

**CROSS CONNECTION CONTROL PLAN
FOR
METRO WATER SERVICES, NASHVILLE, TN
2008**

I. INTRODUCTION

A. Goal

The goal of the Metro Water Services' (MWS) water system is to supply safe water to each and every customer under all foreseeable circumstances. Each instance where water is used improperly so as to create the possibility of backflow threatens the health and safety of our customers and threatens our chances of realizing this goal. The possibility of backflow due to improper use of water within the customer's premises is especially significant because such cross connections may easily result in the contamination of our water supply mains. Such situations may result in the public water system becoming a transmitter of diseased organisms, toxic materials, or other hazardous substances that may adversely affect large numbers of people. The only protection against such occurrences is the elimination of such cross connections or the isolation of such hazards from the water supply lines by properly installed approved backflow prevention devices.

B. Plan of Action

The MWS' water system is determined to take every reasonable precaution to see that cross connections are not allowed to contaminate the water being distributed to its customers. This cross connection plan outlines a program of action designed to control cross connections within the area served by the MWS' water system. This plan is intended to be a practical guide for safeguarding the quality of water distributed from becoming contaminated or polluted through backflow.

II. AUTHORITY FOR CONTROLLING CROSS CONNECTIONS

A copy of Metro code No. 15.12.070 (Cross-connections prohibited--Contamination prevention requirements) adopted by the City Council is attached to this plan as Appendix 1. These code provisions are part of the **Code of Laws of the Metropolitan Government of Nashville and Davidson County, Tennessee**. These codes prohibit cross connections within the water system, authorizes the water system to make inspections of the customer's premises, requires that cross connection hazards be corrected, and provides for enforcement. These codes express a clear determination on the part of Metropolitan Government that the water system is to be operated free of cross connections that endanger the health and safety of those depending upon the public water supply. These codes are considered to be a sound basis for the control of cross connection hazards by the operating staff and management of the MWS' water system. The provisions contained within these codes are in keeping with the requirements set forth in Section 68-221-711 of the Tennessee Code

Annotated and Section 1200-5-1-17(6) of the Tennessee Department of Environment and Conservation Rules for governing Public Water Systems.

III. PROGRAM TO BE PURSUED

The MWS' water system has established an active ongoing cross connection control program. This program is to be a continuing effort to locate and correct all existing cross connection hazards and to discourage the creation of new problems. Safeguarding the quality of water being distributed to our customers is a high priority concern of the management of the MWS' water system.

A. Staffing

The MWS' water system has designated an individual (Cross Connection Coordinator or Coordinator) to see that the program to control cross connections is pursued in an aggressive and effective manner. It is proposed that a minimum of five (5) man days per week be allotted to the cross connection program initially. Depending on customer preference in scheduling, work related to the testing of devices may occur after hours or on weekends. The effectiveness of the program will be evaluated periodically. An effort will be made to provide additional staffing, if necessary, to effectively control cross connections. Personnel who work on the cross connection control program on a part time basis will be expected to give priority to cross connection control in keeping with the needs that arise.

B. Cross Connection Surveys

Commercial/Non-Residential:

A representative of the MWS' water system will visit the premises of all commercial customers, irrigation system customers, and customers known to have wells or auxiliary water storage or sources. The various water uses within the premises will be investigated to determine if backflow can occur. Locations that are determined to be considered an extreme hazard will require either immediate protection or disconnect and those with a lesser degree of hazard (please refer to Section VIII) will be given ninety (90) days to comply with required protection or be disconnected from service. Locations requiring assemblies will be visited and tested every twelve (12) months to determine if backflow prevention measures are maintained and are functioning properly and that new cross connections have not been created. Locations not requiring an assembly will be surveyed on a frequency not to exceed five (5) years or when use/occupancy changes.

Residential (Beginning March 1, 2009)

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 to not create cross-connections and a brochure will be given to each new customer describing cross-connections and the responsibility of the customer in not creating one.

If the written questionnaire 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 (closed loop systems will require a double check valve minimum)
3. Pools, Saunas, Hot Tubs, Fountains
4. Auxiliary Intakes and Supplies-wells, cistern, ponds, streams, etc.
5. Any other situations or conditions listed in the manual or conditions deemed a threat by the water system.

Written questionnaires will be sent to existing residential customers to determine if potential cross-connections exist. Each year, the Coordinator will be responsible for sending out a questionnaire to approximately 10% of MWS' residential customers. This questionnaire will contain some educational materials and will also ask the customer to answer some questions relating to the potential for cross connections from their private system to the public system. If results from that questionnaire show that an on-site inspection is warranted, then one will be scheduled at the Owner's convenience. The distribution system will continue to be surveyed in this manner. Questionnaires that reveal potential cross-connections based on the criteria above will be inspected and a determination will be made as to the need of a backflow prevention assembly.

C. Public Awareness Efforts

The MWS' water system 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 water system will seek to use every practical means available to acquaint the customers with the health hazards associated with cross connections in an effort to get their cooperation. Use of the MWS website, customer notification letters, annual consumer confidence report and local video and print media will be incorporated into the notification plan. An effort will be made to have an employee, or employees, of the water system to appear before the civic clubs, PTA's, school groups, and other appropriate forums to discuss the problem of cross connections and the program that is being pursued for their control.

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

1. Notation on water bills at least once a year about the program
2. Website posting of program and Plan
3. Customer information sheet available on public location through print-out from network directories.
4. Internal notice to employees of the program and its purpose at least once a year.

D. Customer's Responsibility

Cross connections, created and maintained by the customer for his convenience, endanger the health and safety of all who depend upon the public water supply. Therefore, the customer who creates a cross connection problem shall bear the expense of providing necessary backflow protection and for keeping the protective measures in good working order.

E. Enforcement

Where cross connections are found to exist, the water system will require the problem to be eliminated or isolated by a properly installed, approved backflow prevention device to prevent the possibility of backflow into the distribution system. Such protective measures will include a backflow protection device 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 corrective action cannot be obtained within the required period of time consistent with Section VIII, water service will be discontinued for the protection of the health and safety of the other customers.

IV. SCHEDULING INSPECTIONS

To optimize the execution of the Plan, MWS will schedule inspections geographically. This enables a systematic approach to our large service area. New water service connections will result in the performance of a survey and/or test prior to a release for a Use and Occupancy Permit through Metropolitan Government. Subsequent tests on these locations will be scheduled on the next twelve month rotation by geographic location.

Re-test visits and Enforcement Action

Re-test visits will be made to obtain required backflow protection voluntarily. If voluntary cooperation cannot be obtained, the water system will not hesitate to take appropriate enforcement action to obtain adequate backflow protection. If the customer refuses to make corrective action needed for the protection of the water system, MWS' water system will, after appropriate written notification, discontinue water service. Depending on the degree of hazard (please refer to Section VIII), the water system may disconnect water service immediately. In any case

water service will not be restored until appropriate protection has been provided and assurances received that the facilities will be properly maintained.

V. PROCEDURES FOR INSPECTIONS

MWS' water system 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 their internal water delivery system free of cross connections. It is recognized that many customers may not recognize that they have 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 internal water delivery system including the various outlets, 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 (test form) along with a request for needed corrective action necessary to properly protect the public water system.

A. Prearranged Surveys

MWS' water system recognizes that it may be advantageous to give officials of certain establishments advanced notice of the water system's intentions of making a detailed cross connection survey. This will usually be done by sending a letter or by phone call to the contact of account record, informing that person that a survey is being scheduled and asking that person to designate an employee, who is knowledgeable of the internal plumbing of the system and water usage, to assist in making the survey. Details concerning the date, time of survey, and who is to assist with the survey will then be prearranged before conducting the survey. When such appointments are made, the water system will exercise care to see that the appointments are kept with promptness. The water system's representative will be as courteous and helpful as possible when making the surveys.

B. Unannounced Visits

MWS' water system may also make unannounced visits to some premises when conducting cross connection surveys. Such will usually be the case where:

1. The establishment is small and no difficulty is expected in locating the occupant or a knowledgeable representative
2. Where unannounced visits will not be disruptive
3. Particularly, where it is felt that advance notice of the visit may result in an unrealistic picture of typical water use practices.

- C. Field Visits Procedures
During the investigation, a test form will be completed showing details of significant findings. The hazards which cross connections pose will be explained fully to the persons assisting in the survey. The customer will be informed that the information gathered during the survey will be reviewed by the Water System's management and that a signed copy of the testing form will be left with them upon completion of the test or inspection.
- D. Reports to Customers
The findings of the investigation will be summarized on the testing form and a signed copy will be left with the person assisting in the investigation, or the ranking management official of the establishment. Cross connections found will be described briefly along with the 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 the customer in working out any details with which he may have questions. The customer will be given a time limit for making the needed corrections. Time for making corrections may vary from immediately (immediate disconnection) to ninety (90) days depending on the type of hazard. More time may be granted on a case by case basis depending on degree of hazard (please refer to Section VIII) and other contributing factors such as funding and availability of contractor services in performing the corrective work. In no way will MWS allow extensions of time beyond the twelve month plus ninety (90) day compliance period. MWS will exercise the interruption of service policy when compliance cannot be achieved in the prescribed timeframes. Any extensions of time will be noted in the file for that account and location.
- E. Re-test Visit and Re-test
Re-test 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 water system. Dates of re-test visits will be indicated on the testing form left with owner or their representative upon completion of test or scheduled by the customer if completion of work occurs prior to retest date.
- F. Installation of Backflow Prevention Devices
Where the customer is asked to install a reduced pressure or double check valve assembly, the customer will be supplied a list of acceptable units. It will be pointed out that a unit cannot be accepted until MWS' water system has verified that the installation fully meets the installation criteria and has been tested to verify that the unit is meeting accepted performance standards. Such backflow prevention units must be of a make and model currently listed as acceptable by both the water system and the Tennessee Department of Environment and Conservation. A list of approved devices and the details of their installation are available at MWS offices and on the MWS website (<http://www.nashville.gov/water/index.htm>).

G. Technical Assistance

The customer will be urged to notify the water system when they are ready to begin installing either a reduced pressure or double check valve type backflow preventer device. As notified and as needed, MWS' water system'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.

VI. PROTECTIVE MEASURES REQUIRED

A. Internal Protection

The water system's primary concern and responsibility is to safeguard the quality of water within the public water supply lines, while the customer is primarily concerned with his internal water lines. MWS will only address primary devices as they apply to requirements of protecting the public water supply. Internal protection (secondary devices) as required by other Metro Agencies (Codes et al) are not covered by this plan. Compliance with these standards must be coordinated through those respective agencies.

MWS' water system will evaluate the customer's entire internal water delivery system and the various water uses before determining the best way to protect the public water system. Where the cross connection survey reveals that a limited number of internal approved air-gap separation or vacuum breakers might be used to protect against backflow, the customer will be given the option of these devices in lieu of mainline backflow protection.

Main Line Protection

Main line protection, or protective devices on the customer's service line immediately behind the water meter and before any water outlet, will be required on all premises where the water system has reservations that anything less could compromise the goal of the water system to deliver safe water (under all foreseeable circumstances) to all of its customers.

B. Acceptable Protective Devices

All backflow prevention devices used for the protection of the water system must be of a make and model acceptable to MWS' water system and approved by the Division of Water Supply, Tennessee Department of Environment and Conservation. All such devices will be installed at a location and in a manner approved by MWS' water system and shall meet the minimum standards established by the water system and the Tennessee Department of Environment and Conservation. A list of approved devices and the details of their installation are available at MWS offices and on our website: <http://www.nashville.gov/water/index.htm>

VII. INSPECTION AND TESTING OF PROTECTIVE MEASURES

A. Approval of New Installations

MWS' water system will not consider the installation of protective measures to be complete until:

1. The installation has been inspected and approved by the water system
2. Where applicable*, tested to determine that the protective device meets acceptable performance standards.

B. Routine Inspection and testing of Protective Measures

To assure that all protective devices are functioning properly, representatives of MWS' water system will inspect and test protective devices at least every twelve (12) months. More details may be found in Section IX TESTING OF PROTECTIVE DEVICES.

C. Routine Revisits

In conjunction with visits for surveys and testing of backflow prevention devices, the water system's representatives will investigate to determine that cross connections, actual or potential, have not been added ahead of the protective device and that the protection has not been by-passed or altered in some other way that would compromise the desired protection.

Where service line protection is not in place, the system's cross connection control representative will make a complete inspection of the internal plumbing system and all water uses to determine if connections have been made or the Plan has been updated that require protection. MWS' water system's goal is to make such inspections at least every twelve (12) months.

VIII. CONNECTIONS REQUIRING MAXIMUM PROTECTION MEASURES

A. Extreme Hazards Requiring Immediate Correction

Where cross connections are found which pose an extreme hazard of immediate concern, the Coordinator has full authority and shall require MWS' Field Personnel to immediately physically disconnect the water service to the location in non-compliance. This will be communicated to the customer for any operational considerations that they may have. This action will also be reported to the appropriate MWS and Metro Government personnel.

B. Premises of Less Immediate Concern

In cases where there are fewer hazards, or less likelihood of cross connections contaminating the system, a reasonable time period will be

* All continuous pressure type devices such as the reduced pressure, double check valve, and double check-detector check must be tested routinely.

allowed for corrections – typically thirty but up to ninety (90) days depending on type of connection and demonstration of action by the customer.

C. Examples of Hazardous Connections

Reduced pressure backflow prevention or approved air-gap separation devices will be required on the service line serving the customer's premises under the following circumstances:

1. To isolate auxiliary water sources, including but not limited to:
 - a. Private wells
 - b. Surface water sources
 - c. Re-circulated water, process fluids, gases, etc.
 - d. Stored water, from public water systems, in other than acceptable facilities or which receive chemical or other treatment
2. To protect against submerged outlets or connections to tanks or piping systems, including but not limited to:
 - a. Vessels containing, or possibly containing, contaminated substances (chemical, bacteriological, radiological, etc.)
 - b. Heating or cooling coils submerged in containers
 - c. Treated water for boilers, fire systems, chilled water systems, etc.
 - d. Commercial boilers, with or without treatment
 - e. Sewage treatment plants, pumping stations where backflow potential exists
 - f. Facilities for direct flushing of water hoppers, sewers, etc.
 - g. Industrial or other piping systems.
3. Because of the high degree of hazard involved in the following types of establishments, it is deemed essential that maximum protection, consisting of an air-gap separation or a reduced pressure type backflow preventer, be provided on the water service line leading to the following establishments. This listing is not a complete list but is to be used as a guide. Requirements of specific types of protective devices will be made during the review process of new development, remodeling or during twelve (12) month inspection cycle.

- a. Premises wherein inspection is restricted
 - b. Hospitals, mortuaries, clinics, and professional buildings where similar degrees of hazard exists
 - c. Sewage treatment plants and pumping stations
 - d. Chemical plants
 - e. Metal plating plants
 - f. Processing plants (food, beverage, petroleum, or other) where processed or used water may be cross connected to the water system
 - g. Manufacturing plants or shops with water using equipment or other uses that can degrade water quality
 - h. Radioactive material processing plants or nuclear reactors
 - i. Laboratories
 - j. Multi-unit housing such as triplexes and apartment complexes
4. Double check or double detector checks may be used in locations where water connections are of a less degree of hazard than those listed above. Allowance for this type of device is typically on dedicated fire service lines where chemical suppression, on-site tankage and or auxiliary sources of water are not present.

IX. TESTING OF PROTECTIVE DEVICES

MWS' water system recognizes that it is essential that continuous pressure type backflow prevention devices be tested on a regular basis by competent and certified personnel, if the devices are to be relied upon. It is recognized that the devices can fail to meet the performance standards of which they were designed due to fouling, wear, or mechanical problems. Routine testing and proper maintenance is considered essential for proper operation. It is also recognized that testing equipment must be properly maintained and calibrated in accordance with regulatory and equipment standards. Certification of calibration of testing equipment will also be kept on file in the Cross-connection Section of MWS.

A. Routine Testing of Backflow Prevention Devices

All reduced pressure backflow prevention devices utilized for the protection of the MWS' water system will be tested routinely by a trained certified tester in keeping with the following criteria:

1. Immediately following installation

2. At least every twelve (12) months and more frequently where MWS deems necessary
3. Any time protective devices have been partially disassembled for cleaning and/or repairs
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 or internal parts)

Double check valves or double check-detector valve assemblies will be tested in keeping with the following criteria:

1. Immediately following installation
2. At least every twelve (12) months
3. Any time devices have been disassembled for cleaning or repairs
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 or internal parts)

B. Accepted Test Procedures

Tests of these units will be made using test equipment and test procedures conforming to those outlined in the latest Edition of the "Cross Connection Control Manual" published by the Foundation for Cross Connection Control and Hydraulic Research – University of Southern California.

C. Repairs

Should a protective device be found defective (not meeting above referenced performance standards), the water system will require the device to be repaired and placed in proper operating condition immediately or within ninety (90) days depending on degree of hazard (please refer to Section VIII). Following repairs, the device is to be tested again to verify that it is meeting performance standards. The owner will be held responsible for maintaining protective measure in a good state of repair. The owner of a device needing repairs or maintenance will be permitted to do the work or the owner may elect to secure the services of someone else experienced in the repair of the devices.

D. Official Tests

MWS' water system is vitally interested in the proper performance of backflow prevention devices; its representative will test the devices as needed. Costs for such tests will be borne by the customer as a direct cost and will appear on the customer's subsequent month's water bill. Tests performed by the water systems cross connection control personnel, their

designee, or other MWS sanctioned certified testers will be considered official and acceptable by the water system. The water system will utilize personnel who have completed special training and who hold a valid certificate issued by the Tennessee Department of Environment and Conservation to test backflow prevention devices. Likewise, water system designees or sanctioned third-party testers would also require the completion of special training and hold a valid certificate issued by the Tennessee Department of Environment and Conservation to test backflow prevention devices. In the event that the water system finds itself without a certified individual, the services of a certified individual from another water system or service organization specializing in backflow prevention work, should be secured to test protective devices as needed to comply with the above criteria.

E. Prior Arrangements for Testing

Prior arrangements will be made for a mutually agreeable time for testing the devices prior to actually making the test. In all cases, the time which water service is interrupted will be held to a minimum in order to minimize the inconvenience to the customer. The customer, upon notification by the water system, has an obligation to work out a mutually agreeable time for testing protective devices within 14 days.

F. Parallel Units

The water system may require the installation of parallel units if the customer cannot readily accommodate interruptions of water service for periodic testing and repairs of the backflow prevention device or is unwilling to cooperate in scheduling a shutdown promptly for testing during normal hours worked by water system personnel.

G. Records

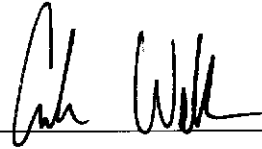
Records will be maintained as a part of the MWS' water system's permanent files to:

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

Records to be maintained by the MWS' water system will include, but not necessarily be limited to the following:

1. Records on initial surveys, recommendations, re-test, corrective action, routine re-test, test results, etc. of individual premises
2. Correspondence between water system and its customers, health department, plumbing inspection agency, etc.
3. A master listing of all protective devices, showing the location, kind of protective device, make, model, size, etc.
4. Test reports on each protective device
5. A file system designed to call to the attention of the cross connection control personnel when testing and re-test of premises are needed

State Approval:



Date:

11/13/08

MWS Approval:



Date:

11-04-08

Appendix 1

15.12.070 Cross-connections prohibited--Contamination prevention requirements.

- A. A cross connection is any connection between the water supply system ("system") of the metropolitan government and any other water supply system or any connection between the system and any other system or device that could cause a backflow, backsiphonage or provide an entry point of any material, fluid or otherwise, into the system.
- B. In the interest of protecting the public drinking water supply from contamination resulting from cross connections, the department of water and sewerage services ("department") is authorized to develop and administer a cross connection control plan ("plan") in accordance with standards established under the Federal Safe Drinking Water Act of 1974 and statutes and rules of the State of Tennessee governing public water systems. A copy of the plan shall be placed on file with the metropolitan clerk, and may be modified from time to time by the department as necessary.
- C. To the extent the plan calls for the department to test private equipment and devices, the reasonable costs of such tests shall be the responsibility of the owner of such equipment and devices. The department shall bill and collect such costs in the same manner as other charges for water and sewerage services.
- D. It is unlawful for any person to cause a cross connection to be made or to allow one to exist for any purpose without the express written consent of the department.
- E. The department will approve requests for cross connections only where such requests are consistent with the criteria established in the plan.
- F. The department shall, after reasonable efforts to notify the owner or other responsible entity, physically disconnect the water service line serving any property having or maintaining an unapproved cross connection. Service shall be restored only after the cross connection has been eliminated or an approved and functioning backflow prevention device is installed in accordance with the plan.
(Ord. BL2005-844 § 1, 2006; prior code § 40-1-12)