

Manchester Water Department Cross-Connection Control Plan

I. Introduction

A. Goal

The goal of the Manchester Water Department 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 due to cross connections threatens the health and safety of customers and chances of realizing this goal. The possibility of backflow due to improper use of water within the customer's premises is especially significant because 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 assemblies. The Manchester Water Department must continue maintenance of a continuing program of cross connection control to systematically and effectively prevent the contamination or pollution of all potable water systems.

B. Plan of Action

The Manchester Water Department is determined to take every reasonable precaution to ensure that cross connections are not allowed to contaminate the water being distributed to its customers. This cross connection plan outlines a course of action designed to control cross connection within the area served by the utility. This plan is intended to be a practical guide for safeguarding the quality of water distributed from becoming contaminated or polluted through backflow. By following the plan of action, the water provider will ensure that all aspects of the ordinance on Cross Connection Control are being followed by customer.

II. Authority for Cross Connection Control

A copy of the ordinance, adopted June 16, 1987, by Board of Directors is attached to this plan as Appendix 1. This ordinance prohibits cross connections within water systems, authorizes the water system to make inspections of the customer's premises, requires that cross-connection hazards be corrected and provides for enforcement. This ordinance expresses clear determination on the part of the Board of Directors that the water system is to be operated free of cross-connections that endanger the health and safety of those depending upon the public water supply. This ordinance is considered to be a sound basis for the control of cross-connection hazards by the operating staff and management of the Manchester Water Department. The provisions, contained within this ordinance, are in keeping with the requirements set forth in Section 68-221-711 (6) of Tennessee Code Annotated and Section

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

III. Program To Be Pursued

The Manchester Water Department will establish an active on-going 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 Manchester Water Department.

A. Staffing

Water provider has designated staffing to ensure that the program to control cross-connections is pursued in an aggressive and effective manner. It is proposed that a minimum of one man at four days per month be allotted to the cross-connection control program initially. Depending on customer preference in scheduling, work related to the testing of devices may occur after hours or on weekends. A cross-connection control coordinator or manager and successor will be named. The cross-connection control coordinator is in charge of implementation of an effective cross-connection control program. The Cross-Connection Control Coordinator will ensure that the all aspects of the plan and ordinance are followed.

Dana Douglas- Cross-Connection Control Coordinator

B. Cross-Connection Control Surveys/Inspections

A representative of the water system will survey the distribution system for all customers, both residential and nonresidential, for possible cross-connections. If it is determined from the surveys that possible cross-connection may exist, the premise will be inspected. The need for backflow protection will be determined based on the results from the inspection. Notification of the type of backflow prevention assembly required and a date of compliance will be sent to the customer.

Non-Residential:

All nonresidential and commercial establishments are required to have an approved backflow preventer installed that is in agreement to the hazard present or be inspected every 5 years. The inspections will be performed on all new establishments before water service is established or within 90 days of connection. If there are existing establishments that have not been inspected, a list agreed upon by State (based on risk and public safety) and time line for inspection by the water provider will be generated. All non-residential establishments not requiring an assembly will be inspected (every 5 years maximum). If establishment changes ownership (name listed on water bill), if plumbing permits are issued, irrigation systems installed, or a well is drilled within the water provider's system,

then an inspection will need to be performed (no later than 90 days). 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. (Attach a list of criteria for requiring assemblies)

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 to not create cross-connections.

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. 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 sent to existing residential customers to determine if potential cross-connections exist. The distribution system will be divided into four quadrants and will be entirely surveyed within five years. 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 if backflow prevention assemblies are needed. **In addition to the above, the Manchester Water Department has set a goal of conducting inspections of at least 5% of our residential customers each year.**

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, 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 bib). However, if the pool or vessels is connected directly or indirectly by a hard line, an RP is required at minimum.

Residential customers required to have backflow prevention assemblies will be informed of possible thermal expansion problems within the establishment and correction of the condition.

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 or the premises will require an approved assembly.

Wells that are drilled within the area of the distribution system within the last calendar year are inspected and a well user agreement is signed between the Manchester Water Department and the customer. A list of existing wells that do not have a well user's agreement within the distribution area will be generated and ten (10) wells per year will be inspected until the entire list has been completed. Any well system that is connected directly or indirectly to the water system is required to disconnect or install a reduced pressure principle assembly. The customer will be required to sign a well user agreement if no assembly is required. It is recommended that inspections be performed on new listings within the year, and then perform inspections on existing, uninspected wells. The list is updated at the Local environmental field office and is available to the water system.

New lines that are constructed in areas where residential areas have been mainly supplied by well systems are surveyed and inspected.

C. Public Education and Awareness Efforts

The Manchester Water 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 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 cooperation. Use of customer notification letters, annual consumer confidence report and print media will be incorporated into the notification plan. Efforts will be made to have an employee, or employees, of the water system to appear before the 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 Consumer Confidence Report (CCR) at least once per year. A brochure will be given to all new customers requesting water service describing cross-connections and prevention of backflow.

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. Annual consumer confidence report
4.
 - a. Personal visits to commercial, industrial, institutional, and agricultural customers to explain the need for controlling cross-connections.
 - b. Whenever possible, any such potential customer will be informed of needed cross-connection measures in the design or construction stage.

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. This includes repair, testing, installation, etc.

E. Enforcement

Where cross-connections are found to exist, the Manchester Water 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 (90 days maximum for high and low hazard, 14 days maximum for high risk high hazards) to the customer, water service will be discontinued until conditions are in line with the water provider's ordinance for the protection of the health and safety of the water distribution system.

After surveys or inspections have been completed, the establishments 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 (90 days maximum for high and low hazard, 14 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 Manchester Water Department.

The Manchester Water 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 water provider, based on the seriousness of the hazard and risk of contamination, ranging from immediate correction or time period of up to 90 days. The maximum allowable time for correction will no more than 90 days. Those sites deemed high risk high hazard are corrected within a maximum limit of 14 business days, preferably immediate correction. If the conditions do not satisfy the ordinance or plan within 90 days, water service will be discontinued. In the case of backflow prevention devices on fire systems, it is recommended that the fire marshal be contacted before water

service is discontinued, to prevent harm to anyone in case a fire occurred in a public building. The fire marshal can condemn the building, thus not allowing anyone to enter.

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

IV. Procedures for Inspections:

The Manchester Water 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 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 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.

A. 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 Water System's management or engineering staff and that a written report containing any recommendations and requirements will be mailed to them as soon as possible.

B. Reports to Customers:

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 the questions. The customer will be given a time limit for making the needed corrections depending (maximum of 90 days) upon the seriousness of the cross-connections involved and upon the complexity and difficulty of correcting the problems.

C. Follow-up Visits and Re-inspections

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 water system.

D. Installation of Backflow Prevention Devices:

Where the customer is asked to install a backflow prevention assembly, the customer will be supplied with a list of acceptable and approved assemblies. In addition, minimum acceptable installation criteria will be supplied. It will be pointed out that a unit cannot be accepted until the water system has verified that the installation fully meets the installation criteria and has been tested to verify that the assembly has a status of Passed. Such backflow prevention assemblies must of a make, model, and orientation currently listed as acceptable by the both the water system and Tennessee Department of Environment and Conservation.

E. 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 assembly. The Water system 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.

V. Premises Requiring Reduced Pressure Principle Assemblies or Air Gap Separation

A. High Risk High Hazards

Establishments which pose significant risk of contamination or may create conditions which pose an extreme hazard of immediate concern (High Risk High Hazards), the cross-connection control inspector shall require immediate or a short amount of time (14 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. The following list is establishments deemed high risk high hazard:

High Risk High Hazards:

1. Mortuaries, morgues, autopsy facilities
2. Hospitals, medical buildings, animal hospitals and control centers, doctor and dental offices
3. Sewage treatment facilities, water treatment, 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 processes and storage plants
19. Restricted establishments
20. Schools and Educational Facilities
21. Animal feedlots, chicken houses, and CAFOs
22. Taxidermy facilities
23. Establishments which handle, process, or have extremely toxic or large amounts of toxic chemicals or use water of unknown or unsafe quality extensively.

B. High Hazard

In cases where there is less risk of contamination, or less likelihood of cross-connections contaminating the system, a time period of (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. (Provide criteria list, suggested to use Appendix A of manual)

VI. Premises Allowing Double Check Valve Assemblies

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. Low Hazards are protected by double check valve assemblies at minimum. Double check valve (and detector) assemblies used for main line protection are allowed only on Classes 1-3 fire protection systems.

VII. Inspection and Testing of Backflow Prevention Assemblies

A. 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 water system based installation criteria; and
2. Assembly is tested initially and has a status of Passed.

B. Routine Inspection and Testing of Assemblies

To assure that all assemblies are functioning properly, assemblies will be tested within a 12 month period (no more than 365 days from last test) by backflow prevention assembly

testers with a valid 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 water system representative or approved tester will investigate to determine:

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

All reduced pressure 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 water system in keeping with the following criteria:

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

C. Accepted Test Procedure

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

D. Official Tests

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

E. Prior Arrangements for Testing

Prior arrangements will 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 water system, has an obligation to work out a mutually agreeable time for testing assemblies within time allotted by the water system.

F. Repairs

Should a protective assembly not be tested within the 12 month time frame be found defective or have a status of Failed, the water system 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 (specified) time limit (maximum 90 days, 14 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.

VIII. Parallel Units

The water system may require the installation of parallel assemblies if the customer cannot readily accommodated 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 water system personnel.

IX. Records

Good records are invaluable in the water system'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 Water System's permanent files to:

- A.** 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;
- B.** Give a complete picture as to the current status and history of the individual premises regarding the potential for backflow, corrections made, etc.;
- C.** To support enforcement action, whenever necessary, to obtain backflow protection; and
- D.** Document that assemblies have been properly installed, maintained, and tested routinely.

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

- A.** Master List of all Establishments with assemblies used for premise isolation, including location, assembly used, make, model, size, serial number etc.;
- B.** Correspondence between water system and its customers
- C.** Copy of Approved Plan
- D.** Copy of Approved Ordinance
- E.** Test reports for each assembly
- F.** Copies of Certificates of Competency for each tester
- G.** Copies of test kit certifications
- H.** Site Inspection Reports
- I.** Residential written surveys
- J.** Backflow incident reports
- K.** Records on initial surveys, recommendations, follow-up, corrective action, routine re-inspections, etc.
- L.** A file system designed to call to the attention of the cross-connection control personnel when testing and reinspections of premises are needed.

M. Public education pamphlets and information.

X. Backflow Contamination Procedures:

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

- A. Isolate the lines containing any contaminant from the distribution system;
- B. Inform customers with contaminated lines not to consume or use the water;
- C. Report contamination to the Columbia Field Office;
- D. Determine and separate the cross-connection allowing the backflow and contamination;
- E. Remove contamination from lines;
- F. Test and ensure that lines meet Division of Water Supply regulations for safe water;
- G. Return service to customers affected customers once water is safe;
- H. Document the details of the incident including cause, isolation, and correction, and send report to Columbia Field Office;
- I. Continue to survey and inspect system for similar situations that may allow backflow.

XI. Modifications to Plan

This plan may be modified from time to time to meet the needs of the utility and to meet the states requirements. The plan and ordinance will be reviewed by the water system 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 manager shall be authorized to modify, as needed this plan without the approval of the water system’s governing body. The manager shall report any modifications to this plan to the board for their information, in a timely manner. The manager shall also advise the Columbia Field Office of any changes to this plan for their review and comments.

XII. Approval Signatures

State Approval: _____ **Date:** _____

Board Approval: _____ **Date:** _____

Board Chairman
Signed: _____ **Date:** _____

Executive Director
Signed: _____ **Date:** _____

INSTALLATION CRITERIA
FOR
REDUCED PRESSURE PRINCIPLE AND DOUBLE CHECK VALVE BACKFLOW PREVENTION
ASSEMBLIES

MINIMUM INSTALLATION REQUIREMENTS are underlined, 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:
 1. The ground
 2. Top of the opening(s) in enclosure wall
 3. 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.

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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 stationery 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 4 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 unions and 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. 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.
- I. The test cocks, valve stems, or name plates should not be painted and their accessibility, operation of legibility should not be hampered nor the relief valve discharge passage be restricted by insulation or other coverings.
- J. The assemblies should be installed in an approved position as listed in the Latest Approved List and special supports added if needed.
- K. For applications where water temperatures exceed 110°F (43°C) only approved hot water devices are to be used.
- L. 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.
- M. 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 A

TYPICAL CROSS CONNECTION HAZARDS

Actual or potential cross connection hazards may be present within almost every 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 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, solvent reclaim facilities.

Wash water storage tanks equipped with re-circulating pumps.

Dye vats in which toxic chemicals and dyes are used.

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

Boilers, steam lines, and heat exchangers.

12. Paper Processing

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

13. Petroleum Processing

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

14. Plating Facilities

Plating facilities using highly toxic cyanides, heavy metals, such as, copper, cadmium, chrome, acids, and caustic solutions.

Plating solution filtering equipment with pumps and circulating lines.

Tanks, vats, or other vessels used in painting, descaling, anodizing, cleaning, stripping, oxidizing, etching, pickling, dipping, and rinsing operations and lines used for transferring fluids.

15. Storage Tanks, Cooling Towers, and Circulating Systems

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

16. Sewerage Systems

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

Water-operated sewage pump ejectors.

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

17. Steam Generation Facilities

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

18. Hospital-Medical Facilities

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

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

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

Establishments with equipment list will normally require premise isolation with a Reduced Pressure Principle Assembly or Double Check Valve 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 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.

Air-conditioning systems (using water for processing)

Aspirators

Air lines

Autoclaves and sterilizers

Auxiliary systems

Baptismal tanks

Bathtubs (Hard Piped)

Bedpan washers

Bidets

Booster pumps

Brine tanks, softeners

Boilers

Car wash equipment

Chemical feeders

Chillers

Chlorination equipment

Coffee urns

Commercial cookers

Condensers

Compressors

Cooling systems

Cooling towers

Culture vats

Cuspidor, dental

Developing equipment

Dishwashers

Display fountains

Drinking fountains

Ejectors, steam or water

Extractors

Fire protection systems, standpipes, sprinkler systems and drain lines

Fish tanks, ponds

Floor drains
Food mixing tanks
Frost-free toilets, hydrants, and fountains
Garbage grinders
Garbage can washers
Garden sprayers
Heat exchangers
Humidity controls
Hydraulic equipment
Hydraulic insecticide or fertilizer applicators
Hydraulic lifts
Ice makers
Irrigation systems, lawn sprinklers
Kitchen equipment
Laboratory equipment
Laundry equipment
Lavatories
Lawn sprinklers
Liquid handling systems
Lubrication, pump bearings
Medical equipment
Pest control equipment
Photo laboratory sinks
Potato peelers
Pressure cookers
Process water circulation systems
Pump, priming systems
Sewer flush tanks
Shampoo sinks, basins
Showers, telephone type shower heads
Sinks, slop sinks
Soda fountains
Solar water and space heating equipment
Steam boilers
Steam tables
Stop and waste vales
Swimming pools, ponds, fountains
Tank and vats
Therapeutic tanks, spas, and hot tubs
Threaded hose bibbs
Toilets, flushometer, flush tank, ballcock, flush valve siphon jet
Vegetable peelers
Vacuum systems
Urinals (siphon set blowout)
Vacuum systems (water operated with water seals)
Water treatment devices
Water troughs

Water-using mechanical equipment
Water Jacketed tanks, vats, cookers

C. **Premises, facilities or establishments that pose a significant risk of cross-connection** –

Reduced Pressure Backflow Prevention Assemblies required for premises isolation

Agricultural processing facilities
Aircraft and missile plants
Amusement parks
Animal hospitals and clinics
Automotive plants
Auxiliary water systems
Autopsy facilities
Beverage bottling plants
Breweries
Buildings (multistory) – hotels, apartment houses, public and private buildings, or structures having unprotected cross connections
Campgrounds
Canneries
Car washes
Chemical plants – manufacturing, processing, compounding, treatment, packing, storage
Chemically contaminated water systems
Civil works
Clinics
Cold storage plants
Dairies, creameries
Dry cleaners
Dental buildings
Dye works
Extermination Companies
Fertilizer plants
Fertilizer (liquid) and spray distributors
Film laboratories
Fire sprinkler systems
Funeral homes
Hospitals
Laboratories
Laundries and dye works
Lawn irrigation systems
Medical buildings
Metal manufacturing, cleaning, processing, and fabricating plant
Mortuaries
Morgues
Motion picture studio
Nursing home or convalescent homes
Greenhouses, plant nurseries

Oil and gas production, storage, or transmission facilities
Oil refineries
Packing houses
Paper and paper product plants
Plating plants
Power plants
Private wells
Radioactive materials or substances – plants or facilities that process or use radioactive materials
Reduction plants
Restricted, classified, or other closed facilities
Rubber plants
Sand and gravel plants
Schools and colleges
Sewage pumping stations
Storm water pumping stations
Hard plumbed swimming pools, ponds, and fountains
Tanneries of all kinds
Therapeutic tanks, spas, and hot tubs
Vegetable and food processing facilities
Waterfront facilities and industries
Water treatment plants
Wastewater treatment plants
Water using recreational facilities (swimming pools, water slides)

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

1. The degree of hazard involved.
2. The likelihood of frequent and/or unapproved plumbing changes.
3. The probability of frequent modification of water using equipment.
4. The complexity of the internal piping system.
5. The difficulty in making frequent inspections to verify that the internal protection provided is being adequately maintained.
6. The likelihood of protective assemblies being rendered ineffective.
7. The ease of access to premises.
8. The time necessary to inspect all water outlets not protected by a backflow prevention assembly.

- 9. The time needed to inspect the facility at least annually to determine if new cross connections have been created.

**Water System
Cross-Connection Survey
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. Does a creek, river, or spring water run near or on your property? Yes _____ No _____
- 10. Do you have a booster pump, well pump, or any other type water pump? Yes _____ No _____
- 11. Do you receive irrigation water from a different source? Yes _____ No _____
- 12. Do you have a backflow protection device on your property now? Yes _____ No _____
- 13. Do you have any situation that you are aware of that could create a cross-connection?
Yes _____ No _____
- 14. Do you have any other water-using equipment on your property not mentioned above?
Yes _____ No _____

If yes, please list below:

Print Name

Phone #

Signature

Date

Please notify this office if any of the above conditions change.

State Guidance for Approved Backflow Prevention Assemblies

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

DOUBLE CHECK-DETECTOR CHECK VALVE ASSEMBLY (DCDA)

A specially designed unit composed of a line size approved double check valve assembly with a specific bypass line equipped with a small water meter and a 3/4 inch approved double check valve assembly. The meter shall register accurately for only very low rates of flow and shall show a registration for all rates of flow. The meter will detect small leakage or theft of water for unmetered fire lines. This assembly is designed for fire service lines and is recommended for unmetered fire lines. This assembly is designed to protect against a **low hazard or pollutant**.

DOUBLE CHECK VALVE ASSEMBLY (DCVA)

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

REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTION ASSEMBLY (RPBP)

An assembly containing two independently acting approved check valves together with a hydraulically operating, mechanically independent pressure differential relief valve located between the check valves and at the same time below the first check valve. The unit shall include properly located test cocks and tightly closing shutoff valves at each end of the assembly. This assembly is designed to protect against a **health hazard (i.e. contaminant)**.

REDUCED PRESSURE PRINCIPLE-DETECTOR BACKFLOW PREVENTION ASSEMBLY (RPDA)

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

The following assemblies will meet recommendations and requirement for protection of the water system:

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

* Double Check Valve Assemblies and Double Check Valve Detector Assemblies are permissible on non-chemical fire lines Class 1-3 only. Use of these assemblies is at discretion of the water purveyor.

Atmospheric Vacuum Breakers, Pressure Vacuum Breakers, and Spill-Resistant Pressure Vacuum

Breakers are not approved by the Division of Water Supply for premise isolation.

Existing Assemblies not on Approved List

Assemblies not listed on the Approved List may be accepted by the Division of Water Supply as an approved assembly under very strict guidelines. The water purveyor may elect, at their discretion, to accept only assemblies listed on the Approved List in order to establish the utmost confidence in backflow protection and prevention.

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

1. Approved Ordinance and Ordinance of water purveyor at the time of installation did not address or require assemblies from Approved List. Ordinance or ordinance must be amended and approved, if needed, to allow unapproved existing assemblies that meet the following requirements.
2. Assembly must meet all installation criteria required by the water provider.
3. Must meet the definition of assembly and is annually tested. The assembly must be deemed **Passed** to remain as an acceptable and approved backflow prevention assembly for the protection of the water system.
4. Installation, operation, and maintenance of the assembly will provide adequate protection against backflow.
5. Assembly must be repaired using manufacturer-specified parts in accordance to procedures outlined by manufacturer.
6. A written plan must be reported by the water provider concerning the assembly not shown on the latest Approved List. The plan will specify all conditions and information concerning the assembly including manufacturer, model, serial number, installation, repair information (if available), time line of replacement (depending on type of hazard and risk of contamination) if assembly cannot be repaired in accordance with manufacturer procedures. All plans and worksheets must be completed and kept on file by the water system.
7. If assembly cannot be repaired according to the manufacturer-specified procedures, it must be replaced with an assembly listed on the latest Approved List. The replacement assembly will be installed, operated, and maintained in accordance to the approved ordinance/ordinance of the water purveyor.

State Guidance for Backflow Prevention Assembly Performance Evaluations

Performance evaluations are needed to demonstrate that all parts of the assemblies are performing as designed and as approved.

1. Performance evaluations must be performed on every assembly at least annually.
2. Each backflow prevention assembly must be deemed **Passed** to remain approved and acceptable protection for the public water system.

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

Reduced Pressure Principle Assembly:

- a. Relief Valve must be have an opening point of 2.0 psid or greater
- b. Backpressure on Check Valve #2 must hold tight.
- c. Static Pressure Drop across Check Valve #1 must be 3.0 psid or greater than relief valve opening point.
- d. Shutoff Valve #2 must hold tight.
- e. Static Pressure Drop across Check Valve #2 must be 1.0 psid or greater.

Double Check Valve Assembly:

- a. Static Pressure Drop across Check Valve #1 must be 1.0 psid or greater.
- b. Backpressure on Check Valve #2 must hold tight.
- c. Shutoff Valve #2 must hold tight.
- d. Static Pressure Drop across Check Valve #2 must be 1.0 psid or greater.

3. The Backflow Prevention Assembly Tester must have, at minimum, a valid Certificate of Competency in Testing and Evaluation Backflow Prevention Assemblies and a valid test kit certification by a manufacturer-approved entity.
4. Backflow Prevention Assembly Testers must test and evaluate according to the latest Division of Water Supply's approved procedures.
5. Test kits must be certified annually and the water provider and tester must show proof of certification from manufacturer-approved entities.

6. Proof of annual test kit certification and Certificate of Competency must be current and kept on file for each tester by water provider for five years.
7. Test reports must be completely and accurately documented and the appropriate evaluation determined from testing procedure.
8. All correspondence and documentation pertaining to each backflow prevention assembly will be kept on file by the water provider for at least five years. This includes, but not limited to, test reports, repair reports and installation records.
9. Each location requiring an assembly will have a documented backflow prevention assembly, if the assembly at the address cannot be identified or is not the correct assembly, the water provider will be notified.
10. Every assembly must pass each part of the Performance Evaluation. If any test does not meet the minimum requirements set forth in the testing procedure, the assembly is deemed **Failed**. If conditions around the assembly do not allow the assembly to be tested, the assembly fails the assembly performance evaluation. (Examples would include assembly is submerged, test cocks missing or plugged, relief valve continually discharging)

Failed: The status of a backflow prevention assembly determined by a performance evaluation based on the failure to meet all minimum standards set forth by the approved testing procedure.
11. Assemblies must be tested when installed and after every repair. Backflow prevention assemblies on lawn irrigation systems must be tested when assemblies are placed in service. If lawn irrigation backflow assemblies are taken out of service to winterize the system, upon startup of the system, the assemblies must be retested.
12. Water systems may elect to place additional requirements on assembly testers as long as there is no conflict with State statute or regulation.

State Guidance for Certificate of Competency for Testing and Evaluating Backflow Prevention Assemblies

The information listed below is guidance concerning Certificate of Competencies:

- Anyone testing backflow prevention assemblies for the purposes outlined in the water system's Cross-Connection Control Ordinance or Ordinance must have a **valid** Certificate of Competency in Testing and Evaluation of Backflow Prevention Assemblies issued by the Division of Water Supply.
- A valid certificate is defined as a Certificate (Basic or Renewal) issued by the state of Tennessee that has not surpassed the three-year time limit from issuance. After certificates have been granted by the State of Tennessee, a Certificate No. is assigned to the applicant. Certificates are valid for three (3) years after certificates are granted. All Certificates are no longer valid, if the Renewal Certificate is not attained within three (3) years from the date the certificate was issued. A 1 year grace period is allowed to attend the renewal class however, the person must not be allowed to test after the 3 year expiration.
- The applicant must complete and satisfy all requirements set forth by the Division of Water Supply to attain and renew the Certificate of Competency.
- Applicant must successfully complete a State-approved Basic Cross-Connection Control training session, written exam, and practical exam to attain an initial Certificate of Competency. The student must successfully complete a State-approved Renewal Cross-Connection Control training session and practical exam to renew the Certificate of Competency.
- Certificate of Competency must be valid in order to perform assembly evaluations.
- In order to renew the Certificate of Competency, a Renewal Course and Exam must be taken within three years after the issuance date to remain valid.
- If the Certificate of Competency is not renewed three years after issuance, the certificate is no longer valid, but does not expire.

Manchester Water Department
Cross-Connection Control Plan

- A one year grace period to renew the Certificate of Competency is allowed once the three year time limit has passed.
- Water providers will not accept a test report from a tester whose certificate is in the grace period or has expired.
- If the tester does not renew during the one year grace period, the certificate expires and the tester must take the Basic Course and Basic Exam in order to attain the Certificate of Competency.
- The Certificate of Competency is not transferable and no one may work “under” the certificate.
- A Plumber Certificate in Testing and Evaluating Backflow Prevention Devices issued by Division of Water Supply cannot be substituted and will not be accepted in place of the Certificate of Competency.
- Certificates of Competency in Testing and Evaluation of Backflow Prevention Assemblies from other states or entities will only be accepted if approved by the Division of Water Supply. No entities or states presently have an approved Certificate of Competency.
- Water providers may elect to impose additional restrictions on testers within their systems, as long as the State’s statutes, regulations, and policies are met.

Minimum Requirements in Ordinance/Ordinance:

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

State Guidance Concerning Lawn Irrigation 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 by Public Water Systems:

- For public water systems to protect their distribution lines, lawn irrigation systems are protected by a **Reduced Pressure Principle Assembly** or **Reduced Pressure Principle Detector Assembly**.
- 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** or **Reduced Pressure Principle Detector Assembly** only.
- Pressure vacuum breakers, Spill-resistant vacuum breaker, and atmospheric vacuum breakers may not be used to protect the public water system's main-line piping or distribution system. These devices are point-of-use devices and may not be used for premise isolation.
- Assemblies must be tested annually.
- Assemblies on lawn irrigation systems must be tested during the start-up period (typical maximum time limit is within 90 days). Annual testing just prior to winterization or seasonal shutdown is not acceptable. Testing may also be initially staggered in order to reduce problems with scheduling tests.

Backflow Incident Report Form

Reporting Agency: _____ Report Date: _____

Reported By: _____ Title: _____

Mail Address: _____ City: _____

State: _____ Zip Code: _____ Telephone: _____

Date of Incident: _____ Time of Occurrence: _____

General Location (Street, etc.): _____

Backflow Originated From:

Name of Premises: _____

Street Address: _____ City: _____

Contact Person: _____ Telephone: _____

Type of Business: _____

Description of Contaminants:
(Attach Chemical Analysis or MSDS if available)

Distribution of Contaminants:

Contained within customer's premises: Yes: _____ No: _____

Number of persons affected: _____

Effect of Contamination:

Illness Reported: _____

Physical irritation reported: _____

Backflow Incident Report Form
Page 2 of 3

Cross-Connection Source of Contaminant (boiler, chemical pump, irrigation system, etc.):

Cause of Backflow (main break, fire flow, etc.):

Corrective Action Taken to Restore Water Quality (main flushing, disinfection, etc.):

Corrective Action Ordered to Eliminate or Protect from Cross Connection (type of backflow preventer, location, etc.)

Previous Cross-Connection Survey of Premises:

Date: _____ By: _____

Types of Backflow Preventer Isolating Premises:

RPBA: _____ RPDA: _____ DCVA: _____ DCDA: _____

Air Gap: _____ None: _____ Other Type: _____

Date of Latest Test of Assembly: _____

Backflow Incident Report Form
Page 3 of 3

Notification of Division of Water Supply:

Date: _____ Time: _____ Person Notified: _____

Attach sheets with additional information, sketches, and/or media information, and mail to Local Environmental Field Office

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

In accordance with Water System's Cross Connection Control program and state law, a private well or auxiliary water source may not be connected in any manner to the public water supply unless proper protection against cross connection is provided. Only a Reduced Pressure Backflow Preventer or an approved air gap (complete separation from public water supply) may be used for protection. These devices must have prior approval by Water System. Customers using the public water supply and not in compliance with this rule will have their water service discontinued.

Check appropriate box:

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

Please type or print

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

Manchester Water Department
Cross-Connection Control Plan

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

Date: _____

Name: _____ Notary: _____

Signature: _____ Commission Expires: _____