



Creating a better quality of life

111 WEST VINE STREET • MURFREESBORO, TN 37130 • TEL: (615) 893-5210 • FAX: (615) 849-2679

Cross-Connection Control Program Procedures Manual

Murfreesboro Water & Sewer Department
 City of Murfreesboro, Tennessee
 P.O. Box 1477
 Murfreesboro, TN 37133-1477

In cooperation with the
 Tennessee Department of Environment and Conservation
 Division of Water Supply

Date Procedures Received: _____

Procedures Approved: _____

Date Reviewed: _____

Reviewer(s): _____

Date of Letter: _____

ANNUAL REVIEW

<i>Year</i>	<i>Date of Review</i>	<i>Signature of Reviewer</i>	<i>Comments</i>
1 st	_____	_____	_____
2 nd	_____	_____	_____
3 rd	_____	_____	_____
4 th	_____	_____	_____

Table of Contents

Chapter 1 Introduction.....	1-1
1.1 Department Mission and Vision Statements	1-1
1.1.1 Mission Statement	1-1
1.1.2 Vision Statement.....	1-1
1.2 Purpose	1-1
1.3 Objective.....	1-1
1.4 Definitions	1-2
1.5 Maintenance of the Cross-Connection Control Program.....	1-8
Chapter 2 Authority for Cross-Connection Control	2-1
2.1 State of Tennessee.....	2-1
2.2 City of Murfreesboro	2-1
Chapter 3 Program Implementation.....	3-1
3.1 Staffing.....	3-1
3.2 Cross-Connection Control Surveys and Inspections.....	3-1
3.2.1 Non-Residential	3-2
3.2.2 Residential	3-2
3.2.3 Well System Inspections.....	3-3
3.2.4 Internal Protection.....	3-4
3.3 Public Education and Awareness Efforts	3-4
3.4 Required Protective Device.....	3-5
3.5 Responsibilities	3-6
3.5.1 The Department.....	3-6
3.5.2 The Customer	3-8
3.5.3 The Installer	3-9
3.5.4 The Repairer.....	3-10
3.6 Installation of Backflow Prevention Assemblies	3-10
3.6.1 Plumbing Permit Required.....	3-10
3.6.2 Installation Criteria	3-11
3.6.3 Thermal Expansion Control	3-12
3.6.4 Water Heater Temperature-Pressure Relief Valves.....	3-13
3.6.5 Fire Protection Systems.....	3-13
3.6.6 Nonpotable Supplies.....	3-13
3.7 Correction of Violations.....	3-14
3.8 Enforcement.....	3-15
3.8.1 High Risk Hazard.....	3-15
3.8.2 High or Low Hazard	3-16
3.8.3 Due Process	3-17
Chapter 4 Procedures for Inspection	4-1
4.1 Plumbing Inspections.....	4-1
4.2 Field Visit Procedures	4-1
4.3 Reports	4-1
4.4 Follow-up Visits and Reinspections	4-2
4.5 Fees.....	4-2

4.6	Technical Assistance	4-2
Chapter 5 Premises Requiring Reduced Pressure Principle Assemblies or Air Gap Separation.....		5-1
5.1	High Risk High Hazards	5-1
5.2	High Hazard	5-1
Chapter 6 Premises Allowing Double Check Valve Assemblies.....		6-1
6.1	Low Hazard.....	6-1
Chapter 7 Inspection and Testing of Backflow Prevention Assemblies		7-1
7.1	Approval of New Installations.....	7-1
7.2	Routine Inspection and Testing of Assemblies	7-1
7.3	Accepted Test Procedure	7-2
7.4	Official Tests	7-2
7.5	Prior Arrangements for Testing.....	7-2
7.6	Repairs	7-2
Chapter 8 Parallel Units		8-1
Chapter 9 Records		9-1
Chapter 10 Backflow Contamination Procedures		10-1
Chapter 11 Modifications to Plan.....		11-1
Appendix A – Typical Cross-Connection Hazards		A-1
Appendix B – Tags		B-1
Appendix C – Fees		C-1
Appendix D - State Guidance Concerning Lawn Irrigation Systems on Public Water Systems and Well Systems		D-1
Appendix E – MWSD Cross-Connection Questionnaire		E-1
Appendix F – Well User’s Agreement.....		F-1
Appendix G – Installation Criteria.....		G-1
Appendix H – Inspectors - General Procedures		H-1
Appendix I – Department Contacts.....		I-1

Chapter

1

Introduction

1.1 Department Mission and Vision Statements

1.1.1 Mission Statement

The Murfreesboro Water & Sewer Department is committed to serving the needs of the Murfreesboro residents, businesses, and guests by providing high-quality drinking water, wastewater disposal, repurified water and storm water services while providing for future economic growth via progressive planning; implementing water conservation measures; safeguarding public health and the environment; and providing for continuous process improvements and cost efficiencies.

1.1.2 Vision Statement

The Murfreesboro Water and Sewer Department will be a utility that is a leader in providing public health protection utilizing environmentally sound and innovative utility services using state-of-the-art technologies, proven operational expertise, resource planning and excellent customer service in a cost-effective manner.

1.2 Purpose

The purpose of this manual is to detail the procedures used to assure safe drinking water for all Murfreesboro Water and Sewer Department, hereafter referred to as Department, customers in accordance with State of Tennessee regulations and City of Murfreesboro Codes. It is designed to illustrate the characteristics of water hydraulics, illustrate degrees of hazards associated with water use, and explain administrative and field procedures in layman terms.

1.3 Objective

The first objective is to streamline the procedures that are used by everyone involved in keeping our water supply safe. This includes plumbers, engineers, inspectors, the water system, and each water customer. Inspections and surveys are used to determine

which service connections present a hazard and require the installation of backflow prevention assemblies. The ultimate goal is for our water customers to understand and appreciate the importance and requirements that accompany the protection of their drinking water supply.

The second objective is to execute a containment program, rather than an isolation program. A containment program is one that protects our water supply at the point of connection to the Customer's water by requiring that an approved backflow prevention assembly be installed at locations identified by the Department as cross-connection hazard. This will greatly reduce the chances of a wide spread contamination event due to backflow and/or backsiphonage. An isolation program goes further into the plumbing systems of individual homes and buildings and addresses all aspects of possible cross-connections within those systems.

1.4 Definitions

Air Gap shall mean a physical separation between the free flowing discharge end of a potable water supply line and an open or non-pressurized receiving vessel.

Approved Air Gap shall mean a separation of at least twice the inside diameter of the supply line when measured vertically above the overflow rim of the vessel, but in no case less than one (1) inch.

Approved shall mean any condition, device, method or procedure that is accepted by the Tennessee Department of Environment and Conservation, Division of Water Supply, and by the Department.

Atmospheric Vacuum Breaker shall mean 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 shall mean any piping connection or other device whereby water may be secured from any sources other than from the public water supply.

Auxiliary Water Supply shall mean any water supply on or available to the premises other than water supplied by the public water system.

Backflow shall mean the reversal of the intended direction of flow of water or mixtures of water and other liquids, gases, or other substances into the distribution pipes of a potable water system from any source.

Backflow Connection shall mean any arrangement whereby a backflow can occur.

Backpressure shall mean a pressure in the downstream piping that is higher than the supply piping.

Backflow Prevention Assembly shall mean an approved assembly designed to prevent backflow into the potable water system.

Backsiphonage shall mean negative or sub-atmospheric pressure in the supply piping.

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

Chemigation is the application of pesticides or system maintenance compounds through and irrigation system.

Containment shall mean a method of backflow prevention which requires the installation of an air gap or a backflow prevention assembly immediately following the water meter or as close to that location as deemed practical by the Department.

Contamination shall mean the introduction or admission of any foreign substances that has the ability to cause illness or death.

Contaminant shall mean any substance introduced into the public water system that has the ability to cause illness or death.

Cross-Connection shall mean any physical arrangement whereby a public water supply is connected, directly or indirectly, with any other water supply system, sewer, drain, conduit, pool, storage reservoir, plumbing fixture, or other device which contains, or may contain, contaminated water, sewage, or other waste or liquid of unknown or unsafe quality which may be capable of contaminating the public water supply as a result of backflow caused by the manipulation of valves, because of ineffective check valves or backpressure valves or because of any other arrangement.

Cross-Connection Control Program Coordinator/Officer shall mean the person who is vested with the authority and responsibility for the implementation of the Cross-Connection Control Program and this ordinance.

Customer shall mean any natural or artificial person, business, industry, or governmental entity that obtains water, by purchase or without charge, from the Department.

Department shall mean the Murfreesboro Water and Sewer Department.

Director shall mean the Director of the Water and Sewer Department of the City of Murfreesboro or authorized deputy, agent or representative.

Direct Cross-Connection shall mean an actual or potential cross-connection subject to backsiphonage and backpressure.

Double Check Detector Assembly shall mean 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 rates of flow up to three (3) gallons per minute and shall show a registration for all rates of flow. This assembly shall only be used to protect against non-health hazards and is designed primarily for use on fire sprinkler systems.

Double Check Valve Assembly shall mean an assembly of two (2) internally loaded check valves, either spring loaded or internally weighted, installed as a unit between tightly closing resilient seated shut-off valves and fitted with properly located resilient seated test cocks. This type of device shall only be used to protect against non-health hazard pollutants.

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

Fertigation is the application of a commercial fertilizer, soil amendment, or reclaimed water from food processing and wastewater treatment facilities with irrigation water.

Fire System Classifications Protection shall mean the classes of fire protection systems, as designated by the American Water Works Association "M14" for cross-connection control purposes based on water supply source and the arrangement of supplies, as follows:

- (1) Class 1 shall mean those with direct connections from the 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.
- (2) Class 2 shall mean the same as Class 1 except that booster pumps may be installed in the connections from the street mains.
- (3) Class 3 shall mean those with direct connection from public water supply mains in addition to any one or more of the following: elevated storage tanks, fire pumps taking suction from above ground covered reservoirs or tanks; and pressure tanks.
- (4) Class 4 shall mean those with direct connection from the public water mains, similar to Class 1 and Class 2, with an auxiliary water supply dedicated to fire protection and available to the premises, such as an auxiliary supply located within 1700 feet of the pumper connection.
- (5) Class 5 shall mean those with direct connection from the public water mains and interconnected with auxiliary supplies, such as pumps taking suction from reservoirs exposed to contamination, or from rivers, ponds, wells, or industrial water systems; or where antifreeze or other additives are used.
- (6) Class 6 shall mean those with combined industrial and fire protection systems supplied from the public water mains only, with or without gravity storage or pump suction tanks.

Hazard, Degree of shall mean a term derived from evaluation of the potential risk to public health and the adverse effect of the hazard upon the public water system.

Hazard, Health shall mean 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.

Hazard, High shall mean a site where there is less risk of contamination, or less likelihood of cross-connections contaminating the system than a high risk hazard but where any substance that could, if introduced in the public water supply, cause death, illness, or spread disease.

Hazard, High Risk shall mean a site capable of posing a significant risk of contamination or that may create conditions which pose an extreme hazard of immediate concern of death, illness, or spread disease.

Hazard, Low shall mean a site where any substance introduced would not be a health hazard but would constitute a nuisance or be aesthetically objectionable if introduced into the public water supply.

Hazard, Plumbing shall mean a cross-connection in a Customer's potable water system plumbing that is not properly protected by an approved air gap or backflow prevention assembly.

Hazard, Non-Health shall mean 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.

Indirect Cross-Connection shall mean actual or potential cross-connection subject to backsiphonage only.

Industrial Fluid shall mean any fluid or solution that may be chemically, biologically, or otherwise contaminated or polluted in a form or concentration that could constitute a health, system, pollution, or plumbing hazard if introduced into the public water supply. This shall include, but is not limited to: polluted or contaminated water; all types of process water or used water originating from the public water system and that may have deteriorated in sanitary quality; chemicals; plating acids and alkalis; circulating cooling water connected to an open cooling tower; cooling towers that are chemically or biologically treated or stabilized with toxic substances; contaminated natural water systems; oil, gases, glycerin, paraffin, caustic, and acid solutions and other liquid or gases used in industrial processes or for fire purposes.

Inspection shall mean 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 shall mean any system of piping or other arrangement whereby the public water system is connected directly with a sewer, drain, conduit, pool, storage reservoir, or other device, which does or may contain sewage or other waste, or liquid which would be capable of imparting contamination to the public water system.

Main shall mean the principal artery of any system of continuous piping to which branches may be connected.

Non-potable Water shall mean water not safe for drinking, personal or culinary utilization. Repurified water is considered non-potable water.

Passed shall mean 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 shall mean an evaluation of an approved reduced pressure principle assembly (including approved detector assemblies) using the latest approved testing procedures in determining the status of the assembly.

Person shall mean any individual, corporation, company, proprietorship, association, partnership, State, municipality, utility district, water cooperative, or Federal agency.

Point of Entry shall mean the point of connection to the potable water system.

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

Pollution shall mean the presence of a pollutant or substance in the public water system that degrades its quality so as to constitute a non-health hazard.

Potable Water shall mean water which meets the criteria of the Tennessee Department of Environment and Conservation and the Environmental Protection Agency for human consumption.

Pressure Vacuum Breaker shall mean an assembly consisting of a device containing one or two (2) 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. The assembly is approved for internal use only and is not approved for premise isolation by the State of Tennessee.

Public Water Supply or Public Water System shall mean the Murfreesboro Water and Sewer Department, which furnishes water to the City for general use and which is recognized as the public water supply by the Tennessee Department of Environment and Conservation.

Reduced Pressure Principle Assembly shall mean an assembly consisting of two (2) independently operating approved check valves together with 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.

Reduced Pressure Principle Detector Assembly shall mean 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 three (3) gallons per minute and shall show registration for all flow rates. This assembly shall be used to protect against non-health and health hazards and used for internal protection.

Repurified Water shall mean a high quality product of a multiple-stage advanced treatment process that cleans and disinfects domestic wastewater. Chlorine is then added to produce a residual which helps to maintain its freshness. Repurified water is distributed through a separate system of special repurified water mains at a pressure somewhat lower than the potable water. Although the repurified water produced by Murfreesboro is virtually indistinguishable from potable water, it is not intended for use as drinking water. A listing of other restrictions and plumbing requirements is contained in the Murfreesboro Repurified Water Usage Policies and Procedures Manual.

Service Connection shall mean the point of delivery to the Customer's water system; the terminal end of a service connection from the public water system where the Department loses jurisdiction and control over the water. Service connection shall include connections to fire hydrants and all other temporary or emergency water service connections made to the public water system.

State shall mean The State of Tennessee, Tennessee Department of Environment and Conservation, Division of Water Supply.

Survey shall mean an evaluation of a premises by a water system performed for the determination of actual or potential cross-connection hazards and the appropriate backflow prevention needed.

Water System shall mean the water system operated, whether located inside or outside, the corporate limits of the City which water system consists of two (2) parts, the Utility System and the Customer System.

- (1) The Utility System shall consist of the facilities for the production, treatment, storage, and distribution of water, and shall include all those facilities of the water system under the complete control of the Department, up to the point where the Customer's System begins (i.e. downstream of the water meter).
- (2) The Customer System shall include those parts of the facilities beyond the termination of the Department's distribution system that are utilized in conveying water to the point of use.

1.5 Maintenance of the Cross-Connection Control Program

The Cross-Connection Control Program shall be reviewed every five years. This review shall include the review of the Murfreesboro City Code, Chapter 33—Water and Sewers, Article II Cross-Connection Control Program, Sections 33-18 through 33-22 and this manual.

Chapter

2

Authority for Cross-Connection Control

2.1 State of Tennessee

The Department must comply with T.C.A. §§68-221-701 through 68-221-720, as well as the Tennessee Rules and Regulations for Public Water Systems which pertain to cross-connections, auxiliary intakes, bypasses, and interconnections, and establish an effective on-going program to control these undesirable water uses.

The Tennessee Code Annotated, Chapter 68: Health, Safety and Environmental Programs, Chapter 221: Water and Sewerage, places the major responsibility on the waterworks system for supplying a safe water to the customers and controlling cross-connection hazards. This law specifically prohibits the water system from installing or maintaining a water service connection to a customer where cross-connections or backflow hazards exist or have potential to exist.

The Regulations for Public Water Systems and Drinking Water Quality (Tennessee Department of Environment and Conservation, Division of Water Supply, Chapter 1200-5-1) require all public water suppliers have an ongoing Cross-Connection Control Program. This program must include provisions for: public relations; routine on-site inspections; enforcement; installation, testing, and repair; and records maintenance. As the State of Tennessee does not have a state plumbing code, local authorities must adopt legislation which authorizes cross-connection control activities. Pursuant to this State legislation, the City of Murfreesboro has established an ordinance dealing with cross-connection policy.

2.2 City of Murfreesboro

Authority for the Cross-Connection Control Program is the Murfreesboro City Code, Chapter 33—Water and Sewers, Article II Cross-Connection Control Program, Sections 33-18, 33-19, 33-20, 33-21, and 33-22, dealing with water and sewer.

This established Sections 33-18 through 33-22 to provide for the implementation and operation of a program to effectively control cross-connection hazards. This ordinance specifically prohibits cross-connections and makes provisions regarding policy and operational aspects of the program. The Department is responsible for the enforcement of this ordinance and has developed the following policies and guidelines for the

implementation and maintenance of the program. Any discrepancies between this policy and the City Code sections cited above are superseded by the City Code.

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 Tennessee Department of Environment and Conservation, and the operation of such cross-connection, auxiliary intake, bypass or interconnection is at all times under the direction of the Director.

If, in the judgment of the Director, an approved backflow prevention assembly is required at the Department's water service connection to the Customer's premises, or at points within the premises, to protect the potable water supply, the Director shall compel the installation and maintenance of said assembly at the owner's expense.

For new installations, the Department shall inspect the site and/or review plans in order to determine the type of backflow prevention assembly, if any, that will be required, and notify the owners in writing of the required assembly. All required assemblies must be installed by the owner and operable prior to initiation of water service.

For existing premises, the Department shall perform evaluations and inspections and shall require correction of violations in accordance with Murfreesboro City Code §33-18 through 33-22.

Chapter

3

Program Implementation

3.1 Staffing

The Department employs three (3) full-time personnel to implement the Department's Cross-Connection Control Program in accordance with the authority of the Murfreesboro City Code.

The Cross-Connection Control Officer is responsible for implementation of the Cross-Connection Control Program.

All Cross-Connection Control personnel will be certified by the State for testing and evaluating backflow prevention assemblies. This certification will be renewed every three years or as required by the State.

The Department will review the staffing needs annually to determine if the goals outlined in the plan can be met with the current level of staffing.

3.2 Cross-Connection Control Surveys and Inspections

A representative of the Department will survey the distribution system to determine if customers, residential and non-residential, have cross-connections. If it is determined from the surveys that possible cross-connection may exist, the premises 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 Customer.

The frequency of surveys, inspections and reinspections are based on potential health hazards involved shall be established by the Director in accordance with guidelines acceptable to Tennessee Department of Environment and Conservation.

The Director or his representative shall have the right to enter, at any reasonable time, any property served by a connection to the Murfreesboro water system for the purpose of inspecting the piping system for cross-connections, auxiliary intakes, bypasses, or interconnections. On request, the owner, lessee, and occupant of any property that is served by the Department shall furnish any pertinent information regarding the piping system 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 addressed in accordance with Section 3.8 of this manual.

3.2.1 Non-Residential

All non-residential and commercial establishments are required to have an approved backflow preventer installed that is in agreement to the actual or potential hazard present or inspections to determine that no assembly is needed based on criteria attached. The inspections will be performed on all new establishments before water service is established or within ninety (90) days of connection. If there are existing establishments that have not been identified and inspected, the Department will develop a list, based on risk and public safety, and time line for inspection by the Department. If an establishment changes ownership (name listed on water bill), if plumbing permits are issued, irrigation systems installed, or a well is drilled within the establishment, then an inspection will need to be performed no later than ninety (90) days from the change. The need for backflow protection will be determined based on the results from an inspection. Notification of the type of backflow prevention assembly required and a date of compliance will be sent to the Customer.

3.2.2 Residential

For new residential customers, a written questionnaire will be given upon request for water service. If the survey reveals that a potential cross-connection may be present, an inspection is to be performed. 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 Customer. Each new residential customer will agree in writing (Appendix E) to not create cross-connections and a brochure is given to each new customer describing cross-connections and the responsibility of the Customer in not creating one.

If the written questionnaire (Appendix E) reveals that the new Customer may have any of the following, an inspection will be required:

- (1) Lawn irrigation systems.
- (2) Residential fire protection systems.
- (3) Pools, Saunas, Hot Tubs, Fountains.
- (4) Auxiliary Intakes and Supplies-wells, cistern, ponds, streams, etc.
- (5) Home water treatment systems.
- (6) Hobbies that require extensive amounts of toxic chemicals (taxidermy, metal plating, biodiesel, ethanol production, etc.).

- (7) Any other situations or conditions listed in the manual or conditions deemed a threat by the water system.

Written questionnaires will be provided to residential customers when they sign up for service to determine if potential cross-connections exist. The distribution system will continue to be surveyed to identify potential cross-connections. Questionnaires that reveal potential cross-connections based on the criteria above will be inspected and a determination made if backflow prevention assemblies are needed.

The system will be surveyed for residential lawn irrigation systems through questionnaires received and by secondary meters. All residential lawn irrigation systems will require a reduced pressure principle assembly. Residential customers with pools, saunas, or hot tubs not filled by a hard pipe directly or indirectly connected may be allowed to use an air gap (and may be requested to use an atmospheric vacuum breaker at the hose bibb). However, if the pool or vessels is connected directly or indirectly by a hard line, a reduced pressure principle or detector is required at minimum.

Residential customers required to have backflow prevention assemblies will be informed of possible thermal expansion problems and must make such modifications to the private water supply system to prevent this condition.

3.2.3 Well System Inspections

Wells drilled on properties that are supplied by a public water system, particularly those designed for chemigation and fertigation, will need to be inspected to ensure separation from water system or the premises will require an approved assembly.

Annually, the Department will review the records of the Nashville Environmental Field Office for wells drilled within a calendar year that are located in or near the Murfreesboro water service area. The well location will be inspected and if appropriate a Well User's Agreement (See Appendix F) must be signed by the Customer.

Nashville Environmental Field Office records will be inspected for existing wells and cross referenced to Department records to determine if a Well User Agreement is on file. Those that do not have a Well User's Agreement on file will be inspected. At least two (2) sites per month will be inspected until all locations have been inspected.

Any well system that is connected directly or indirectly to the water system will be required to disconnect. The Customer will be required to sign a Well User Agreement agreeing that at no time will the well be connected with the

Department's water system and that no cross-connections exist on the premises. Inspections will be performed on new listings within the year.

The Department will survey and inspect residential and commercial areas where new lines are constructed when previously water was mainly supplied by well systems.

3.2.4 Internal Protection

In conjunction with the main line backflow protection device(s), internal protection of the potable water may be recommended. Internal protection is utilized to prevent contamination of potable water after it has entered the Customer's piping system. In such cases, additional backflow prevention devices may be recommended to isolate specific areas or sources of potential contamination.

3.3 Public Education and Awareness Efforts

The Department 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. The Department will seek to use every practical means available to acquaint the customers with the health hazards associated with cross-connections and solicit the cooperation of the Customer. Use of customer notification letters, annual water quality report and local video and print media will be incorporated into the notification plan. Efforts will be made to have representatives of the Department speak at meetings of civic clubs, PTAs, school groups, and other appropriate forums to discuss the problem of cross-connections and the program that is being pursued for their control.

Information will be provided to all customers about cross-connection control and backflow prevention by individual pamphlets or through an article in the annual water quality report at least once per year. A brochure will be given to all new customers requesting water service describing cross-connections and prevention of backflow. This information will cover the fundamental causes of backflow, the dangers involved, and protection against cross-connections.

The following measures may also be used to inform customers about the need to control cross-connections:

- (1) Reminders with water bills.
- (2) Posters at the counter where the water bills are paid displayed one month out of the year.

- (3) An article in the annual water quality report on cross-connection control or related issue.
- (4) Personal visits to commercial, industrial, institutional, and agricultural customers to explain the need for controlling cross-connections.
- (5) Whenever possible commercial, industrial, institutional, and agricultural customers will be informed of needed cross-connection measures in the design or construction stage.

3.4 Required Protective Device

- (1) Where the nature of use of the water supplied to a premises by the water system is such that it is deemed:
 - (A) Impractical to provide an effective air-gap separation
 - (B) The owner and/or occupant of the premises cannot or is not willing to demonstrate to the Director or designated representative 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
 - (C) The nature and mode of operation within a premises are such that frequent alterations are made to the plumbing
 - (D) The nature of the premises is such that the use of the structure may change to a use wherein backflow prevention is required
 - (E) There is a likelihood that protective measures may be subverted, altered, or disconnected
 - (F) The plumbing from a private well enters the building served by the public water supply
- (2) The Director shall require the use of an approved protective device on the service line serving the premises to assure that any contamination that may originate in the customer's premises is contained therein.
- (3) The protective devices shall be of the type approved by the Tennessee Department of Environment and Conservation and the Director as to manufacture, model, size and application. The method of installation of backflow protective devices shall be approved by the Director prior to installation and shall comply with the criteria set forth by the Tennessee Department of Environment and Conservation and with the installation criteria set forth in subsection (6) below. The installation shall be at the expense of the owner or occupant of the premises.

- (4) Applications requiring backflow prevention devices include, but are not limited to, service and/or fire flow connections for most commercial and educational buildings, construction sites, all industrial, institutional, medical facilities, all fountains, lawn irrigation systems, swimming pools, softeners and other point of use treatment systems, and on all fire hydrant connections other than by the Fire Department in combating fires.
 - (A) Class 1, Class 2, and Class 3 fire protection systems generally shall require a double check detector assembly, except a reduced pressure principle detector assembly shall be required where:
 - a. Underground fire sprinkler pipelines are parallel to and within ten feet horizontally of pipelines carrying sewage or significantly toxic wastes
 - b. Premises have unusually complex piping systems
 - c. 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 principle detector assembly.
 - (C) Wherever the fire sprinkler system piping is not an acceptable potable water system material, or chemicals such as liquid foam concentrates are used, a reduced pressure principle detector assembly shall be required.
- (5) Plumbing for commercial and educational buildings wherein backflow prevention devices are not immediately required shall be designed to accommodate such devices in conformance with standards for such devices, including the required drains.
- (6) Additionally, the Director may require internal and/or additional backflow prevention devices wherein it is deemed necessary to protect potable water supplies within the premises.

3.5 Responsibilities

3.5.1 The Department

Under the rules of the Environmental Protection Agency (EPA), Federal Safe Drinking Water Act of 1974, 40 CFR 141, and the Tennessee Department of Environment and Conservation (TDEC), the Tennessee Code Annotated §§68-221-701 through 68-221-720, as amended, and the Federal Safe Drinking Water Act, as amended, relating to Cross-Connection Control, the water system has the

primary responsibility of maintaining a Cross-Connection Control Program to prevent water from unapproved sources, or any other substance, from entering the public water supply. Upon detection of a prohibited cross-connection, the Director is to either eliminate the cross-connection by requiring the installation of an approved backflow prevention assembly or immediately discontinue service until the contaminate source is eliminated.

- (1) The Department shall ensure that all of its Cross-Connection Control personnel possess a valid certification from the Tennessee Department of Environment and Conservation, Division of Drinking Water (or its successor) for the testing of and evaluation of backflow assemblies.
- (2) The Department shall test all assemblies at least annually.
- (3) The Department shall maintain records of all tests conducted by Department personnel.
- (4) The Department shall have the right to inspect and test the assemblies whenever deemed necessary by the Director.
- (5) The Department shall not disrupt the water service to test the assembly without the prior knowledge of the occupant of the premises.
- (6) The Department shall conduct testing of all backflow prevention assemblies or methods on the main line.
- (7) The Department shall test backflow preventer assemblies upon installation; when cleaned, repaired, or overhauled; when relocated; and at least once annually.
- (8) The Department shall test all backflow prevention assemblies or methods which are in place, but have been out of operation for more than three (3) months, before being put back into operation. Backflow prevention assemblies or methods used in seasonal applications shall be tested before being put into operation each season.
- (9) The Department shall retest all backflow prevention assemblies or methods within five (5) business days after repair or replacement and notification by Customer.
- (10) The Department shall ensure that when water service has been terminated for non-compliance, the backflow prevention assembly or method is repaired or replaced prior to the resumption of water service.

3.5.2 The Customer

- (1) The Customer shall be responsible for ensuring that no cross-connections exists without the approved backflow protection on the Customer's premises starting at the point of service from the public potable water system.
- (2) The Customer shall, at the Customer's own expense, cause installation, operation, and maintenance of the backflow prevention assemblies or methods on Customer's premises.
- (3) The Customer shall, within five business (5) days after installation is completed, provide the Department with copies of records of the installation of the backflow prevention assembly(ies), on the yellow Installation and Maintenance tag (Appendix B) provided by the Department, as well as a copy of the certification, from the Tennessee Department of Environment and Conservation, Division of Drinking Water (or its successor) for the testing of and evaluation of backflow assemblies, of the individual installing the assembly(ies) or making the repairs.
- (4) The Customer shall correct any malfunction of the backflow prevention assembly or method which is revealed by periodic testing.
- (5) The Customer shall inform the Department of any proposed or modified cross-connection and also any existing cross-connection of which the Customer is aware but has not been found by the Department.
- (6) The Customer shall notify the Department, in writing, of backflow prevention assemblies or methods that are in place but have been out of operation for more than three (3) months or have been removed for storage and reinstalled in order for the Department to test the assemblies before being put back into operation.
- (7) The Customer shall notify the Department of backflow prevention assemblies or devices used in seasonal applications and allow the Department to test the assemblies or devices before being put into operation each season.
- (8) The Customer shall not install a bypass around any backflow prevention assembly or method unless there is a backflow prevention assembly or method of the same type on the bypass. Customers who cannot shut down operation for testing of the assemblies or methods must supply additional assemblies or methods necessary to allow testing to take place.
- (9) In the event of a backflow incident, the Customer shall immediately notify the Department of the incident and take steps to confine the contamination

or pollution. Water service will not be restored until corrective action is taken and approved after inspection by the Department.

- (10) The Customer shall maintain records of installations, repairs, overhauls, or replacements of backflow prevention assemblies or methods for at least five (5) years and, upon request, such records shall be made available to the Department.
- (11) The Customer shall be responsible for the payment of all fees for permits, annual or semi-annual assembly or method testing, retesting in the case that the assembly or method fails to operate correctly, and reinspections for noncompliance with the Department's requirements.
- (12) The Customer shall make all repairs indicated promptly, and to keep any protective assembly working properly. The expense of such repairs shall be borne by the owner or occupant of the premises. Repairs shall be made by qualified personnel, acceptable to the Director. The failure to maintain a backflow prevention assembly in proper working order shall be grounds for discontinuance of water service to a Customer's premises.

3.5.3 The Installer

- (1) The Installers' responsibility, after acquiring a permit through the City of Murfreesboro Codes Department, is to make proper installation of backflow prevention assemblies in accordance with the manufacturers' installation instructions and any additional instructions approved by the Department.
- (2) The Installer shall possess a valid certification from the Tennessee Department of Environment and Conservation, Division of Drinking Water (or its successor) for the testing of and evaluation of backflow assemblies. The Installer shall provide evidence of current certification at the time of installation to the Customer.
- (3) The Installer is responsible for only installing approved backflow prevention assemblies. Approved assemblies can be obtained by contacting the Tennessee Department of Environment and Conservation, Water Supply Branch at water.supply@state.tn.us.
- (4) The Installer is responsible to make sure an assembly is working properly when it is installed, and is required to furnish the following information to the Cross-Connection Control Office immediately after a reduced pressure principle detector or double check valve assemblies are installed:
 - (A) Service address where device is located
 - (B) Owner

- (C) Description of device's location
- (D) Date of installation
- (E) Type of device
- (F) Manufacturer
- (G) Model number
- (H) Serial number

- (5) All backflow preventers are required to be tested following installation by the Department.
- (6) The Installer shall ensure that only a licensed fire sprinkler contractor shall install fire protection systems.

3.5.4 The Repairer

- (1) The Repairer shall make all repairs in accordance with the Murfreesboro City Code §23-2. The individual(s) conducting the repairs must be certified by the State.
- (2) The Installer shall possess a valid certification from the Tennessee Department of Environment and Conservation, Division of Drinking Water (or its successor) for the testing of and evaluation of backflow assemblies. The Repairer shall provide evidence of current certification at the time of repair to the Customer.
- (3) The Repairer shall test the device in accordance with standard testing procedures approved by the State.
- (4) The Repairer shall notify the Customer when repair(s) or replacement of an assembly is completed. This notification shall include the yellow Installation & Maintenance tag (Appendix B).
- (5) The Repairer is recommended to be available for follow-up testing in the event the device fails inspection.

3.6 Installation of Backflow Prevention Assemblies

3.6.1 Plumbing Permit Required

No installation, alteration or change shall be made of any backflow prevention assembly connected to the public water supply for water supply, fire protection, or any other purpose without first securing a suitable plumbing permit from the Building and Codes Department. A copy of such permit shall be displayed in a conspicuous place at the job site at all times from the time of issuance until the final inspection.

3.6.2 Installation Criteria

Minimum acceptable criteria for the installation of reduced pressure principle detector type backflow prevention assemblies, and double check valve assemblies requiring regular inspection and testing shall include the following:

- (1) All required assemblies must be installed pursuant to Murfreesboro City Code §33, Article II, by a person certified by the Tennessee Department of Environment and Conservation, Division of Water Supply, or its successor. Evidence of current certification at the time of installation will be required.
- (2) All assemblies shall be installed in accordance with the manufacturer's installation instructions, and shall possess all test cocks and fittings required for testing the assembly. All fittings shall permit direct connection to Department test devices.
- (3) The entire assembly, including test cocks and valves, shall be easily accessible for testing and repair.
- (4) Reduced pressure principle backflow prevention assemblies shall be located a minimum of twelve (12) inches plus the nominal diameter of the device above the floor surface. Maximum height above the floor surface shall not exceed sixty (60) inches.
- (5) Clearance of assembly from wall surfaces or other obstructions shall be a minimum of six (6) inches.
- (6) Assemblies shall be protected from freezing, vandalism, mechanical abuse, and from any corrosive, sticky, greasy, abrasive, or other damaging environment.
- (7) Assemblies shall be positioned where discharge from relief port will not create undesirable conditions.
- (8) An approved air-gap shall separate the relief port from any drainage system.
- (9) An approved strainer, fitted with a test cock, shall be installed immediately upstream of the backflow device or shut off valve before strainer.
- (10) Assemblies shall be located in an area free from submergence or flood potential.

- (11) A gravity drainage system is required on all installations. Generally, below ground installations will not be permitted. On certain slopes where installations below ground level may be permitted, a single or multiple gravity drain system may be used provided the single drain line is at least four (4) times the area of the relief port or the multiple drain lines are at least two and one-half (2½) times the area.
- (12) Where jockey (low volume-high pressure) pumps are utilized to maintain elevated pressure, as in a fire protection system, the discharge of the pump must be on the downstream side of any check valve or backflow prevention device. Where the supply for the jockey pump is taken from the upstream side of the check valve or backflow prevention assembly, an assembly of the same type as required on the main line shall be installed on the supply line.
- (13) High volume fire pumps shall be designed not to discharge below twenty psi in the Department's water mains. Ideally, such pumps should draw from an in-house reservoir fed by several supply lines. If any of the supply lines have a source other than the public water supply, all supply lines must have air gap discharges into the reservoir.
- (14) No backflow prevention assemblies or methods shall be installed in a place where they would create a safety hazard such as, but not limited to, over an electrical panel or above ceiling level.
- (15) All backflow prevention assemblies or methods shall be installed so that they are accessible for testing.
- (16) Duplicate units shall be provided where the use of water is critical to the continuance of normal operations or protection of life, property, or equipment, to avoid the necessity of discontinuing water service to test or repair the protective device. Where it is found that only one unit has been installed and the continuance of service is critical, the Director shall notify, in writing, the occupant of the premises of plans to interrupt water service and arrange for a mutually acceptable time to test or repair the assembly. In such cases, the Director may require the installation of a duplicate unit.
- (17) The removal, bypassing, or altering of a protective assembly or the installation, thereof so as to render an assembly ineffective, shall constitute 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 the Director.

3.6.3 Thermal Expansion Control

A device for the control of thermal expansion shall be installed on the Customer's water system where the thermal expansion of the water in the system will cause the water pressure to exceed the pressure setting of the pressure relief valve of the water heater. The thermal expansion device shall control the water pressure to prevent the pressure relief valve of the water heater from discharging.

3.6.4 Water Heater Temperature-Pressure Relief Valves

All storage water heaters operating above atmospheric pressure shall be provided with an approved, self-closing (levered) pressure relief and temperature valve or combination thereof, except for non-storage instantaneous heaters. Such valves shall be installed in the shell of the water heater tank or may be installed in hot water outlet, provided the thermo-bulb extends into the shell of the tank. Temperature relief valves shall be so located in the tank as to be actuated by water in the top 1/8 of the tank served.

For installations with separate storage tank, said valve shall be installed on the tank and there shall not be any type of valve installed between the water heater and the storage tank. There shall not be a check valve or shut off valve between a relief valve and the heater or tank which it serves. The relief valve shall not be used as a means of controlling thermal expansion.

3.6.5 Fire Protection Systems

The Department has adopted the American Water Works Association classification scheme (Manual M-14) for backflow protection on fire prevention systems. This scheme classifies fire systems into six classes based on water source and arrangement of supplies. The type of backflow protection necessary for the premises is determined by the classification of the fire system. Minimum acceptable backflow protection on fire systems in the City of Murfreesboro is a double check detector assembly.

All existing fire systems are required to upgrade to current ordinance requirements. The Department is in the process of identifying facilities with fire systems. Those with the highest potential hazard will be required to upgrade their systems until all are corrected. Any facility obtaining a building permit for any purpose is required to immediately upgrade the fire system regardless of hazard.

3.6.6 Nonpotable Supplies

- (1) The potable water system made available to premises served by the public water system shall be protected from possible contamination as specified herein. Any

water outlet which could be used for potable or domestic purposes and which is not supplied by the potable system must be labeled in a conspicuous manner as:

WATER UNSAFE FOR DRINKING

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

3.7 Correction of Violations

Any Customer found to have cross-connections, auxiliary intakes, bypasses, or interconnections in violation of the City's ordinance shall be allowed a reasonable time within which to comply with the provisions of the ordinance. After a thorough investigation of existing conditions and an appraisal of time required for completing the work, the amount of time shall be designated by the Director, but in no case shall the time for correction exceed ninety (90) days (fourteen (14) days for high risk hazard).

Where cross-connections, auxiliary intakes, bypasses, or interconnections are found that constitute an extreme hazard of immediate concern of contaminating the public water system, the Director shall require that immediate corrective action be taken to eliminate the threat to the public water system. When in the opinion of the Director an imminent threat to public health exists, the Director shall have the authority to terminate water service without prior notification.

Expeditious steps shall be taken to disconnect the public water system from the on-site piping system unless the imminent hazard is corrected immediately, subject to the right to a due process hearing upon timely request. The time allowed for preparation for a due process hearing shall be in relationship with the risk of hazard to the public; and may follow disconnection when the risk of public health and safety in the opinion of the Director warrant disconnection prior to a due process hearing.

The failure to correct conditions threatening the safety of the public water system prohibited by the City of Murfreesboro Ordinance and T.C.A. §68-221-711, within the time limits set by the Department, shall be grounds for denial of water service. If proper protection has not been provided after a reasonable time, the Director shall give the Customer legal notification that water service is to be discontinued, and physically separate the public water system from the Customer's on-site piping system in such a manner that the two (2) 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 of public health and safety in the opinion of the Director warrant disconnection prior to a due process hearing.

3.8 Enforcement

The water service, both potable and repurified, may be discontinued in the case of non-compliance with the ordinance. Non-compliance includes, but is not limited to, the following:

- (1) Refusal to allow the Department access to the property to inspect for cross-connection(s).
- (2) Removal of a backflow prevention assembly or method that is required by the Department.
- (3) Bypassing of a backflow prevention assembly or method that is required by the Department.
- (4) Providing inadequate backflow prevention when potential or actual cross-connections exist.
- (5) Failure to install a backflow prevention assembly or method that is required by the Department.
- (6) Failure to test and/or properly repair a backflow prevention assembly or method as required by the Department.
- (7) Failure to comply with the requirements of the ordinance.

It is the Department's responsibility to see that all cross-connection hazards are protected and that all testing and repairs are completed in a timely manner. This manual provides a timetable for installation, testing and repair completion. It establishes actions to be taken in the event that the Customer is non-compliant. These actions are:

3.8.1 High Risk Hazard

- (1) Day 0-Letter for non-protected site, untested assembly or a failed backflow test.
- (2) Day 5- Second Notice, installation or repair not completed.
- (3) Day 10-Certified Letter-Non Compliance, Action may be taken.
- (4) Day 14-Water Service is discontinued.

3.8.2 High or Low Hazard

- (1) Day 0-Letter for non-protected site, untested assembly or a failed backflow test.
- (2) Day 30-Second Notice, installation or repair not completed.
- (3) Day 60-Certified Letter-Non Compliance, Action may be taken.
- (4) Day 90-Water Service is discontinued.

Where cross-connections are found to exist, the Department will require the problem to be eliminated or isolated by a properly installed, approved backflow prevention assembly to prevent the possibility of backflow into the distribution system. Such protective measures will include a backflow prevention assembly on the Customer's water service line ahead of any water outlets. Every effort will be made to secure the voluntary cooperation of the Customer in correcting cross-connection hazards. If voluntary action cannot be obtained with time set forth by written notice (ninety (90) days maximum for high and low hazard, fourteen (14) business days maximum for high risk high hazards) to the Customer, water service will be discontinued until conditions are in line with the City's ordinance for the protection of the health and safety of the water distribution system.

After surveys or inspections have been completed, the Customer will be contacted by written correspondence outlining any correction (adding or repairing backflow prevention devices) needed and the time schedule allowed for correction of conditions. If the conditions have not been corrected by the time allotment (ninety (90) days maximum for high and low hazard, fourteen (14) business days maximum for high risk high hazards), the water service will be discontinued to the establishment, along with any fines or other penalties deemed necessary by the Department.

The Department may give additional warnings of discontinuance and/or bring about penalties before the water service is discontinued. The time period for correction will be determined by the Department, based on the seriousness of the hazard and risk of contamination, ranging from immediate correction to a time period of not more than ninety (90) days. The maximum allowable time for correction will be no more than ninety (90) days. Those sites deemed high risk high hazard are required to be corrected within a maximum limit of fourteen (14) business days, preferably immediate correction. If the conditions do not satisfy the ordinance or plan within ninety (90) days (fourteen (14) business days for high risk hazards), water service will be discontinued. In the case of backflow prevention devices on fire systems, the Fire Marshall will be contacted before water service is discontinued in a public building to prevent harm to anyone, in case a fire occurred, in a public building. The Fire Marshall has the authority to condemn the building, thus not allowing anyone to enter.

Water service will not be allowed to the Customer until all corrections have been made and all conditions of the ordinance have been satisfied.

3.8.3 Due Process

The requirements of this program shall apply to all premises served by the Department whether located inside or outside the corporate limits and is hereby made a part of the conditions required to be met for the Department to provide water services to any premises. This Cross-Connection Control Program shall be rigidly enforced since it is essential for the protection of the water distribution system against the entrance of contamination.

Where cross-connections, auxiliary intakes, bypasses, or interconnections are found that constitute an extreme hazard of immediate concern of contaminating the public water system, the Director shall require that immediate corrective action be taken to eliminate the threat to the public water system. When in the opinion of the Director an imminent threat to public health exists, the Director shall have the authority to terminate water service without prior notification.

Expeditious steps shall be taken to disconnect the public water system from the on-site piping system unless the imminent hazard is corrected immediately. Any person aggrieved by the action of the Director is entitled to a due process hearing upon timely request. The time allowed for preparation for a due process hearing shall be in relationship with the risk of hazard to the public; and may follow disconnection when the risk of public health and safety in the opinion of the Director warrant disconnection prior to a due process hearing.

Chapter

4

Procedures for Inspection

The Department hopes that its efforts to acquaint its Customers with the hazards of cross-connections will be successful to the point that the Customer will try to maintain an internal water delivery system free of cross-connections. It is recognized that many Customers may not recognize a situation that would permit backflow into the water supply lines. Therefore, a thorough investigation will be made of all premises considered likely to have cross-connections. Such inspections will involve the Customer's entire water using equipment, and other system components in an effort to locate all actual and potential cross-connections. The findings will be reported to the owner or occupant in writing along with a request for needed corrective action necessary to properly protect the public water system.

4.1 Plumbing Inspections

Final approval by the City for new plumbing systems and additions to existing systems shall not be given prior to completion of a cross-connection inspection and acceptable installation of any necessary backflow prevention devices. The Director shall inspect all newly installed and/ or repaired devices. No devices will be inspected or approved unless a completed "Installation and Maintenance Tag" (bright yellow) is affixed to the device. If the tag is present, the inspector will then inspect and test the device and remove the yellow tag for his records. The inspector will then attach either a light blue "Approved" tag or a red "Rejected" tag. If any device is rejected, the inspector will notify the person identified on the yellow tag. The City plumbing inspector or the Director shall not grant final approval if the device is rejected or no tag is present.

4.2 Field Visit Procedures

During the inspection, a field sheet will be completed showing details of significant findings. The hazards which cross-connections pose will be explained fully to the persons assisting the inspection. The Customer will be informed that the information gathered during the survey will be reviewed by the Department's staff and that a written report containing any recommendations and requirements will be mailed to them as soon as possible.

4.3 Reports

The findings of the investigation will be summarized and a written report will be sent to the person assisting in the investigation, or the ranking management official of the establishment. Cross-connections found will be described briefly along with recommended method of correction. An effort will be made to keep the description of the findings and recommendations clear, concise and as brief as possible. The correspondence will indicate a willingness to assist with questions. The Customer will be given a time limit for making the needed corrections (maximum of ninety (90) days (fourteen (14) business days for high risk hazards)) depending upon the seriousness of the cross-connections involved and upon the complexity and difficulty of correcting the problems.

4.4 Follow-up Visits and Reinspections

Follow-up visits will be made as needed to assist the Customer and to assure that satisfactory progress has been made such visits will continue until all corrective action has been completed to the satisfaction of the Department.

4.5 Fees

All fees for administration of the Cross-Connection Control Program shall be set by a resolution of the City Council based upon a recommendation by the Director.

Fees may be charged for testing of backflow prevention assemblies by the Department. In the event that a backflow prevention assembly fails the initial or annual test, or there are deficiencies in the installation either from failure to conform to the installation criteria specified within this Article or from deterioration, then the Director shall issue a written notice of failure/deficiency.

Whenever a failure/deficiency is not corrected within thirty (30) days of written notification for high and low hazard locations and five (5) business days of written notification for high risk hazard locations, a fee shall be charged for retesting by the Cross-Connection Control Officer in accordance with the fee schedule. (Appendix C)

The fee shall be assessed on the annual test and each time an assembly is retested, after the first follow-up inspection, by the Department subsequent to failure/deficiency after the initial period.

4.6 Technical Assistance

The Customer will be urged to notify the water system when they are ready to begin installing either a reduced pressure principle or double check valve (Class I, II or II fire system) type backflow preventer assembly. The Department's Cross-Connection

Representative will visit the site to detail how the units must be installed to achieve the desired protection and to minimize maintenance and testing problems.

Chapter

5

Premises Requiring Reduced Pressure Principle Assemblies or Air Gap Separation

5.1 High Risk High Hazards

For establishments which pose significant risk of contamination or may create conditions which pose an extreme hazard of immediate concern (High Risk High Hazards), the Director shall require immediate or a short amount of time (fourteen (14) business days maximum), depending on conditions, for corrective action to be taken. In such cases, if corrections have not been made within the time limits set forth, water service will be discontinued.

High Risk High Hazards require a reduced pressure principle (or detector) assembly.

5.2 High Hazard

In cases where there is less risk of contamination, or less likelihood of cross-connections contaminating the system, a time period ninety (90) days maximum will be allowed for corrections. High Hazard is 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. (Appendix A)

Chapter

6

Premises Allowing Double Check Valve Assemblies

6.1 Low Hazard

Low Hazard is 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. At this time double check valves assemblies are not allowed with the exception of fire protection systems. If a low hazard location is identified as needing a backflow preventer then an air gap or reduced pressure principle backflow device will be required.

Chapter

7

Inspection and Testing of Backflow Prevention Assemblies

7.1 Approval of New Installations

The Water System will not consider the installation of assemblies to be complete until:

- (1) The installation has been inspected, and approved by the Department based upon installation criteria.
- (2) Assembly is tested initially and has a status of Passed.

7.2 Routine Inspection and Testing of Assemblies

To assure that all assemblies are functioning properly, assemblies will be tested within a 12-month period by backflow prevention assembly testers with a Certificate of Competency. If assembly is not tested within the 12-month period, enforcement action will be started. In conjunction with testing the assembly, the Director will investigate to determine:

- (1) If cross-connections, actual or potential, have been added ahead of the protective assemblies.
- (2) The assembly meets all installation criteria.
- (3) The assembly has not been bypassed or altered in some other way as to compromise the backflow protection.

All reduced pressure principle and double check valve backflow prevention assemblies, including detector assemblies, utilized for the protection of the water system will be tested by a person possessing a valid Certificate of Competency from the State and approved by the Department in keeping with the following criteria:

- (1) Immediately following installation.
- (2) At least every twelve (12) months.
- (3) Any time assemblies have been partially disassembled for cleaning and/or repair.

- (4) Where there is indication that the unit may not be functioning properly (i.e. excessive or continuous discharges from relief valve, chatter, or vibration of internal parts).

7.3 Accepted Test Procedure

Tests of assemblies will be made using a three (3) or five (5) valve test kit that has valid annual certification in accordance to the latest approved testing procedure from the Division of Water Supply.

7.4 Official Tests

Only tests performed by persons possessing a valid Certificate of Competency will be considered official tests by the water systems. All test reports submitted must be of the type approved by the Division of Water Supply. All parts of the testing procedure are recorded accurately on the test report with a determination of status (Pass or Fail). Certificates of Competency are not transferrable.

7.5 Prior Arrangements for Testing

Prior arrangements may be made for a mutually agreeable time for testing the assemblies prior to performing the test. In all cases, the time which water services are interrupted will be held to a minimum in order to minimize the inconvenience to the Customer. The Customer, upon notification by the Department, has an obligation to work out a mutually agreeable time for testing assemblies within time allotted by the Department.

7.6 Repairs

Should a protective assembly be found defective or have a status of Failed, the Department will require the assembly to be repaired promptly with manufacturer's specified parts, in accordance to manufacturer's suggested procedure, and placed in proper operating condition within a the specified time limit (maximum ninety (90) days, fourteen (14) business days for high risk high hazards).

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 will be held responsible for maintaining protective measures in a good state of repairs. The owner of an assembly needing repairs or maintenance will be permitted to do the work, if such owner is properly qualified or the owner may elect to secure the services of someone else experienced in the repair of the assemblies.

Chapter

8

Parallel Units

The Department requires the installation of parallel assemblies if the customer cannot readily accommodate interruptions of water service for periodic testing and repairs of the assemblies or is unwilling to cooperate in scheduling a shutdown promptly for testing during normal hours worked by Department personnel.

Parallel (duplicate) units shall be provided where the use of water is critical to the continuance of normal operations or protection of life, property, or equipment, to avoid the necessity of discontinuing water service to test or repair the protective device. Where it is found that only one unit has been installed and the continuance of service is critical, the Director shall notify, in writing, the occupant of the premises of plans to interrupt water service and arrange for a mutually acceptable time to test or repair the assembly. In such cases, the Director may require the installation of a duplicate unit.

Chapter

9

Records

Good records are invaluable in the Department's efforts to safeguard the quality of water being distributed against degradation from backflow through cross-connections. Adequate records will be maintained as a part of the Department's permanent files to:

- (1) Document the overall effort of the water system to properly discharge its responsibility to see that each Customer receives safe water under all foreseeable circumstances.
- (2) Give a complete picture as to the current status and history of the individual premises regarding the potential for backflow, corrections made, etc.
- (3) To support enforcement action, whenever necessary, to obtain backflow protection.
- (4) Document that assemblies have been properly installed, maintained, and tested routinely.

Records to be maintained by the Department will include, but not necessarily be limited to the following;

- (1) Master List of all establishments with assemblies used for premise isolation, including location, assembly used, make, model, size, serial number etc.
- (2) Correspondence between the Department and its Customers.
- (3) Copy of approved plan.
- (4) Copy of approved ordinance.
- (5) Test reports for each assembly.
- (6) Copies of Certificates of Competency for each tester.
- (7) Copies of test kit certifications.
- (8) Site inspection reports.
- (9) Residential written surveys.

- (10) Backflow incident reports.
- (11) Records on initial surveys, recommendations, follow-up, corrective action, routine reinspections, etc.
- (12) A file system designed to call to the attention of the cross-connection control personnel when testing and reinspections of premises are needed.
- (13) Public education pamphlets and information.

Chapter

10

Backflow Contamination Procedures

If contamination is caused by backflow, the Department will take the following actions to protect the health of the Customer:

- (1) Isolate the lines containing any contaminant from the distribution system.
- (2) Inform Customers with contaminated lines not to consume or use the water.
- (3) Report contamination to the Local Field Office.
- (4) Determine and separate the cross-connection that is allowing the backflow and contamination.
- (5) Remove contamination from lines.
- (6) Test and ensure that lines meet Division of Water Supply regulations for safe water.
- (7) Return service to Customers affected once water is safe.
- (8) Document the details of the incident including cause, isolation, and correction, and send report to Local Field Office.
- (9) Continue to survey and inspect system for similar situations that may allow backflow.

Chapter

11

Modifications to Plan

This plan may be modified from time to time to meet the needs of the Department and to meet the TDEC's requirements. The plan and ordinance will be reviewed by the Department every five (5) years to determine if the existing plan meets requirements set forth by the Division of Water Supply and that it promotes an ongoing program. The Director shall advise the local Field Office of any changes to this plan for their review and comments.

Appendix A – Typical Cross-Connection Hazards

Actual or potential cross-connection hazards may be present in water using premises. 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 premises or facility with an alternate water supply on or available to the premises. Water stored in reservoirs that are not properly protected or circulated is considered an auxiliary supply.

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 and 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 and 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, and 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, and vacuum pump seals.

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

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

Establishments with an equipment list will normally require premise isolation with a reduced pressure principle assembly depending on hazard unless otherwise found to have an appropriate air gap.

Many devices or equipment below may be designed and constructed with approved air gaps that would adequately protect the water system. However, the Cross-Connection Control Inspector should consider and make judgments on the amount of risk that the establishment poses to the distribution 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.

C. The following list of establishments is an example of sites that are deemed High Risk High Hazard:

1. Mortuaries, morgues, autopsy facilities
2. Hospitals, medical buildings, animal hospitals and control centers, doctor and dental offices, premises with kidney dialysis equipment
3. Sewage treatment facilities, water treatment facilities, sewage and water treatment pump stations
4. Premises with auxiliary water supplies or industrial piping systems
5. Chemical plants (manufacturing, processing, compounding, or treatment)
6. Laboratories (industrial, commercial, medical research, school)
7. Packing and rendering houses
8. Manufacturing plants
9. Food and beverage processing plants
10. Automated car wash facilities
11. Extermination companies
12. Airports, railroads, bus terminals, piers, boat docks

13. Bulk distributors and users of pesticides, herbicides, liquid fertilizer, etc.
14. Metal plating, pickling, and anodizing operations
15. Greenhouses and nurseries
16. Commercial laundries and dry cleaners
17. Film laboratories
18. Petroleum processors and storage plants
19. Restricted establishments
20. Taxidermy facilities
21. Establishments which handle, process, or have extremely toxic or large amounts of toxic chemicals or use water of unknown or unsafe quality extensively.

D. The following list of establishments is an example of sites that are deemed High Hazard:

1. Air-conditioning systems (using water for processing)
2. Aspirators
3. Air lines
4. Autoclaves and sterilizers
5. Auxiliary systems
6. Baptismal tanks
7. Bathtubs (Hard Piped)
8. Bedpan washers
9. Bidets
10. Booster pumps
11. Brine tanks, softeners
12. Boilers

13. Car wash equipment
14. Chemical feeders
15. Chillers
16. Chlorination equipment
17. Coffee urns
18. Commercial cookers
19. Condensers
20. Compressors
21. Cooling systems
22. Cooling towers
23. Culture vats
24. Cuspidor, dental
25. Developing equipment
26. Dishwashers
27. Display fountains
28. Drinking fountains
29. Ejectors, steam or water
30. Extractors
31. Fire protection systems, standpipes, sprinkler systems and drain lines
32. Fish tanks, ponds
33. Food mixing tanks
34. Frost-free toilets, hydrants, and fountains
35. Garbage grinders

36. Garbage can washers
37. Garden sprayers
38. Heat exchangers
39. Humidity controls
40. Hydraulic equipment
41. Hydraulic insecticide or fertilizer applicators
42. Hydraulic lifts
43. Ice makers
44. Irrigation systems, lawn sprinklers
45. Kitchen equipment
46. Laboratory equipment
47. Laundry equipment
48. Lavatories
49. Lawn sprinklers
50. Liquid handling systems
51. Lubrication, pump bearings
52. Medical equipment
53. Photo laboratory sinks
54. Potato peelers
55. Pressure cookers
56. Process water circulation systems
57. Pump, priming systems
58. Shampoo sinks, basins

59. Showers, telephone type shower heads
60. Sinks, slop sinks
61. Soda fountains
62. Solar water and space heating equipment
63. Steam boilers
64. Steam tables
65. Swimming pools, ponds, fountains
66. Tanks and vats
67. Therapeutic tanks, spas, and hot tubs
68. Threaded hose bibs
69. Toilets, flushometer, flush tank, ballcock, flush valve siphon jet
70. Vegetable peelers
71. Vacuum systems
72. Urinals (siphon set blowout)
73. Vacuum systems (water operated with water seals)
74. Water treatment devices
75. Water troughs
76. Water-using mechanical equipment
77. Water Jacketed tanks, vats, cookers

Appendix C – Fees

High Risk Hazard – Maximum 14 business days

Inspection	Fee	Time to correct deficiency	Result
Annual Inspection	\$35.00	5-days	Letter for non-protected site
1 st Follow-up Inspection	\$0.00	5-days	Second notice
2 nd Follow-up Inspection	\$50.00	Up to 4-days	Certified letter-non compliance
Final Follow-up Inspection	\$100.00	0-days	Disconnect water service
Post Disconnect Inspections	\$100.00		Water turned on after passing

*Post disconnect costs do not include reconnect fees.

High & Low Hazard – Maximum 90-days

Inspection	Fee	Time to correct deficiency	Result
Annual Inspection	\$35.00	Up to 30-days	Letter for non-protected site
1 st Follow-up Inspection	\$0.00	Up to 30-days	Second notice
2 nd Follow-up Inspection	\$50.00	Up to 15-days	Certified letter-non compliance
Final Follow-up Inspection	\$100.00	0-days	Disconnect water service
Post Disconnect Inspections	\$100.00		Water turned on after passing

*Post disconnect costs do not include reconnect fees.

Per Resolution 09-R-10 effective date July 1, 2009

Appendix D - State Guidance Concerning Lawn Irrigation Systems on Public Water Systems and Well Systems

Lawn irrigation systems, both commercial and residential, are recognized by the State of Tennessee, Division of Water Supply 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 systems use toxic chemicals injected in the piping to fertilize and eliminate undesired plants.

Required Protection for Lawn Irrigation Systems on Public Water Systems:

- A. For public water systems to protect their distribution lines, lawn irrigation systems are protected by a reduced pressure principle assembly.
- B. Double check valves cannot be used for premise isolation on lawn irrigation systems. Double check valves may be used for non-health hazards only. Water which contains or may contain pathogens or harmful chemicals is considered a health hazard and must be protected by a reduced pressure principle assembly.
- C. 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.
- D. Assemblies must be tested annually (within 12 months).
- E. Assemblies on lawn irrigation systems must be tested during the start-up period (typical maximum time limit is within ninety (90) days). Annual testing immediately prior to winterization or seasonal shutdown is not acceptable.

Appendix E – MWSD Cross-Connection Questionnaire Residential

Occupant Name:	
Occupant Address:	

1. Occupancy: _____ Own _____ Rent

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

3. Do you have? (Please Check all that apply):
 Hot Tub _____ Swimming Pool _____ Jacuzzi _____
 Waterbed _____ Solar System _____ Green House _____
 Underground Sprinkler System _____ Darkroom Equipment _____
 Drip/Soaker/Irrigation System _____ Portable Dialysis Machine _____
 Insecticide Sprayers (That attach to garden hose also) _____
 Utility sink w/threaded faucet _____
 Wood burning hot water heater _____ Ghost pipes (unidentified) _____

4. Do you have bathtub that fills from the bottom?
 Yes _____ No _____

5. Do you have a water softener or any extra water treatment system?
 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
 by public water?
 Yes _____ No _____

8. Is your home or building elevated above your water meter?
 Yes _____ No _____

9. Hobbies that require extensive amounts of toxic chemicals (taxidermy, metal plating, biodiesel, ethanol production, etc.).

Yes_____No_____

10. Does a creek, river, or spring water run near or on your property?

Yes_____No_____

11. Do you have a booster pump, well pump, or any other type water pump?

Yes_____No_____

12. Do you receive irrigation water from a different source?

Yes_____No_____

13. Do you have a backflow protection device on your property now?

Yes_____No_____

14. Do you have any situation that you are aware of that could create a cross-connection?

Yes_____No_____

15. Do you have any other water-using equipment on your property not mentioned above?

Yes_____No_____

If yes, please list below:

Print Name

Phone Number

Signature

Date

My signature affirms that I agree not to create a cross-connection with the City's water supply. Please notify this office if any of the above conditions change.

Appendix F – Well User’s Agreement



MURFREESBORO WATER & SEWER DEPARTMENT
Cross-Connection Control
P.O. Box 1477
Murfreesboro, TN 37133-1477
Telephone 615-848-3222

WELL AND RIVER WATER USERS - CROSS-CONNECTION CONTROL STATEMENT

DATE: _____

In accordance with Section 33-18 through 33-22 of the Murfreesboro City Code, the Murfreesboro Water & Sewer Department is hereby notified of the intent to utilize a well and or river water at the following 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 connection, auxiliary intakes, bypasses, or interconnections exist or shall be made. No such cross connections, auxiliary intakes, bypasses, or interconnections will be permitted without the written approval of the Tennessee Department of Public Health and the Murfreesboro Water and Sewer Department.

I (we) further understand and agree that the Director of the Murfreesboro Water and Sewer Department may discontinue the public water supply service at any premises upon which there is found to be a cross connection between the auxiliary water source and the potable water supply, and service shall not be restored until such cross connection have been separated.

Name: _____

Address: _____

Signature: _____

Appendix G – Installation Criteria

Reduced Pressure Principle Backflow Prevention Assemblies

MINIMUM INSTALLATION REQUIREMENTS are underlined and all others are suggestions or items to consider:

- A. The RP assemblies should never be subject to flooding; 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 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. All new 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 Division of Water Supply.
- C. The assemblies should be installed where the units can be easily tested and repaired.
- (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 five (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. Installation of backflow prevention assemblies will not allow any unprotected or uninspected connections in front of the backflow prevention assembly.
- F. Backflow preventers should be installed with isolation valves on both ends of the assembly to allow removal of the assembly for repair or replacement.
- G. 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.
- H. Protective enclosures are required for outdoor main line devices. Such enclosures must meet ASSE Standard #1060 - Performance Requirements for Outdoor Enclosures for Backflow Prevention Assemblies. The American Society of Sanitary Engineering for Plumbing and Sanitary Research's November 1996 issue provides a standard that "details the requirements of an outside enclosure for various types of backflow prevention assemblies. It includes enclosure types for freezing and non-freezing locations."
- I. The relief valve of an RP 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.
- J. The test cocks, valve stems, or name plates should not be painted and their accessibility, operation or legibility should not be hampered nor the relief valve discharge passage be restricted by insulation or other coverings.
- K. The assemblies should be installed in an approved position as listed in the Latest Approved List and special supports added if needed.
- L. For applications where water temperatures exceed 110°F (43°C) only approved hot water devices are to be used.

- M. Prior to completing the installation, temperature pressure relief valves on heating vessels should be properly installed and in good working condition. If needed, thermal expansion tanks should be installed.
- N. All irrigation systems (residential or otherwise) require the maximum protection of a reduced pressure principle backflow prevention device which must be installed, inspected, and tested according to established procedures. Devices installed outdoors may be protected with a weatherproof, insulated enclosure. In cases where the device is physically removed during cold weather, no enclosure is required but the feed line must be drained and capped. Outdoor installations may require a four (4) inch thick concrete pad to anchor the device. At the Customer's request, a separate irrigation water meter may be set by the Department. There will be no sewer charges for such meters but normal tap fees and minimum bill will be assessed.
- O. No unprotected bypasses or connections are made between the assembly and meter.

Existing assemblies not meeting the minimum requirements above, with the exception of being installed in an area that may allow flooding of the assembly, may be allowed variances by the water system. However, no variance may be allowed that will compromise the protection of the assembly or that will allow contaminants in the distribution system. All variances should be documented and kept on file for the life of the assembly. Please review the document entitled: Approved Backflow Prevention Assemblies

Appendix H – Inspectors - General Procedures

Final approval by the City for new plumbing systems and additions to existing systems shall not be given prior to completion of a cross-connection inspection and acceptable installation of any necessary backflow prevention devices. The Director shall inspect all newly installed and/ or repaired devices.

A. Inspections and Testing

- (1) Devices shall not be inspected or approved if an "Installation and Maintenance Tag" (bright yellow) is not affixed or not completed as required.
- (2) If the "Installation and Maintenance Tag" is present, the inspector will then inspect and test the device and remove the yellow tag for his records.
- (3) All installations shall conform to the installation requirements set forth in §33-19 of the Murfreesboro City Code.
- (4) All devices shall be tested at least annually using accepted test procedures.
- (5) For each test, a device test report shall be completed in entirety. A copy of the report shall be given to the owner of the device upon request.
- (6) Immediately following the inspection and/or testing, the inspector shall complete and attach one of the following tags to the device:
 - a. "Approved" (light-blue) - device is properly installed and operating correctly.
 - b. "Rejected" (red) - device is improperly installed or not operating correctly.
- (7) If any device is rejected for any reason, the inspector shall notify the owner, if possible, or the person identified on the yellow tag.
- (8) The City plumbing inspector shall not grant final approval if the device is rejected or no tag is present.

B. Installation and Maintenance Tag

- (1) Any person installing, repairing, or testing any backflow prevention device within the Murfreesboro Water System must affix an "Installation and Maintenance Tag" to the device upon completion of the work.
- (2) The person doing the actual work on the device must completely fill in all information requested on the tag.
- (3) These tags (bright yellow in color) are available from the Codes Department when application is made for plumbing permits, or from the Water & Sewer Department.

C. Inspection Fees

- (1) A notice is issued for devices failing initial or annual tests, and a grace period of thirty (30) days for high or low hazards and fourteen (14) business days for high risk hazards are allowed for repair.
- (2) If the deficiency is not corrected during this period, the Customer shall be notified that a fee will be assessed on their monthly water bill.
- (3) A fee is assessed for the initial and each subsequent visit after the first follow-up inspection. (See Appendix C).

Appendix I – Department Contacts

A Certificate of Occupancy will not be granted to premises prior to a cross-connection inspection and approval of any backflow prevention devices. The installation, repair, testing, or replacement of any backflow prevention device shall be inspected and approved by the Department unless prior arrangements have been made and approved by the Department. Further information regarding the Cross-Connection Control Program may be obtained from the Murfreesboro Water and Sewer Department.

Office Location

5528 Sam Jared Dr.
Murfreesboro, TN 37130

Mailing Address

PO Box 1477
Murfreesboro, TN 37133-1477

Cross-Connection Officer

Frank Maccagnano
Office (615) 848-3222
Mobile (615) 642-3265
FAX (615) 848-3244