

TITLE 179 PUBLIC WATER SYSTEMS

CHAPTER 22 OPERATION AND MAINTENANCE OF COMMUNITY AND NON-TRANSIENT NON-COMMUNITY PUBLIC WATER SYSTEMS

22-001 SCOPE AND AUTHORITY: These regulations establish minimum requirements for the operation and maintenance of existing community and non-transient non-community (NTNC) public water systems. The authority is found in Neb. Rev. Stat. §§ 71-5301 to 71-5313. These regulations are effective for the purpose of compliance on May 1, 2004.

22-002 COMPLIANCE DATE: These regulations are effective for the purpose of compliance beginning May 1, 2004. Until that date, operation and maintenance requirements for public water systems are found in 179 NAC 2-008.

22-003 DEFINITIONS

Department means the Department of Health and Human Services Regulation and Licensure.

Director means the Director of Regulation and Licensure or his/her authorized representative.

Encroachment means a potential source of contamination located less than a specified minimum horizontal separation distance from a public water supply source or any other likely hazards to the safety of the drinking water quality, pressure, or economies delivered by the system. Examples applicable to community water systems include but are not limited to those potential sources of contamination and minimum horizontal separation distances identified in Attachment 1 of 179 NAC 2-007. Examples applicable to NTNC water systems include but are not limited to those potential sources of contamination and minimum horizontal separation distances identified in 178 NAC 12-003.01B.

22-004 GENERAL OPERATING REQUIREMENTS: All community and NTNC public water systems must:

1. Be operated and supervised by competent personnel possessing a certificate of competency issued by the Director.
2. Assure an adequate supply of safe drinking water on a continuous basis.
3. Notify the Director of any situation with the water system which presents or may present an imminent and substantial hazard to health.
4. Flush and disinfect all newly constructed or serviced storage facilities, wells, and water mains not subject to the requirements of 179 NAC 2-007.02 or 2-007.04.

Disinfection must be accomplished prior to placing the new or repaired portion of the system into service. Disinfection must be accomplished in accordance with the following methods which are incorporated herein by reference. They are available for viewing at the Department of Health and Human Services Regulation and Licensure, Public Health Assurance Division, 301 Centennial Mall South, Lincoln, NE 68509, or they can be obtained from the American Water Works Association, 6666 West Quincey Ave., Denver, CO 80235. Alternate methods may be approved by the Director after consultation.

- a. Water wells
 - (1) Community – C654-97
 - (2) NTNC – C654-97 or requirements of 178 NAC 12-004.05A
 - b. Water Storage – C652-02
 - c. Mains – C651-99
5. Provide or have available personnel, tools, spare parts, work areas, and chemicals necessary to accomplish continuous operation of the system.
 6. Maintain an emergency plan of operations for safeguarding the water supply, protecting the drinking water, and, if necessary, providing for an alternate drinking water supply in the event of natural or man-made disasters. The plan must include a list of individuals who may be called for help in times of disaster, their titles and their phone numbers. This list must be updated annually with a copy provided to the Department. The plan must state the basic domestic water needs and usage under normal conditions. Any special institutional, commercial or industrial users must be shown. Any special back-up or standby equipment or auxiliary power supply must be included as well as alternate sources of supply or bottled water sources. All available chemicals and equipment for the purpose of disinfection must be listed. The emergency plan must outline all emergency operations and must be updated at least every 3 years with copies provided to the Department of Health and Human Services Regulation and Licensure for inclusion in the state Drinking Water Emergency plan located in the Division of Public Health Assurance. The emergency plan must be placed at key locations, clearly marked and readily accessible to utility personnel.
 7. Conduct an on-going program for the effective detection and elimination of cross-connections and the prevention of backflow. Such program is subject to review by the Director and must include and require:
 - a. That there be no unprotected physical connection between the public water system and any pipes, pumps, hydrants, tanks, steam condensate returns, engine jackets, heat exchangers, or other water supplies whereby potentially unsafe water or contaminating materials may be discharged or drawn into the public water system unless first approved by the public water system and then by the Director.
 - b. That the public water system must install or require installation of properly located backflow prevention assemblies, devices or methods appropriate to the potential hazards enumerated in Tables 1 and 2 when such

hazards exist and where, in the opinion of the public water system, effective measures consistent with a potential risk have not been taken. Title 179 NAC 22-003 item 7.b. does not apply to lawn sprinkling systems, with the exception of those with provisions to inject toxic substances including lawn chemicals. A public water system that enacted provisions in its cross-connection control program requiring installation of dual check valves on residential service lines to protect the public water system from low hazard cross-connections prior to [the effective date of these regulations] will be permitted to continue only if such installation was accomplished and maintenance of the devices is performed in accordance with the manufacturer's recommendations.

- c. That there be no interconnection with the public water system and another potable water system unless first approved by the public water system and then by the Director.

TABLE 1

Cross-Connections Rated by Degree of Hazard for Commonly Encountered Equipment and Fixtures and Their Use

[For a more complete list, refer to the Manual of Cross-Connection Control referenced in 179 NAC 22-003 item 7.i.(1)]

Direct or Indirect Potable Water Connections	Hazard	
	High	Low
I. Subject to Back Pressure		
A. Pumps, tanks and lines handling:		
1. Sewage	X	
2. Toxic substances	X	
3. Nontoxic substances		X
B. Water connection to steam and steam boiler		
1. Boiler or steam connection to toxic substances	X	
2. Boiler or steam connection to nontoxic substances (boiler blowoff through air gap)		X
II. Not Subject to Back Pressure		
A. Sewer-connected water line (not subject to waste stoppages)	X	
B. Low inlets to receptacles containing:		
1. Toxic substances	X	
2. Nontoxic substances		X
C. Coils or jackets used as heat exchangers in compressors in lines carrying:		
1. Sewage	X	
2. Toxic substances	X	
3. Nontoxic substances		X
D. Flush valve toilets or urinals	X	
E. Toilet, urinal tanks and approved bathtubs		X
F. Bidets, sitz tanks, or spa, therapy and roman pools not otherwise isolated by design or backflow protectors	X	
G. Valved outlets or fixtures with hose attachments that may constitute a cross-connection to:		
1. Toxic substances	X	
2. Nontoxic substances		X
H. Aspirators that may constitute a cross-connection to:		
1. Toxic substances	X	
2. Nontoxic substances		X

TABLE 2

Permitted Backflow Assemblies, Devices and Methods

Assembly, Device or Method ¹	Degree of Hazard				Installation ^{2,3,4,6}
	Low		High		
	Back Siph-onage	Back Pres-sure	Back Siph-onage	Back Pres-sure	
Air Gap	X	X	X	X	Must be a minimum of 1 inch but not less than 2 times the diameter of the effective spout opening when not affected by side walls, and 3 times the diameter of the effective opening when affected by side walls. Side walls will be assumed to not affect air gaps when they are spaced horizontally a distance greater than 4 times the effective opening from the spout opening.
Atmospheric Vacuum Breaker	X		X		Upright position. No valves downstream. Minimum of 6 inches or listed distance above all downstream piping & flood level rim of receptor ⁵
Double Check Valve Assembly	X	X			Horizontal unless otherwise listed. Requires 1 foot below & sufficient side & head room for testing & maintenance with a maximum of 5 feet above the ground, work floor, or a permanently installed working platform with stairs or ladder affixed. Does not discharge water during normal operation.
Pressure Vacuum Breaker Assembly	X		X		Upright position. May have valves downstream. Minimum of 12 inches above all downstream piping & flood level rim of receptor. May discharge water.
Reduced Pressure Principle Backflow Prevention Assembly	X	X	X	X	Same as Double Check Valve Assembly above except may discharge water & wherever installed, provision for draining away at least 2 times the rated gallons per minute of the assembly must be made.

Footnotes:

¹ For description of assemblies and devices, refer to the Cross-Connection Control Standards found in 179 NAC 22-003 item 7.i. Backflow preventers described herein and in the standards as "assemblies" must be installed as assemblies keeping the shutoff valves intact. Examples of sites having potential cross-connections are found in the manuals referenced in 179 NAC 22-003 item 7.i.

- ² Previous approval by the public water system is required for use of a pit or vault (normally prohibited due to possible flooding) or for parallel and bypass installations (normally prohibited without special design considerations and proper cross-connection controls).
- ³ Backflow preventers must not be located in any area containing fumes that are toxic, poisonous or corrosive; nor in any area in which they could be damaged by freezing, or by excessively high temperatures or pressures, vibration, physical impact or structural stress; nor knowingly be allowed to conduct highly corrosive or sandy waters without a special testing and maintenance program to assure proper & safe operation.
- ⁴ Refer to general and specific installation requirements as stated in the Cross-Connection Control Standards provided for in 179 NAC 22-003 item 7.i.(1) for conditions or situations not otherwise covered in these regulations.
- ⁵ Not to be subjected to operating pressure for more than 12 hours in any 24-hour period. Hose bibb vacuum breakers are permitted for some uses described in the Cross-Connection Control Standards listed in 179 NAC 22-003 item 7.i.(1). Where required under 179 NAC 22-003 item 7.b., hose bibbs must be protected with approved, anti-siphoning hose bibb vacuum breakers or a hose bibb with integral backflow protection. In hose bibb installations subject to freezing, such hose bibb vacuum breakers must be frost-proof and self-draining.
- ⁶ Fire protection systems as a minimum must be equipped with backflow prevention devices as described in AWWA Manual M-14, second edition. Backflow preventers under this regulation and connected to fire protection systems must be considered part of those systems. As such, they must not be installed, moved, removed, replaced, shut off or in any way altered unless in strict compliance with the rules and regulations promulgated by the State Fire Marshal.
 - d. That all backflow protection devices equipped with test ports be tested as often as required by the public water system but at least once each year by a Grade 6 certified water operator, with test results certified to the public water system as often as required by the public water system, but in no case more than 30 calendar days after the test. Title 179 NAC 22-003 item 7.d. does not apply to lawn sprinkling systems, with the exception of those with provision to inject toxic substances including lawn chemicals.
 - e. That the public water system require its consumers to assess and report potential backflow hazards on their premises no less often than every five years and to take any steps necessary for protection of public health and safety as reasonably requested by the public water system.
 - f. That the public water system must maintain, or cause to be maintained, records of locations, types, tests and repairs of backflow preventers for a period of five years of said tests and repairs.
 - g. That backflow preventers required by this regulation must have been tested and approved or listed for the intended use by one of the following organizations:

- (1) Foundation for Cross-Connection Control and Hydrologic Research, University of Southern California, University Park, Los Angeles, California 90089.
 - (2) American National Standards Institute, 1430 Broadway, New York, New York 10018.
 - (3) Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, Illinois 60062.
 - (4) National Sanitation Foundation, 2355 West Stadium Boulevard, P.O. Box 1468, Ann Arbor, Michigan 48106.
 - (5) International Association of Plumbing and Mechanical Officials, 5032 Alhambra Avenue, Los Angeles, California 90032.
- h. That an on-going public information program must be conducted by the public water system to further the public water system customers' understanding and awareness of cross-connection hazards, the types of remedies available and the need to protect the public water system against backflow no less often than once per year.
- i. That approval of Cross-Connection Control Programs (including as a minimum, backflow preventers, their installation, operation, testing, maintenance and repair) must be based on the following standards.
- (1) Manual of Cross-Connection Control, published by the Foundation for Cross-Connection Control and Hydraulic Research, University of Southern California, ninth edition, a copy of which is available for viewing at the Office of the Nebraska Department of Health and Human Services Regulation and Licensure, Public Health Assurance Division, 301 Centennial Mall South, Lincoln, NE 68509. Said manual may be obtained from the Foundation for Cross-Connection Control and Hydraulic Research, University of Southern California, KAP-200 University Park MC-2531, Los Angeles, CA 90089-2531.
 - (2) American Water Works Manual, M-14, second edition, a copy of which is available for viewing at the Office of the Nebraska Department of Health and Human Services Regulation and Licensure, Public Health Assurance Division, 301 Centennial Mall South, Lincoln, NE 68509. Said manual may be obtained from the American Water Works Association, 6666 West Quincey Ave., Denver, CO 80235.

22-005 GENERAL MAINTENANCE: All community and NTNC public water systems must adopt and carry out a preventive maintenance program incorporating the following elements:

1. Secure all water system facilities in a manner that protects the supply from contamination and prevents unauthorized entry and vandalism.

2. Inspection, servicing, replacement, and record keeping of all mechanical equipment in accordance with manufacturer's recommendations for such maintenance. An operation and maintenance manual must be maintained and updated when facility equipment changes occur. The operation and maintenance manual must include specification of equipment and recommended maintenance practices of that equipment as specified by the manufacturers.
3. Prevention of rust and corrosion by application of paint, protective coatings, cathodic protection, or other treatment capable of prolonging the useful life of the system.
4. Maintaining a system of records for the owner's annual review of the capability of the source of supply, treatment, storage, and distribution facilities to provide for future service demands both short-term and long-term (2 and 10 year plans);
5. Take all available action as necessary to protect the system and its components from encroachments which are likely hazards to the safety of the drinking water quality, or which could have a substantial impact on the system pressure or economies delivered by the system. Such action includes the adoption of ordinances, regulations, contracts, or other enforceable instruments necessary to ensure adequate protection from such encroachments. This may include issues such as zoning, water rights, condemnation, land purchases, easements, abandonment of old wells, and establishing lakes, lagoons, drainage ways, special use areas, and sanitary and water districts.
6. Have arrangements made for obtaining disinfection equipment to apply emergency disinfection within 24 hours of an incident that potentially impacts the microbiological quality of the drinking water.
7. If the system disinfects, have available equipment for accurate measurement of disinfectant residual.

22-006 WELLS AND PUMPING FACILITIES: All NTNC public water systems must comply with the first four of the following items. All community public water systems must comply with all the following items.

1. Maintain a sanitary seal on each wellhead.
2. Seal cracks and crevices to prevent entry of vermin, flooding, or other contaminants.
3. Maintain down-turned well casing vents, and where applicable, air release/vacuum relief valves, with 24-mesh corrosion resistant screens.
4. Tightly seal all penetrations into the upper terminus of the well casing.
5. Maintain a means to pump each well to waste.
6. Provide a labeled, dedicated electrical outlet, in each appropriate location for chemical feed equipment.
7. Have a chemical tap available on the finished water discharge line located downstream from the check valve.
8. For systems that are required to disinfect on a continuous basis and have treatment facilities that are not staffed 24 hours per day, the system must provide a means by which a disinfectant is applied accurately on a continuous basis. This does not

- apply to systems under an Administrative Order that require chlorination for only six months.
9. Record accurate measurement of gallons of water pumped per minute (gpm) and the time pumped or total gallons pumped, for each well not less than once per week.
 10. Measure and record static water levels and pumping water levels, and calculate available drawdown in each active well at a frequency of no less than once every three months from October 1 through April 30 of each year, and at a frequency of no less than once per month from May 1 through September 30 of each year. Static and pumping levels must be expressed as the distance in feet from the measuring point at the upper terminus of the well to the water level in the well. Available drawdown must be expressed as the distance in feet between the static water level and the top of the well screen or pump intake whichever is located nearer to the static water level.
 11. Have a readily accessible auxiliary power source to provide a supply of safe drinking water for emergency use within 24 hours.
 12. Provide and maintain on the premises signage for emergencies and chemical hazards in accordance with 179 NAC 22 Attachment 1.
 13. Maintain clean well houses and pumping facilities for the purpose of producing safe drinking water with the emphasis on easy access to those system components requiring periodic attention.

22-007 DISTRIBUTION SYSTEMS: All community and NTNC public water systems must:

1. Operate to maintain a minimum positive pressure of 20 psi throughout the distribution system except under extraordinary conditions such as unusual peak fire flow demand or major distribution system breaks.
2. Maintain an up-to-date map of the distribution system showing locations, sizes and materials of underground lines and appurtenances.
3. Following a drop in system pressure to less than 20 psi, but maintaining a positive pressure, collect a minimum of two water samples at least 24 hours apart from each affected zone on the sample site plan. All samples must be collected within five working days of the recorded drop in system pressure and submitted for analysis to the Department Laboratory or to a laboratory that has entered into an agreement with the Department pursuant to 179 NAC 3-009. If any samples collected pursuant to the requirements of 179 NAC 22-006 item 3 show the presence of coliform organisms, disinfection procedures must be accomplished in accordance with AWWA Standard C651-99. Alternate disinfection procedures may be used after consultation with and approval by the Director. If used, alternate disinfection procedures must continue until collection of water samples as prescribed in 179 NAC 22-006 item 3 show the complete absence of coliform organisms.
4. When system pressure is completely lost, collect a minimum of two sets of five samples from each affected zone on the sample site plan. Each set must be collected at least 24 hours apart. All samples must be collected within five working days of the recorded complete loss in system pressure and submitted for analysis to the Department Laboratory or a laboratory that has entered into an agreement with the Department pursuant to 179 NAC 3-009. If any samples collected pursuant to the requirements of 179 NAC 22-006 item 4 show the presence of coliform

organisms, disinfection procedures must be accomplished in accordance with AWWA Standard C651-99. Alternate disinfection procedures may be used after consultation with and approval by the Director. If used, emergency disinfection procedures must continue until collection of water samples as prescribed in 179 NAC 22-006 item 4 show the complete absence of coliform organisms.

22-008 POTABLE WATER STORAGE FACILITIES: All community and NTNC public water systems must:

1. Inspect, and clean if necessary, water storage facilities equipped for accessibility, no less than once every five years.
2. Secure the storage facility by use of locks on access manholes and hatches, and take other necessary precautions to prevent trespassing, vandalism, and sabotage.
3. Provide and maintain corrosion resistant screen of an effective mesh size on water storage structure vents. Screen mesh size must be proper for the vent design. Replace when necessary with in-kind screen.
4. Maintain water tightness, as designed, of walls, floor, and roof to prevent the entrance of nonpotable water, birds, and other contaminant sources.
5. Provide and maintain a corrosion resistant screen of effective mesh size and/or a self-closing flap valve installed near or at the termination of all overflow lines on water storage structures. Screen mesh size and flap valves must be proper for the overflow line design. Replace when necessary with in-kind screen and/or flap valve. The termination point of the overflow lines must be maintained so that overflow discharge does not create, or contribute to, an erosion problem.

22-009 TREATMENT: All community and NTNC public water systems that use a process for removal of a primary or secondary contaminant, or apply chemicals for the purpose of conditioning, continuous disinfection, or adjustment of drinking water must:

1. Maintain and record accurate measurement of chemical use no less often than five days per week.
2. Provide an ammonia solution for use in detecting chlorine leaks when gas chlorination is used,.
3. Store chemicals in accordance with manufacturer's recommendations for chemical compatibility.
4. Maintain color coding in accordance with the following color scheme, or utilize other identification to easily differentiate between pipes.

Water Lines

Raw	Olive Green
Settled or Clarified	Aqua
Finished or Potable	Dark Blue

Chemical Lines

Alum or Primary Coagulant	Orange
Ammonia	White
Carbon Slurry	Black
Caustic	Yellow with green band
Chlorine (gas and solution)	Yellow
Fluoride	Light blue with red band
Lime Slurry	Light green
Ozone	Yellow with orange band
Phosphate Compounds	Light green with red band
Polymers or Coagulant Aids	Orange with green band
Potassium Permanganate	Violet
Soda Ash	Light green with orange band
Sulfuric Acid	Yellow with red band
Sulfur Dioxide	Light green with yellow band

Waste Lines

Backwash Waste	Light brown
Sludge	Dark brown
Sewer (sanitary or other)	Dark gray

Other

Compressed Air	Dark green
Gas	Red
Other Lines	Light gray

5. Where applicable, maintain operational records and filtration log used in conjunction with treatment processes used for removal or inactivation of regulated contaminants for a minimum of five years.
6. If disinfecting, provide approved methodology equipment for accurate measurement of disinfectant residual.
7. When treating to remove or inactivate regulated contaminants, provide proper test equipment to determine process control changes.
8. For systems that are required to disinfect on a continuous basis and have treatment facilities that are not staffed 24 hours per day, the system must provide a means by which a disinfectant is applied accurately on a continuous basis. This does not apply to systems under an Administrative Order that require chlorination for only six months.

9. Record accurate measurement of gallons of water pumped per minute (gpm) and the total time pumped or total gallons pumped of each treatment plant not less than once per week.
10. Provide functional operational controls for each filter used in conjunction with treatment processes consisting of removal of regulated contaminants.

22-010 RECORDS

1. All community and NTNC public water systems must maintain the following records for a minimum of five years:
 - a. Written public health-oriented customer complaints related to water quality, quantity, pressure and system integrity.
 - b. Water main repair and replacement records, including results of special samples collected for microbiological water quality analysis, and disinfection method associated with repair and replacement.
 - c. Chemical use, where applicable.
 - d. Records of process control test results, test equipment quality assurance, and quality control.
2. All community and NTNC public water systems must maintain records pertaining to cleaning, inspection, repair, and protective coatings on water storage facilities for a minimum of 20 years.

179 NAC 22 -- Attachment 1

This attachment prescribes the minimum hazardous material signage that water system facilities must place on entrances to chemical storage facilities as well as on bulk chemical storage containers and chemical day tanks.

I. Entrances to water system facilities and/ or rooms within water system facilities that store or use hazardous chemicals as part of the treatment process:

Precautionary entrance labeling identifying the hazardous chemical: This labeling shall contain the following.

- A. Common name of the chemical
- B. A signal word such as "WARNING" or "DANGER" as described below.
 - 1. Signs depicting "WARNING" must be yellow with black lettering to identify a potentially hazardous situation.
 - 2. Signs depicting "DANGER" must have the word "DANGER" highlighted on a bright red background and be used for conditions that indicate an immediately hazardous situation.
- C. Identification of the key hazard such as flammable or vapor harmful, etc.
- D. A statement of precaution to avoid the hazards.
- E. A color-coded diamond that readily distinguishes the degree of emergency health hazard (blue), fire hazard (red), reactivity hazard (yellow), and any other special hazards the chemical may represent. The following describes the appropriate labeling conditions.

FIRE HAZARD -----RED

0 --- WILL NOT BURN

1 --- WILL IGNITE IF PREHEATED

2 --- WILL IGNITE IF MODERATELY HEATED

3 --- WILL IGNITE AT MOST AMBIENT CONDITIONS

4 --- BURNS READILY AT AMBIENT CONDITIONS

HEALTH HAZARD -----BLUE

- 0 --- MINIMAL HAZARD
- 1 --- SLIGHTLY HAZARDOUS
- 2 --- HAZARDOUS
- 3 – EXTREME DANGER
- 4 – DEADLY

REACTIVITY HAZARD ---- YELLOW

- 0 – STABLE AND DOES NOT REACT WITH WATER
- 1 – UNSTABLE IF HEATED
- 2 – VIOLENT CHEMICAL CHANGE
- 3 – SHOCK AND HEAT MAY DETONATE
- 4 – READILY CAPABLE OF DETONATION AT NORMAL TEMPERATURE AND PRESSURE

SPECIFIC HAZARDS – WHITE

- OX --- OXIDIZER
- ACID --- ACID
- ALK --- ALKALINE
- COR – CORROSIVE
- ~~W~~ – REACTIVE WITH WATER



RADIOACTIVE

- F. All the above information can be obtained from the chemical Material Safety Data Sheets (MSDS) for each chemical. The public water system must retain the most current copy of all MSDS(s) for all chemicals used in the treatment of potable water and have the MSDS located in an area so that they are available and accessible to all water operators and facility personnel.

- G. All signage installed on entrances to water treatment facilities or rooms within the facilities must be located so that signage is readily visible to individuals entering the facility or rooms within the facility.

II. LABELING OF BULK TANK CHEMICAL STORAGE AND OR DAY-TANK CHEMICAL STORAGE

- A. All bulk chemical storage tanks must be labeled as follows:
 - 1. The common name of the chemical
 - 2. The appropriate color-coded diamond with four quadrants designating the degree of emergency health hazard (blue), fire hazard (red), reactivity hazard (yellow), and any other special hazards as designated in the remaining quadrant (white). The coding for each hazard is described in 179 NAC 22 Attachment 1 item I.E.. The size of characters in this signage must be a minimum of 4 inches tall and placed so that the signage is visible from 200 feet away.
- B. All day-tank chemical storage tanks are to be labeled in the same manner as described above with the signage characters a minimum of 3 inches in height and signage placed so it is visible a minimum of 100 feet away.