CONCERNING LAWN IRRIGATION SYSTEMS

TDEC GUIDANCE CONCERNING LAWN IRRIGATION SYSTEMS

Lawn irrigation systems, both commercial and residential, are recognized by the State of Tennessee, Division of Water Resources as an actual and potential cross-connection to a public water system. The contact between the sprinkler heads and the soil or submergence of sprinkler heads allows a connection between the potable water system and water of unknown or unsafe quality.

Soil and standing water in contact with the sprinkler heads poses a significant risk of containing E.coli, Cryptosporidium, Giardia, other pathogens, and hazardous chemicals used for lawn care. Many lawn irrigation system use toxic chemicals injected in the piping to fertilize and eliminate undesired plants.

Required Protection for Lawn Irrigation Systems by Public Water Systems:

- For public water systems to protect their distribution lines, lawn irrigation systems are protected by a Reduced Pressure Principle Assembly (RPA). A Reduced Pressure Principle Detector Assembly (RPDA) may be used in there is not a separate line and meter to track water usage.
- Double Check Valve and Double Check Detector Assemblies (DCVA and DCDA) cannot be used for premises isolation on lawn irrigation systems. These type assemblies may only be used Class 1-3 fire systems. Water which contains or may contain pathogens or harmful chemicals is considered a health hazard and must be protected by a RPA or RPDA only.
- Pressure vacuum breakers, Spill-resistant vacuum breaker, and atmospheric vacuum breakers may not be used to protect the public water system's main-line piping or distribution system. These devices are point-of-use devices and may not be used for premises isolation.
- Assemblies must be tested annually.
- Assemblies on lawn irrigation systems must be tested during the start-up period (typical maximum time limit is within 90 days). Annual testing just prior to winterization or seasonal shutdown is not acceptable. Testing may also be initially staggered in order to reduce problems with scheduling tests.

APPENDIX F

WELL USER AGREEMENT

OF NON-USE

OR CONNECTION TO THE PUBLIC WATER SUPPLY

WELL USER AGREEMENT
OF NON-USE OR CONNECTION TO THE PUBLIC WATER SUPPLY

In accordance with CUB's Cross-Connection program and Tennessee state law, a private well or auxiliary water source may not be connected in any manner to the public water supply unless proper protection against cross-connection is provided. Only a Reduced Pressure Backflow Preventer or an approved air gap (complete separation from public water supply) may be used for such protection. These devices must have prior approval by CUB. Any person whose premises are supplied with water from the public water system, and who also has on the same premises a well or other auxiliary water source, or who stores water in an uncovered or unsanitary storage reservoir from which the water is circulated through a piping system, shall file with CUB a completed original of this statement regarding the nonexistence of unapproved or unauthorized cross-connections, auxiliary intakes, bypasses or interconnections. Customers using the public water supply and not in compliance with this rule will have their water service discontinued.

Check appropriate box:

☐ *This serves as notification that a well is located on the property at the following address:*

☐ *This serves as notification that a well is not located on the property at the following address:*

_____

Please type or print complete address

_____

I (we) understand and agree that this system is, and shall remain totally segregated from the public water supply, and no unapproved or unauthorized cross-connections, auxiliary intakes, bypasses, or interconnections with any type of irrigation systems or otherwise will be permitted without the proper cross-connection control device and written approval of CUB.

I (we) further understand and agree that should an auxiliary water supply be connected to the public water system at the above address, CUB will be contacted and maximum cross-connection control equipment in the form of an approved air gap or reduced pressure backflow prevention device shall be installed, before such connection is made, to protect the public water supply.

Date: _____

Name: _____ Notary: _____

Signature: _____ Commission Expires: _____

APPENDIX G

CROSS-CONNECTION SURVEY
for
RESIDENTAL WATER SYSTEMS

CROSS-CONNECTION SURVEY – RESIDENTIAL

Occupant Name _____

Occupant Address _____**City**_____ **Zip Code**_____

1. Occupancy: Own _____ Rent _____

2. Meter serves: Homes How Many?____
   Buildings How Many?____

3. Do you have any of the following at this address? (Please Check all that apply):

Hot Tub	☐	Swimming Pool	☐	Underground Sprinkler System	☐
Water Bed	☐	Wood-Burning Hot Water Heater	☐	Darkroom Equipment	☐
Green House	☐	Portable Dialysis Machine	☐	Utility sink with a threaded faucet	☐
Jacuzzi	☐	Drip/Soaker/Irrigation System	☐	Insecticide Sprayers (attached to garden hose)	☐
Solar Heat System	☐	Geothermal Heating System	☐	"Ghost" pipes (unidentified)	☐

4. Do you have bathtub that fills from the bottom? Yes_____No_____
5. Do you have a water softener or any additional water filters or treatment equipment? Yes____No____
6. Do you have an auxiliary water supply on your premises? Yes_____No_____
7. Do you have livestock and use a water trough or water system connected to public water? Yes_____No_____
8. Is your home or building elevated above your water meter? Yes_____No_____
9. Does a creek, river, or spring water run near or on your property? Yes_____No_____
10. Do you have a booster pump, well pump, or any other type water pump? Yes_____No_____
11. Do you receive irrigation water from a different source? Yes_____No_____
12. Do you have a backflow protection device on your property now? Yes_____No_____
13. Do you have any situation that you are aware of that could create a cross-connection? Yes_____No_____
14. Do you have any other water-using equipment on your property not mentioned above? Yes_____No_____
    If yes, please list here: _____

_____ _____
Print Name Phone #

_____ _____
Signature Date

If any of the above conditions change, please notify CUB's Water & Sewer Department immediately.