

**TITLE 35: ENVIRONMENTAL PROTECTION****SUBTITLE F: PUBLIC WATER SUPPLIES****CHAPTER II: ENVIRONMENTAL PROTECTION AGENCY****PART 653****DESIGN, OPERATION AND MAINTENANCE CRITERIA****SUBPART A: DESIGN REQUIREMENTS**

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**SUBPART A: DESIGN REQUIREMENTS****Section 653.101 Sites**

- a) All community water supply construction shall be located at sites not subject to significant risk from earthquakes, land subsidence, floods, fires or other disasters which could result in breakdown of any part of the system, except as described in (c) below.
- b) All sites shall be located outside the flood plain of a 100-year flood or flood of record where appropriate records exist except for surface water intake structures.
- c) The Agency will accept a less suitable site where local conditions do not allow for siting in compliance with (a) and (b) above provided the applicant submits:
  - 1) a complete statement describing reasons for site selection; and
  - 2) construction measures which will be taken to protect the community water supply from risks described in (a) and (b) above.

**Section 653.102 Water Treatment Facilities**

- a) The basic criteria for design of community water supply facilities shall be the Standards or other criteria which the applicant demonstrates will produce a finished water which meets requirements of 35 Ill. Adm. Code 604 under all operating conditions.
- b) The extent of water treatment required shall be in accordance with 35 Ill. Adm. Code 654.101 and 654.102, the

Standards and these Technical Policy Statements.

- c) Duplicate units for rapid mix, flocculation and sedimentation need not be provided unless the treatment process units will be taken out of service for more than one day at a time for maintenance.
- d) The requirement for duplicate units shall be waived if finished water requirements of 35 Ill. Adm. Code 604 can be met with equipment out of service for any period of time.

#### **Section 653.103 Wells**

- a) Construction shall conform to the Standards and the current American Water Works Association (AWWA) Standard for Deep Wells, A100. Well construction shall also comply with all state, county and municipal regulations and statutes.
- b) Water from creviced limestone formations having less than 50 feet of soil cover shall be treated to meet the standards of 35 Ill. Adm. Code 604.
- c) Grouting shall be provided in accordance with the Standards for a depth of ten feet from:
  - 1) the original ground surface where fill has been added; or
  - 2) existing ground surface where soil has been removed.
- d) A lead, elastomeric or other equivalent seal shall be provided between the pump base and pump pedestal for above-base discharge pumps.

#### **Section 653.104 Usage**

- a) Average daily usage shall be based on finished water pumpage records. When records are not available or when a new supply is proposed, average daily usage shall be based on at least 50 gallons per person per day.
- b) The average daily usage estimate shall be increased where large uses such as irrigation, filling swimming pools and service to commercial or industrial establishments are known or anticipated.

#### **Section 653.105 Rate of Usage**

- a) Average daily rate of usage shall be calculated using two times the average daily usage as determined in Section 653.104 and converted into an average rate over 24 hours in units of gallons per minute.
- b) The maximum daily rate of usage shall be calculated using 1.5 times the average daily rate of usage.
- c) The maximum hourly rate of usage shall be calculated using two times the maximum daily rate of usage.

#### **Section 653.106 Distribution System Pressure**

- a) Distribution system design shall conform to the Standards.
- b) Distribution systems shall be designed to maintain a minimum pressure of 20 psi measured at the ground surface in all parts of the system under fire-fighting demand or other similar emergency operating conditions.

#### **Section 653.107 Booster Pumping Stations**

- a) Construction shall conform to the Standards and Section 653.118.
- b) Automatic control equipment shall be installed to prevent the pump from causing a vacuum and/or lowering water pressure in any part of the distribution system to less than 20 psi as measured at ground surface.
- c) Pressure for portions of a distribution system served by a booster pump station as required by Section 653.106 shall be provided during periods when the booster station is not in operation.
- d) One of the following shall be installed if adequate pressure will not be available in any part of the system:
  - 1) hydropneumatic storage designed in accordance with Section 653.109 on the discharge side of the booster pump station; or
  - 2)
  - 3) elevated storage.
- e) The pump shall be accessible for servicing and repair.

#### **Section 653.108 Ground Storage Reservoirs and Elevated Storage**

- a) Construction shall conform to the Standards and for steel structures, AWWA Standard D100 for Welded Steel Elevated Tanks, Standpipes and Reservoirs for Water Storage.
- b) Minimum distances from sources of contamination for below ground storage reservoirs shall be maintained as specified in Section 653.118.

- c) The volume and height of an elevated tank or standpipe shall be based on a study of distribution system hydraulic conditions and anticipated water demands of the system. The tank designed from this study shall be capable of maintaining adequate pressures as described in Section 653.106.
- d) Head range in an elevated tank shall be designed to minimize pressure fluctuations throughout the distribution system.

#### **Section 653.109 Hydropneumatic Storage**

- a) Construction shall conform to the Standards except as described in (b),(c) & (d) below.
- b) Gross volume shall equal or exceed 35 gallons per person served where only hydropneumatic storage is provided.
- c) An air compressor shall be provided to maintain an air cushion in the pressure tanks. Other devices may be considered as a means to control the air cushion in the pressure tank. An example is a system which uses water from the well pump to displace a volume of air in the column pipe to the pressure tank.
- d) Finished water shall be delivered at a rate greater than the maximum hourly rate of usage.
- e) Actual capacity of the well pump or high service pump used to deliver water to the distribution system through the pressure tank shall be greater than the maximum hourly rate of usage.
- f) Actual capacities of multiple well pumps or high service pumps used to deliver water to the distribution system through the pressure tank shall be greater than the maximum hourly demand with the largest well pump or high service pump out of operation.

#### **Section 653.110 Combination Pressure Tanks and Ground Storage**

A combination of ground storage, hydropneumatic storage and pumps may be considered in water systems for maintaining pressure on the distribution system. Design of such a system shall include:

- a) a minimum ground storage volume equivalent to 1.5 times the average daily usage;
- b) a minimum of two pumps, each capable of meeting the peak system demand. If more than two pumps are proposed, the peak system demand shall be met when any pump is out of service;
- c) an electric generator with automatic start capable of providing power to pump(s) which can produce the peak system demand, plus sufficient power to operate all chemical feeders, appurtenances and equipment essential to plant operation. Consideration should be given to sizing the generator to provide power for at least one well; and
- d) an hydropneumatic tank sized to provide service for a minimum of ten minutes under peak system demand.

#### **Section 653.111 Polyvinyl Chloride Pipe**

Polyvinyl chloride (PVC) and chlorinated polyvinyl chloride (CPVC) pipe may be used for water mains in accordance with the AWWA Standards or the following:

- a) Basic Material Standards:
  - 1) National Sanitation Foundation (NSF) Standard 14.
  - 2) American Society for Testing and Materials (ASTM) Standard D1784-81.
  - 3) Piping materials designated Class 12454B (PVC 1120), Class 12454C (PVC 1220) and Class 23447B (CPVC 4120) are acceptable in pressure ratings indicated in (b) below.
- b) Pressure Rating Standards:
  - c)
    - 1) Schedule Ratings shall be in accordance with ASTM Standards D1785-83 (PVC) and F441-77 (CPVC).
    - 2) Standard Dimension Ratio - Pressure Rated (SDR-PR) shall be in accordance with ASTM Standards D2241-83 (PVC) and ASTM F442-77(CPVC).
    - 3) Pipe shall be rated at 160 psi or greater at 73.4E F Schedule 40 shall be required for 8-inch diameter or less in grades PVC 1120, PVC 1220 and CPVC 4120. Schedule 80 shall be required for larger sizes. Pipe to be threaded shall be at least Schedule 80 for 4 inch diameter or less, or Schedule 120 for sizes greater than 4 inch diameter.
    - 4) SDR rating shall be limited to a minimum pressure rating of 160 psi at 73.4E F. An SDR rating of 26 or less shall be required for PVC 1120, PVC 1220, and CPVC 4120.
- d) General Requirements:
  - 1) PVC and CPVC fittings, where used, shall be of the same material as the pipe and shall comply with ASTM Standards:
    - A) D2466-78 for PVC Schedule 40,
    - B) D2467-76a for PVC Schedule 80,
    - C) D2464-76 for threaded PVC Schedule 80,
    - D) F438-77 for CPVC Schedule 40,
    - E) F439-77 for CPVC Schedule 80,

- F) F437-77 for threaded CPVC Schedule 80.
- 2) Solvent cement shall be specific for the piping material and shall comply with ASTM Standard D2564-80 (PVC) and F493-80 (CPVC).
- 3) Elastomeric seals (gaskets) used for push-on joints shall comply with ASTM Standard F477-76.
- 4) All piping, fittings and solvent cement shall bear the NSF seal of approval. The piping shall be visibly marked with the specific schedule number or SDR rating number.
- 5) Jointing shall be solvent welded, heat welded, pressure slip jointed, flanged or threaded joint. Special precautions shall be taken to insure clean, dry contact surfaces when making solvent or heat welded joints. Adequate setting time shall be allowed for maximum strength.
- 6) Plastic pipe shall be supported in accordance with the manufacturer's recommendations. Support intervals shall not be further apart than one-fourth of those allowed for steel pipe of equivalent size.
- 7) Compensation for expansion of buried PVC and CPVC piping shall be made by snaking in the trench or by installing offset expansion loops.
- 8) Disinfection of plastic piping shall be as specified in AWWA Standard C601.

#### **Section 653.112 Automatic Equipment**

- a) Select automatic equipment based upon reliability, ease of maintenance, and specific design factors. Equipment which will automatically shut down a water treatment process is acceptable, provided restart procedures are manual.
- b) Automatic start up shall be allowed for treatment plants which treat only ground water and have only unit processes not exposed to contamination. Examples include iron removal by protected aeration, enclosed retention and pressure sand filtration or ion exchange softening in a pressure vessel operated in a downflow mode.

#### **Section 653.113 Water Plant Waste Treatment**

All community water supplies having or proposing treatment which produces a waste discharge to waters of the state shall obtain a National Pollutant Discharge Elimination System (NPDES) Permit and construct treatment facilities to produce a waste in compliance with 35 Ill. Adm. Code: Subtitle C, Chapter I and the Standards.

#### **Section 653.114 Mercury Containing Devices**

- a) Devices which contain elemental mercury, such as deep well pump seals and pressure and flow measuring instruments, shall only be connected to community water supply systems if those devices incorporate positive means, such as a mercury trap, to prevent mercury from being displaced from the well seal or instrument.
- b) Mercury-containing instruments shall be located to prevent mercury from entering any part of the system during instrument repair or as a result of instrument breakage or damage.

#### **Section 653.115 Chemical Feed Installations**

A construction permit pursuant to 35 Ill. Adm. Code 652.101 shall be obtained from the Agency when:

- a) new chemicals are added to the treatment process; or
- b) changes in points of application of chemicals are made.

#### **Section 653.116 Filtration Rates**

- a) The nominal filter rate for single and multi media rapid rate gravity filters shall be 2 gal/min/sq ft.
- b) Nominal filtration rates may be increased to 3 gal/min/sq ft for single media filters and to 5 gal/min/sq ft for multi-media filters under the following conditions:
  - 1) continuous nephelometric turbidity monitoring and recording equipment is provided for each filter effluent individually or on a rotating basis; and
  - 2) surface wash equipment is provided.
- c) Filtration rates shall be reduced when finished water turbidity exceeds the standard in 35 Ill. Adm. Code 604.202.

#### **Section 653.117 Distribution Systems**

- a) Distribution systems shall be designed to maintain pressures pursuant to Section 653.106.
- b) Pipe shall meet provisions of the AWWA Standards, the Standards and Section 653.111.
- c) Water mains shall be sized to deliver the required quantity of water at adequate pressure described in Section 653.106 including fire flow where applicable.
- d)

- e) The system shall be designed to meet existing demands on the distribution system. Future distribution system demands shall be taken into account.
- 1) The minimum size water main shall be 4 inch nominal diameter in distribution systems serving incorporated areas, subdivisions or other closely situated housing or commercial units.
  - 2) The minimum size water main shall be 3 inch nominal diameter in distribution systems serving rural areas where service connections are widely spaced, water usage per service is low and rates of flow are slow.

#### Section 653.118 Protection of Community Water Supply Structures

- a) Information defining the location of the proposed raw water source shall be submitted.
- b) The area of the site shall be sufficient to prevent adjacent structures from impairing the safety of the supply.
- c) The following items shall be taken into consideration to protect water supplies from the entrance of contamination:
  - 1) Sources of contamination include but are not limited to: privies; septic tanks; cesspools; sewers (storm, sanitary, combined and sewer service connections); subsurface seepage-disposal lines; pits or ponds receiving fluids such as surface waters, oils, and grease; and flood waters.
  - 2) Structures to be protected include but are not limited to: wells; clear water reservoirs such as pressure equalizing reservoirs, collecting reservoirs, finished water clear wells; suction lines; gravity filters; iron removal, chlorine reaction and wet salt storage basins.
  - 3) Minimum distances from sources of pollution are given in Table A for clay and loam soils. Minimum distances shall be increased when structures are to be located in more pervious soils. For example, the minimum distances shall be doubled when more pervious soils, such as sand and gravels, are present.

Table A - MINIMUM DISTANCES FROM SOURCES OF POLLUTION FOR CLAY OR LOAM SOILS

Cesspools, leaching sewage disposal pits	150'
Privies	150'
Septic tanks and subsurface septic tanks effluent disposal tile	75'
Livestock, grazing areas or feedlots	50'
Sewers (non-watertight)	50'
Sewers (cast iron pipe, with mechanical joints)	25'
Sewers (extra-heavy cast iron pipe, asbestos-cement pressure pipe, prestressed concrete pipe, or PVC pipe meeting water main standards, with pressure tested, leaded, mechanical or slip-on joints)	10'
Washwater sumps of reinforced concrete construction	10'
Flood waters - A horizontal distance shall be maintained by natural earth or fill. In addition, wells shall have a six inch concrete envelope completely surrounding the regular casing and extending at least 10 feet below original ground surface	15'*
Flood waters - A vertical distance shall be maintained to which structure and earth protection must be carried above maximum high water elevation	2'

- \* The Agency shall consider special structural arrangements equivalent to earthen construction for protection of the well when horizontal earth protection is impractical.

- d) Community water supplies having fuel storage tanks shall provide protection of all underground water works facilities from leaks which may develop or occur in the fuel tanks or fuel lines.

#### Section 653.119 Protection of Water Main and Water Service Lines

Water mains and water service lines shall be protected from sanitary sewers, storm sewers, combined sewers, house sewer service connections and drains as follows:

- a) Water Mains:

- b)
- 1) Horizontal Separation:
    - A) Water mains shall be laid at least ten feet horizontally from any existing or proposed drain, storm sewer, sanitary sewer, combined sewer or sewer service connection.
    - B) Water mains may be laid closer than ten feet to a sewer line when:
      - i) local conditions prevent a lateral separation of ten feet;
      - ii) the water main invert is at least 18 inches above the crown of the sewer; and
      - iii) the watermain is either in a separate trench or in the same trench on an undisturbed earth shelf located to one side of the sewer.
    - C) Both the water main and drain or sewer shall be constructed of slip-on or mechanical joint cast or ductile iron pipe, asbestos-cement pressure pipe, prestressed concrete pipe, or PVC pipe meeting the requirements of Section 653.111 when it is impossible to meet (A) or (B) above. The drain or sewer shall be pressure tested to the maximum expected surcharge head before backfilling.
  - 2) Vertical Separation:
    - A) A water main shall be laid so that its invert is 18 inches above the crown of the drain or sewer whenever water mains cross storm sewers, sanitary sewers or sewer service connections. The vertical separation shall be maintained for that portion of the water main located within ten feet horizontally of any sewer or drain crossed. A length of water main pipe shall be centered over the sewer to be crossed with joints equidistant from the sewer or drain.
    - B) Both the water main and sewer shall be constructed of slip-on or mechanical joint cast or ductile iron pipe, asbestos-cement pressure pipe, prestressed concrete pipe, or PVC pipe meeting requirements of Section, 653.111 when:
      - i) it is impossible to obtain the proper vertical separation as described in (A) above; or
      - ii) the water main passes under a sewer or drain.
    - C) A vertical separation of 18 inches between the invert of the sewer or drain and the crown of the water main shall be maintained where a water main crosses under a sewer. Support the sewer or drain lines to prevent settling and breaking the water main.
    - D) Construction shall extend on each side of the crossing until the normal distance from the water main to the sewer or drain line is at least ten feet.
- c) Water Service Lines:
- 1) The horizontal and vertical separation between water service lines and all storm sewers, sanitary sewers, combined sewers or any drain or sewer service connection shall be the same as water main separation described in (a) above.
  - 2) Water pipe described in (a) above shall be used for sewer service lines when minimum horizontal and vertical separation cannot be maintained.
- d) Special Conditions - Alternate solutions shall be presented to the Agency when extreme topographical, geological or existing structural conditions make strict compliance with (a) and (b) above technically and economically impractical. Alternate solutions will be approved provided watertight construction structurally equivalent to approved water main material is proposed.
- e) Water mains shall be separated from septic tanks, disposal fields and seepage beds by a minimum of 25 feet.
- f) Water mains and water service lines shall be protected against entrance of hydrocarbons through diffusion through any material used in construction of the line.

#### **Section 653.120 Piping Identification**

- a) Piping in a water treatment facility shall be identified clearly by legends and color coding as described in the Standards or American National Standards Institute (ANSI) Standard A-13.1. A consistent standard shall be used throughout the system.
- b) Potable water lines shall be clearly and permanently identified where dual water lines or pressure sewer systems exist.

### **SUBPART B: OPERATION AND MAINTENANCE**

#### **Section 653.201 Required Supervision**

Specific information required by 35 Ill. Adm. Code 603 shall be furnished by completing a Notification of Ownership or Responsible Personnel form available from the Agency.

**Section 653.202 Chemical Addition**

- a) Chemicals added to drinking water and passed to the distribution system shall be approved by the United States Environmental Protection Agency (USEPA) (pursuant to provisions of the Safe Drinking Water Act (42 U.S.C. 300f et seq. (1980)), the Toxic Substance Control Act (15 U.S.C. 2604 et seq. (1982)), or the Federal Insecticide, Fungicide, and Rodenticide Act (7 U.S.C. 136 et seq. (1980)) or the United States Food and Drug Administration (USFDA) (pursuant to the Federal Food, Drug and Cosmetic Act (21 U.S.C. 301 et seq. (1983)) and meet the purity requirements of Water Chemicals Codex, National Research Council of the National Science Foundation. All chemical containers shall bear the name, address and telephone number of the supplier, along with a functional name or identification and strength of the chemical. Chemicals shall not be fed in excess of the maximum dosage approved by USEPA or USFDA.
- b) Chemicals added for raw water treatment including but not limited to clarification, softening and constituent removal not intended to pass to the distribution system shall meet American Water Works Association Standards purity requirements of Water Chemicals Codex, National Research Council of the National Science Foundation. The chemical shall be specifically approved for use by the USEPA (pursuant to provisions of the Safe Drinking Water Act, the Toxic Substance Control Act, the Federal Insecticide, Fungicide, and Rodenticide Act) or the USFDA (pursuant to the Federal Food, Drug and Cosmetic Act). Chemicals shall not be fed in excess of the maximum dosage approved by USEPA or USFDA.
- c) A free chlorine residual of 10 mg/l shall be maintained at all times in stock solutions used for iron and/or manganese sequestration. This chlorine residual shall not replace the chlorination requirement of 35 Ill. Adm. Code 604.401.
- d) Protective paints and coatings, concrete coatings and admixtures, grouts and liners used in a community water supply shall be approved by the USEPA (pursuant to provisions of the Safe Drinking Water Act, the Toxic Substance Control Act, or the Federal Insecticide, Fungicide and Rodenticide Act).

**Section 653.203 Exceptions for Community Water Supplies**

- a) Replacement in existing community water supplies of components such as pressure tanks, water mains, pressure filters or ion exchange softeners that do not meet the Standards or these Technical Policy Statements shall not be required if:
  - 1) the finished water meets the water quality standards of 35 Ill. Adm. Code 604; and
  - 2) water pressure meets the standards of Section 653.106; and either
  - 3) the components were permitted by the State Agency, other than this Agency, having administrative program authority at the time of construction; or
  - 4) no permits were required from any State Agency at the time of construction.
- b) All components shall meet the Standards and these Technical Policy Statements when replacement for any reason is planned.
- c) Expansion shall not be permitted until requirements of the Standards and these Technical Policy Statements are met.

**SUBPART C: REPAIR WORK AND EMERGENCY OPERATION****Section 653.301 Protection During Repair Work**

Official custodians of community water supplies shall protect the water supply from contamination when any part of the system is out of service for repair, construction, alteration or replacement.

**Section 653.302 Disinfection Following Repair or Replacement**

Any part of a community water system which has direct contact with finished water and has been out of service for repair, alteration or replacement shall be disinfected as required by Section 652.203 before being returned to service. Equipment which does not come in contact with finished water such as raw surface water pumps, raw surface water transmission lines, chemical mixing tanks and clarifiers need only be flushed before being returned to service. Filters shall be disinfected. Wells, water storage tanks and water mains shall be disinfected in accordance with AWWA Standards A100, D105 and C601, respectively.

**Section 653.303 Emergency Operation**

- a) A boil order shall be issued when bacteriological analyses show persistent low level contamination or gross contamination. The boil order shall remain in effect until requirements of 35 Ill. Adm. Code 604.102 are met. Issuance of a boil order does not relieve the water supply from making public notification in accordance with 35 Ill. Adm. Code 606: Subpart B.
- b) Owners and operators of community water supplies shall immediately notify the Agency at the appropriate Regional Office in accordance with Section 652.301(b) when there is knowledge or suspicion that a water supply has become contaminated. On weekends, holidays and after office hours, the Agency may be reached through the Agency Emergency Response Unit at 217/782-3637.



**SUBPART D: PUBLIC NOTIFICATION****Section 653.401 Purpose**

- a) Public notification is used to inform water users of problems within a water supply and to enlist support to obtain resources to correct the problems.
- b) Public notice in no way relieves operators and official custodians from issuing a boil order or other rapid notice of health advisory if an emergency exists. A boil order or emergency notice does not relieve the water supply from making public notification.
- c)

**Section 653.402 Responsibility**

The official custodian of a community water supply is responsible for assuring that public notice is made.

**Section 653.403 Public Notification Required**

Public notification shall be made when:

- a) finished water distributed to the consumer is not in compliance with any Maximum Allowable Concentration (MAC) as specified in 35 Ill. Adm. Code 604: Subparts A, B or C;
- b) finished water samples required by 35 Ill. Adm. Code 605 are not analyzed by a certified laboratory;
- c) turbidity samples are not analyzed by a person approved by the Agency as specified in Section 654.402;
- d) a variance from any Maximum Allowable Concentration specified in 35 Ill. Adm. Code 604: Subpart A, B, or C has been granted by the Illinois Pollution Control Board; or
- e) the compliance schedule included as condition of variance has not been met.

**Section 653.404 Persons to Be Notified**

- a) All water customers shall be notified in writing by direct mail or other means of direct delivery. Notices in institutions shall be posted in conspicuous places so that notice can be read by residents.
- b) Supplies which furnish water to satellite supplies shall notify the official custodian of those supplies when conditions require public notification. That official custodian of the satellite supply shall be responsible for notifying the customers of that satellite supply.
- c) A copy of the written notice and copies of all other materials provided for notification purposes shall be sent to the Division of Public Water Supplies at the same time the customers are notified.

**SUBPART E: OPERATIONAL TESTING EQUIPMENT****Section 653.501 Operational Testing Equipment**

- a) Smooth-nosed sampling taps shall be provided for collecting representative samples of treated and untreated water.
- b) All community water supplies shall have DPD test equipment or other approved means as approved in "Standard Methods for the Examination of Water and Wastewater", 15th edition for measuring disinfectant used.
- c) Testing equipment shall be available to plants with specific treatment processes which include, but are not limited to:
  - 1) fluoride adjustment - test equipment for measuring levels of fluoride ion;
  - 2) iron removal - test equipment for measuring iron levels;
  - 3) ion exchange softening - equipment for measuring hardness;
  - 4) coagulation and filtration - jar test equipment for determining chemical dosages and equipment for measuring pH, hardness, alkalinity and nitrate;
  - 5) lime softening - equipment for measuring pH, hardness and alkalinity;
  - 6) reverse osmosis - equipment for measuring total dissolved solids, chlorides and monitoring sulfates; and
  - 7) polyphosphate addition - equipment for measuring both ortho- and total phosphates.

**SUBPART F: CHLORINATION****Section 653.601 Chlorination - Engineering Design Criteria**

- a) Procedure for Submitting Plans and Specifications - Design documents for chlorination shall be prepared and submitted in accordance with 35 Ill. Adm. Code 602.
- b) Chlorinator equipment shall be:
  - 1) capable of maintaining a minimum free chlorine residual of 0.2 mg/l or a minimum combined residual of 0.5 mg/l in all

- active parts of the distribution system at all times;
- 2) large enough to satisfy the immediate chlorine demand and give a measurable residual of at least 2.0 mg/l under all operating conditions after contact; and
  - 3) capable of feeding chlorine to the water being treated at dosage rate of at least 5.0 mg/l except when the water has a high chlorine demand. Factors in determining chlorine demand are:
    - A) pH;
    - B) water temperature;
    - C) contact time;
    - D) presence in the water of substances having chlorine demand such as hydrogen sulfide, iron, manganese and nitrogenous compounds including ammonia; and
    - E) supplemental treatment such as aeration which reduces chlorine demand.
- c) Selection of Chemical - Chlorine compounds shall meet requirements of Section 653.202 and AWWA Standards for Disinfection B300.
- d) Chemical Feed Equipment
- 1) Gas or solution feed equipment shall be used for adding chlorine.
  - 2) Duplicate chlorination facilities shall be provided when operating conditions do not allow repair of the chlorinator during off-pumping periods.
  - 3) Standby chlorination equipment shall be installed and operational at water supplies treating surface water.
  - 4) Spare parts consisting of at least the commonly expendable parts such as glassware, fittings, hose clamps and gaskets shall be available for emergency repairs.
- e) Equipment Location and Storage of Chemical
- 1) Gas Feed Equipment
  - 2)
    - A) Gas feed equipment and all cylinders shall be located in a separate room away from other operating areas. The room shall be free from excessive heat.
    - B) Chlorination equipment shall be accessible for repair and maintenance.
    - C) Ventilation shall be provided for gas chlorinators and cylinders.
      - i) Mechanical forced-air ventilation shall be installed where natural ventilation to the outside atmosphere is not available.
      - ii) Mechanical forced-air ventilation shall be capable of providing one complete air change per minute. Suction shall be located within 12 inches of floor level.
      - iii) Mechanical forced-air ventilation equipment shall be capable of producing a negative pressure in the area contaminated with chlorine gas and discharging the chlorine gas to a safe location away from the evacuated space.
    - D) All 150 pound chlorine cylinders - full, empty or in use- shall be chained upright. One ton containers shall be secured to prevent movement.
    - E) Chlorine cylinders shall be stored in an area not exposed to direct sunlight.
    - F) One set of corrosion-resistant scales shall be provided for weighing each gas chlorine cylinder in service.
  - 3) Solution Feed Equipment
    - A) Corrosion-resistant containers shall be provided for solution feeders.
    - B) Containers shall have non-corrodible covers with overhanging edges. Openings shall be constructed to prevent contamination.
    - C) Scales or a volumetric measuring device shall be provided for determining the amount of solution fed.
- f) Safety-Respiratory Protection Equipment
- 1) Respiratory protection equipment consisting of self-contained, pressure-demand breathing units meeting requirements of the National Institute for Occupational Safety and Health (NIOSH) shall be provided where gas chlorination is used.
    - A) The units shall use compressed air and have at least a 30 minute capacity.
    - B) It is recommended that the units be compatible with or exactly the same as units used by the local fire department.
  - 2) Respiratory protection equipment shall be stored in an accessible location outside the room housing gas chlorination facilities.
  - 3) All personnel involved in the use and maintenance of gas chlorination facilities shall be able to properly operate the breathing equipment. All personnel shall have periodic refresher training exercises using the equipment.
  - 4) A source of certified air under 29 CFR Section 1910.183 (1983) shall be used for refilling the tanks.
  - 5) The equipment shall be checked at regular intervals to assure that it is in good working condition.

**Section 653.602 Testing Equipment for Residual Chlorine**

- a) Residual chlorine shall be determined by methods in "Standard Methods for the Examination of Water and Wastewater", 15th edition.
- b) Colorimetric determinations of chlorine residuals shall be made using the DPD methods.
- c) The test equipment used shall be capable of indicating values of 0.1, 0.2, 0.3, 0.4, 0.5, 0.7, 1.0, 2.0, mg/l and higher if chlorine is applied for taste and odor control.

**Section 653.603 Minimum Contact Time**

- a) A minimum chlorine contact time of 60 minutes shall be provided for all surface water supplies and for ground water supplies using surface water-type treatment, springs or infiltration lines, or water obtained from creviced rock aquifers with less than 50 feet of cover.
- b) Contact time is measured as the time following filtration of surface or ground water, or chlorination of well water when there is no other treatment, and the time when the water reaches the first user.

**Section 653.604 Distribution System Residuals**

- a) A minimum free chlorine residual of 0.2 mg/l or a minimum combined residual of 0.5 mg/l shall be maintained in all active parts of the distribution system at all times.
- b) Chlorine residual test shall be made at frequent and regular intervals to determine the amount and type of residuals existing at different points in the distribution system.

**Section 653.605 Chlorination Operating Records**

- a) A copy of the daily operating report records signed by the certified operator or registered person in responsible charge shall be submitted to the Illinois Environmental Protection Agency each month as required by 35 Ill. Adm. Code 606.101. These operating reports shall show:
  - 1) amount of water pumped;
  - 2) chlorine chemical used;
  - 3)
  - 4) amount of chlorine chemical fed;
  - 5) calculated chlorine dosage; and
  - 6) residual chlorine test results.
- b) An individual set of records shall be maintained for each installation when more than one source of water with separate chlorination equipment is used.
- c) A copy of the daily operating report shall be maintained by the official custodian of the community water supply.

**Section 653.606 Exemptions From Chlorination - Satellite Supplies**

- a) Satellite community water supplies are exempt from chlorination provided the requirements of Section 653.604 are met.
- b) Chlorination facilities shall be installed and used:
  - 1) whenever the chlorine residual in any active part of the distribution system drops below 0.2 mg/l free or 0.5 mg/l combined; or
  - 2) if daily operating report records of chlorine residuals are not kept and submitted to the Agency.

**Section 653.607 Exemption From Chlorination - Supplies Meeting Statutory Requirements**

- a) Community water supplies which meet all of the requirements specified in Ill. Rev. Stat. 1983, ch. 111 2, par. 1017(b) (as amended) shall be exempt from chlorination upon approval by the Agency of an application for exemption. Applications and approvals shall be in writing.
- b) The decision to issue an exemption shall be based on the following:
  - 1) The population served by the community water supply does not exceed 5000 based upon the latest census figures or complete records of number of individuals served.
  - 2) The supply shall have as its only source of raw water, one or more wells constructed in accordance with Section 653.103 into confined geologic formations not subject to contamination. Verification will be based on driller's log, visual inspection of the well(s), general geology of the area and results of bacteriological analyses performed on raw water samples. Supplies which do not have this data may apply for an exemption as long as sample results verify satisfactory raw water quality which complies with 35 Ill. Adm. Code Part 604.

- 3) The supply shall not have a history of persistent or recurring contamination as indicated by sampling results which show violation of finished water quality requirements for the most recent five year period. Verification will be based on review of the last five years of sample results; the most recent 12 months will be weighted more heavily. New supplies without this data may apply for an exemption based on available samples.
- 4) The supply shall not provide any raw water treatment other than fluoridation. Treatment will be verified by facility inspection.
- 5) The supply shall have an active program in accordance with Section 653.801 approved in writing by the Agency to educate water supply customers on preventing the entry of contaminants into the water system. An outline of the program and copies of handouts to be used shall be sent to the Agency with the exemption application.
- 6) The supply shall employ on its operational staff a certified operator of the proper class. A community water supply which is exempt from the requirement for a certified operator in accordance with Ill. Rev. Stat. 1983, ch. 111 2, par. 509 (as amended) shall employ on its operational staff a registered person in responsible charge of operation of the community water supply. Verification of certified operator or registered person shall be made by checking Notification of Certified Operator in Responsible Charge forms or Registration of Person in Responsible Charge forms on file in Agency records.
- 7) The supply shall submit samples for microbiological analysis at twice the frequency required for non-exempt supplies. Compliance with this requirement shall be verified using Agency monitoring records.
- 8) A unit of local government seeking to exempt its community water supply from the chlorination requirement shall receive approval of the voters of that local government in accordance with Ill. Rev. Stat. 1983, ch. 111 2, par. 1017(b)(8) (as amended). A certified copy of the results of the proposition shall be filed with the Division of Public Water Supplies.
- 9)

#### **Section 653.608 Chlorination Exemption Revocation**

- a) Chlorination exemptions are valid until revoked.
- b) A chlorination exemption shall be revoked immediately without prior notice if a supply fails to meet any of the exemption requirements. An application for a Construction Permit for the installation of chlorination equipment shall be made within 60 days following revocation. Chlorination equipment shall be installed and a properly certified operator shall be retained or an appeal filed with the Illinois Pollution Control Board within 90 days following revocation.
- c) One or more of the following conditions will result in revocation:
  - 1) increase in population to greater than 5000;
  - 2) addition of a new source subject to contamination, or finding that an existing source is subject to contamination based on raw water bacteriological analyses records;
  - 3) development of a history of recurring or persistent contamination as indicated by sampling results;
  - 4) addition of treatment other than fluoridation (although a certified operator will not be required if the additional treatment consists of that designated in Ill. Rev. Stat. ch. 111 2, par 509.1(f)(e));
  - 5) failure to maintain an active program of educating water consumers on prevention of contamination;
  - 6) failure to have a certified operator or registered person for more than 15 days; or
  - 7) failure to submit bacteriological samples twice a month during more than three months of the past 12 months or for two consecutive sampling periods. A supply which fails to monitor for bacteriological quality on a semi-monthly basis but does have one set of samples analyzed for each monthly sampling period will not be required to make public notice for the monitoring violation.

### **SUBPART G: FLUORIDATION**

#### **Section 653.701 Fluoridation - Engineering Design Criteria**

- a) Procedure for Submitting Plans and Specifications - Design documents for fluoridation shall be prepared and submitted in accordance with 35 Ill. Adm. Code 602.
- b) Basis of Design - Equipment shall have the capacity to maintain the fluoride content in the finished water between 0.9 and 1.2 mg/l.
- c) Selection of Chemical - Fluoride compounds shall meet requirements of Section 653.202 and the AWWA Standards.
- d) Chemical Feed Equipment - Feeders shall be accessible for repair and maintenance, protected against dust hazard and be accessible to the chemical storage area.
  - 1) Weighing scales for measuring the daily amount of chemicals shall be provided for dry feeders.
  - 2) Scales or a volumetric device shall be provided for determining the amount of solution fed.

- 3) Dust collection equipment and ventilation shall be provided where loading operations may create dust hazards.
  - 4) Corrosion-resistant containers with non-corrodible covers and over-hanging edges shall be provided for solution feeders. Openings shall be constructed to prevent contamination.
  - 5) A free chlorine residual of 10 mg/l shall be maintained in solutions prepared from dry chemicals. This chlorine residual shall not replace the chlorination requirement of 35 Ill. Adm. Code 604.401.
  - 6) Chlorine shall not be added to hydrofluosilicic acid solutions.
  - 7) Corrosion-resistant parts shall be used in the pump headers when hydrofluosilicic acid is fed.
- e) Point of Application - The point of fluoride application shall be selected to provide uniform fluoride concentrations in the distribution system. Fluoride solutions shall not be applied ahead of ion exchange or lime softening processes.
  - f) Operating Controls - Controls which eliminate any possible hazard of over-dosing shall be provided and operate feed equipment only when there is flow past the point of application. Automatic stop-start operation and proportional feeding shall be used. Separate equipment installations shall be used where fluoridation at a single point is not possible.
  - g) Back-Siphonage Safeguards - Anti-siphon devices shall be provided for all make-up and dilution water lines and on the discharge side of the chemical feeder. An air gap or a siphon breaker in compliance with Section 653.801(d) on the downstream side of the last control valve in the water supply line serving the feeder shall be provided.
  - h) Auxiliary Treatment - Water used for preparing batch solutions or used for dry feeders shall be softened or stabilized with polyphosphates if precipitation of fluoride compounds interfere with the accuracy of the fluoride feeding equipment.
  - i) Safety Items - Rubber gloves and a dust mask shall be provided with each installation using dry chemicals. Rubber gloves, acid-resistant aprons and protective goggles shall be provided where hydrofluosilicic acid solutions are fed.
  - j) Metering - Facilities shall be provided for metering the dilution water and the plant discharge to the distribution system.
  - k) Testing Equipment - Testing equipment for fluoride ion concentration determination shall be provided and shall be:
    - 1) a colorimetric comparator, or
    - 2) a specific ion electrode with expanded scale pH meter.
  - l) Sampling Taps - Sampling taps shall be provided and located such that representative samples can be obtained from:
    - 1) the raw water line before fluoride solution is added, and
    - 2) after fluoride solution is added and has thoroughly mixed with the water being fluoridated.

#### **Section 653.702 Fluoridation Treatment Equipment Start-up**

- a) Operating personnel shall be provided instructions for the use of the fluoridation equipment.
- b) An Operating Permit shall be obtained prior to initiating operation of the fluoridation equipment. The Illinois Department of Public Health shall be notified as soon as fluoridation has been started.

#### **Section 653.703 Fluoride Sampling**

- a) Samples shall be submitted monthly to the Illinois Environmental Protection Agency laboratory.
- b) Sample containers will be furnished by the Illinois Environmental Protection Agency.

#### **Section 653.704 Fluoride Operating Records**

- a) A copy of the daily operating report record signed by the certified operator or registered person in responsible charge shall be submitted to the Illinois Environmental Protection Agency each month as required by 35 Ill. Adm. Code 606.101. These operating reports shall show:
  - 1) amount of water pumped;
  - 2) fluoride chemical used;
  - 3)
  - 4) amount of fluoride chemical fed
  - 5) gallons of dilution water used;
  - 6) calculated fluoride dosage; and
  - 7) fluoride ion test results.
- b) An individual set of records shall be maintained for each installation when more than one source of water with separate fluoridation equipment is used.
- c) A copy of the daily operating report records shall be maintained by the official custodian of the community water supply.

### **SUBPART H: CROSS-CONNECTIONS**

#### **Section 653.801 Cross-Connection Control Program**

An active cross-connection control program shall be adopted and shall include the following:

- a) A cross-connection control survey of the distribution system shall be conducted at least every two years by the official custodian or an authorized delegate.
  - 1) The purpose of this survey is to compile and update an inventory of devices; the survey must consist of a pencil and paper collection of information, conducted by telephone, mail or personal visit to the manager or owner of a specific property.
  - 2) This survey is not intended to include an actual visual inspection of piping or plumbing systems.
- b) An ordinance, tariff, or required condition for service whichever is applicable, which includes a plumbing code at least as stringent as the Illinois Plumbing Code, 77 Ill. Adm. Code 890, shall be adopted and enforced.
- c) Cross-connection control programs shall include a record system which will maintain data on inspections, re-inspections, repairs, alterations and tests.
- d) Only cross-connection control devices which are approved by the Research Foundation for Cross-Connection Control of the University of Southern California, American Water Works Association, American Society of Sanitary Engineering, or American National Standards Institute or certified by the National Sanitation Foundation to be in compliance with applicable industry specifications shall be used.
- e) Installation of approved devices shall be made only as specified by the Research Foundation for Cross-Connection Control of the University of Southern California, American Water Works Association, American Society of Sanitary Engineering, or American National Standards Institute. Maintenance as recommended by the manufacturer of the device shall be performed. Manufacturer's maintenance manual shall be available on-site.

(Source: Amended at 9 Ill. Reg. 17367, effective October 23, 1985)

#### **Section 653.802 Specific Conditions and Installation Procedures**

- a) Complete removal of the cross-connection or installation of an approved cross-connection control device is required for control of backflow and back-siphonage.
- b) Cross-connection control devices shall be installed in accordance with the manufacturer's instructions.
- c) Cross-connection control devices shall be inspected at least annually by a person approved by the Agency as a cross-connection control device inspector (CCCDI). The inspection of mechanical devices shall include physical testing in accordance with the manufacturer's instructions.
- d) Requirements for Cross-Connection Control Device Inspector Approval
  - 1) Each applicant for cross-connection control device inspector (CCCDI) approval must meet the following qualifications:
    - A) Must meet the qualifications to inspect plumbing and plumbing systems as described in the Illinois Plumbing License Law (Ill. Rev. Stat. 1983, ch. 111, par. 1103(1)), and provide proof of qualifications in writing on the application form provided by the Agency.
    - B) Must complete and submit an application for CCCDI Approval at least thirty days prior to the examination date. Examinations shall be held not less frequently than annually. The application must be made on forms provided by the Agency, available at the headquarters and all regional office locations. Applicants shall be notified in writing of their status of eligibility. Notice of eligibility shall include an examination schedule and location.
    - C) Must submit the examination eligibility notice to the examination proctor before being admitted to actual testing.
    - D) Must successfully complete both written and performance examinations demonstrating understanding of the principles of backflow and back-siphonage, and the hazard presented to a potable water system; identifying locations which require installation of cross-connection control devices; identifying, locating, inspecting, testing, maintaining and repairing cross-connection control methods and devices in-line, as located throughout each system which connects to a community public water supply
    - E)
    - F) Must successfully complete the written examination with a score of 75% minimum.
    - G) Must successfully complete a performance-based examination by demonstrating competency in testing device procedures on all types of devices at the examination center.
    - H) Review of the written examination will be available at the test site on the day of examination.
    - I) An applicant who does not agree with the Agency review of his application qualifications may write to the Agency to request that the application be presented to the Water Supply Advisory Board. The Advisory Board shall review the application and shall review the application and shall make a recommendation to the Agency for reconsideration or confirmation of the Agency evaluation.
  - 2) CCCDI's must meet the renewal requirements of Ill. Rev. Stat. 1983, ch. 111, par. 1113(1), and must renew the CCCDI Approval each year, between May 1 and May 30. An application for CCCDI renewal will be sent by the Agency, and

- must be completed and returned by May 30 of the renewal year.
- 3) A CCCDI Approval or admission to examination for CCCDI Approval shall be suspended, revoked or not issued by the Agency for any one or more of the following causes:
    - A) Practice of any fraud or deceit in obtaining or attempting to obtain a CCCDI Approval, including misrepresentation of approval;
    - B) Any repeated, flagrant or willful negligence or misconduct in the inspection, testing or maintenance of cross-connection control devices;
    - C) Falsification of reports required by these rules;
    - D) Willful violation of the Environmental Protection Act or any rules thereunder.
  - 4) Suspension/Revocation Procedures
    - A) The Agency may initiate the suspension/revocation procedure.
    - B) Any person may initiate the procedure for suspension/revocation of any CCCDI by filing a sworn written complaint with the Agency. If the Agency determines that the complaint is duplicitous or frivolous, it shall notify the person filing the complaint but shall take no further action.
    - C) The decision to institute suspension or revocation shall be based upon the seriousness of the violation and its potential deleterious impact upon public health and safety. Examples of cause for suspension include but are not limited to: failure to comply with proper reporting procedures as described in Section 653.802(e)(2), (3) and (4) below; incomplete or improper testing procedures; examples of cause for revocation include but are not limited to: falsification of records; negligence, incompetency or misoperation which results in or could result in a potential or actual health hazard; fraudulent representation of credentials; attempt to obtain CCCDI approval using fraudulent methods; repeated violations meriting suspension. When the suspension/revocation procedure is warranted, the Agency shall notify the CCCDI by certified mail that suspension/revocation is being sought. Such notice shall specify the cause upon which suspension/revocation is sought and include the procedures for requesting a hearing before the Agency. Request for hearing must be made in writing 14 days following receipt of the Agency's certified notification. If no hearing is requested, the Agency will effect the suspension/revocation on the 15th day.
    - D) Should a hearing be requested, the Director shall appoint one or more Agency employees to chair the proceedings. The hearing shall be conducted in accordance with hearing requirements of Sections 10-25 through 10-65 of the Illinois Administrative Procedure Act (Ill. Rev. Stat. 1991, ch. 127, pars. 1010-25 through 1010-65).
    - E) The Director shall make a decision within 30 days after receiving the hearing transcript. The Director shall give written notice of that decision and reasons for the decision to the CCCDI by certified mail.
    - F) Within 30 days of receipt of a notice of suspension/revocation from the Agency, the CCCDI may appeal the suspension/revocation to the Pollution Control Board. The suspension/revocation of the CCCDI's Approval shall be stayed pending a final decision on the appeal by the Pollution Control Board.
  - e) Testing and Records
    - 1) Each device shall be tested at least annually or more frequently if recommended by the manufacturer.
    - 2) Records submitted to the community public water supply shall be available for inspection by Agency personnel in accordance with Ill. Rev. Stat. 1983, ch. 111 2, par. 1004(e).
    - 3) Each device shall have a tag attached listing the date of most recent test, name of CCCDI, and type and date of repairs.
    - 4) A maintenance log shall be maintained and include:
      - A) date of each test;
      - B) name and approval number of person performing the test;
      - C) test results;
      - D) repairs or servicing required;
      - E) repairs and date completed; and
      - F) servicing performed and date completed.
  - f) Cross-connection control devices located in the treatment plant, well house or booster station of a community public water supply facility shall be inspected at least annually by either an approved cross-connection control device inspector or by a certified water supply operator trained for testing, installation, repair and maintenance of cross-connection control devices.
    - 1) Records must be kept as required by Section 653.802(e) above and must be signed by an approved CCCDI or a certified water supply operator who has successfully completed a cross-connection control device inspection training program conducted by the Environmental Resources Training Center (Ill. Rev. Stat. 1983, ch. 144, par. 691 et seq.).
    - 2) Certified water supply personnel who successfully complete Environmental Resources Training Center sponsored cross-connection control device inspection training will receive an authorization number which authorizes them to test only those devices located in the treatment plant, well house or booster station of the community public water supply

facility.

3)

(Source: Amended at 9 Ill. Reg. 17367, effective October 23, 1985)

#### **Section 653.803 Cross-Connection Control Devices**

- a) A fixed proper air gap shall be used whenever technically possible.
- b) Atmospheric Vacuum Breakers may be installed subject to the following conditions:
  - 1) An atmospheric vacuum breaker shall not be installed where back pressure may occur.
  - 2) An atmospheric vacuum breaker shall be installed at the highest point in the waterline and after the last control valve before the point of discharge and a minimum of six inches above the flood level rim of the receptacle.
  - 3) An atmospheric vacuum breaker shall not be used for installations where the substance in the container receiving water is lethal or toxic. Examples of acceptable installations include:
    - A) surface wash piping for a gravity filter;
    - B) solution tanks of gravimetric dry chemical feeders;
    - C) outlets with hose attachments; and
    - D) receptacles with a low level inlet where the substance contained is non-toxic such as food or beverages.
- c) Reduced Pressure Principle Backflow Preventers may be installed subject to the following conditions:
  - 1) Installation
    - A) Units shall be accessible for maintenance and testing.
    - B) Minimum clearances recommended by the manufacturer shall be used.
    - C) Units shall be protected against flooding and freezing.
    - D) Relief ports shall not be plugged. A drain which will remain free flowing under all conditions shall be provided.
    - E) A collection system with an air gap under the relief port drain shall be installed with ceiling level units.
    - F) No reduction shall be made in the size of the relief port drain.
  - 2) Bypasses - A second backflow preventer shall be installed parallel to the first if there is only one service line and the water service cannot be interrupted. Bypass lines without reduced pressure principle backflow preventers shall not be installed.
  - 3) Reduced pressure principle backflow preventers shall be used for installations where a fixed proper air gap is not possible. Examples of such installations include:
    - A) the water line used to provide make up water for chemical feeders in a water treatment plant;
    - B) receptacles with a low level inlet where the contents are non-toxic such as food or beverages; and
    - C) receptacles or vessels which can subject the water supply line to back pressure.
  - 4) Water service lines which connect a community water supply to industrial or commercial establishments shall include either a reduced pressure principle backflow preventer or a fixed proper air gap with repumping if those establishments constitute a hazard to the water supply due to the nature of chemicals or other material handled within the facility.

(Source: Amended at 9 Ill. Reg. 17367, effective October 23, 1985)

#### **Section 653.804 Heat Exchange Cross-Connections**

- a) Instantaneous water heaters or water storage heaters using shell and tube design steam-fired heat exchanger shall be acceptable for heating water for domestic use under the following conditions:
  - 1) The purity of the steam supplied to the heat exchangers shall meet United States Food and Drug Administration (USFDA) requirements for steam that may contact food. Boiler water and steam condensate additives shall meet requirements of USFDA regulation 21 CFR 173.310 (1983).
  - 2) Double check-valve assembly meeting requirements of Section 653.801(d) shall be installed in the cold water inlet piping of the heat exchanger. The unit shall be tested annually and required service performed within 15 days.
  - 3) A maintenance log shall be maintained and include the information specified in Section 653.802(e)(4).
- b) Instantaneous water heaters and water storage heaters using shell and tube design hot water boiler-fired heat exchanger shall be acceptable for heating water for domestic use under the following conditions:
  - 1) Chemical additives to control corrosion and scale of the hot water boiler system shall not contain toxic chemicals (e.g., chromate or nitrite based inhibitors).
    - A) Chemicals approved by United States Environmental Protection Agency (USEPA) or USFDA which will not breakdown to harmful substances in the system may be applied for scale and corrosion control in public water



- supplies (e.g., food grade caustic soda, sodium silicate, sodium polyphosphate).
- B) The addition of sodium sulfite as an oxygen scavenger in hot water boilers is acceptable when approved double check-valves, in compliance with Section 653.801(d), are installed.
- 2) A double check-valve assembly, in compliance with Section 653.801(d), shall be installed in the cold water inlet piping of the heat exchanger.
- A) The unit shall be tested annually and required service performed within 15 days.
  - B) A maintenance log shall be maintained and include information specified in Section 653.802(e)(4).

(Source: Amended at 9 Ill. Reg. 17367, effective October 23, 1985)

#### **Section 653.805 Fire Protection Systems**

A reduced pressure principle backflow preventers shall be installed to protect the community water supply against backflow and back siphonage when:

- a) the fire safety system contains antifreeze, fire retardant or other chemicals;
- b) water is pumped into the fire safety system from another source; or
- c) water flows into the fire safety system by gravity from a non-potable source; or
- d) there is a connection whereby water can be pumped into the fire safety system from any other source.

(Source: Amended at 9 Ill. Reg. 17367, effective October 23, 1985)