

**TOWN OF CONCORD
BOARD OF HEALTH**

"Minimum Sanitation Standards for Private and Semi-Public Water Supplies"

7.01 Purpose

- (A) These regulations are intended to protect public health, safety, and general welfare by ensuring that wells are constructed, developed, maintained, used, and decommissioned in a manner which will protect the quality of the groundwater and the aquifer from which it is derived.

7.02 Authority

- (A) The regulations in this chapter are promulgated by the authority granted to the Concord Board of Health by Massachusetts General Laws, Chapter 40, §21 and Chapter 111, §31
- (B) Public Water Supply Wells subject to regulation under 310 CMR 22.00 are exempt from these regulations.

7.03 Definitions

Abandoned water well: Means a well that meets any of the following criteria: (1) construction was terminated prior to completion of the well, (2) the well owner has notified the Concord Board of Health that use of the well has, after extended use, been permanently discontinued, (3) the well has been out of service for at least three years, (4) the well is a potential hazard to public health or safety and the situation cannot be corrected, (5) the well is in such a state of disrepair that its continued use is impractical, or (6) the well has the potential for transmitting contaminants from the land surface into an aquifer or from one aquifer to another and the situation cannot be corrected.

Aquifer: Means a geologic formation, group of formations, or part of a formation that contains sufficient saturated permeable material to yield significant quantities of water to wells and springs.

Agent: Any person designated and authorized by the Board to execute these regulations. The agent shall have all the authority of the appointing Board and shall be directly responsible to the Board and under its direction and control.

Applicant: Any person who intends to have a private well constructed.

Aquifer: A water bearing geologic formation, group of formations, or part of a formation that contains sufficient saturated permeable material to yield significant quantities of water to wells and springs.

Bentonite Grout: A mixture of bentonite (API Standard 13A) and water in a ratio of not less than one pound of bentonite per gallon of water.

Board: The Board of Health of Concord Massachusetts or its authorized agent.

Business of Digging or Drilling: A person who charges a fee for digging or drilling a well, or a person who advertises for hire the availability to dig or drill wells within the Commonwealth of Massachusetts.

Casing: Impervious durable pipe placed in a boring to prevent the walls from caving and to serve as a vertical conduit for water in a well.

Certified Laboratory: Any laboratory currently certified by the Department of Environmental Protection for drinking water. Provisional certification shall also qualify.

Concrete: A mixture consisting of Portland cement (ASTM Standard C150, type I or API Standard 10, Class A), sand, gravel, and water in a proportion of not more than five parts of sand plus gravel to one part cement, by volume, and not more than six gallons of water. One part cement, two parts sand, and three parts gravel are commonly used with up to six gallons of water.

Contaminant: Means any physical, chemical, biological, or radiological substance or matter in water.

Contamination: Means the presence of any physical, chemical, biological, or radiological substance or matter in water at a concentration and for a duration or anticipated duration which, in the opinion of the regulating agency, would present a threat to the public health, using existing federal and state standards and guidelines where applicable.

Cross connection: Means any physical connection or arrangement between two otherwise separate piping systems, one of which contains potable water and the other water of unknown or questionable safety, whereby water may flow from one system to the other, the direction of flow depending on the pressure differential between the two systems.

Geothermal Well: Any drill hole, excavation, or opening deeper than it is wide constructed into the ground for the purpose of transferring heat as part of a ground-source heat pump system designed and installed with current Massachusetts Department of Environmental Protection guidance documents.

Groundwater: Means subsurface water in the zone of saturation.

Irrigation Well: Any dug, driven, or drilled hole, with a depth greater than its largest surface diameter developed to supply water intended and/or used for the purposes of agricultural, horticultural, and/or landscape irrigation or other uses not requiring potable water, and not subject to regulation by 310 CMR 22.00.

Monitoring Well: Any drill hole, excavation, or opening deeper than it is wide constructed into the ground for the purpose of monitoring or observation of subsurface conditions; not included are wells used on a temporary basis for the purpose of sampling soil vapors or groundwater if the installation tool is left in the ground less than 48 hours.

Neat Cement Grout: A mixture consisting of one bag (94 pounds) of Portland cement (ASTM Standard C150, Type I or API Standard 10, Class A) to not more than six gallons of clean water. Bentonite (API Standard 13A), up to two percent by weight of cement, shall be added to reduce

shrinkage. Other additives, as described in ASTM Standard C494, may be used to increase fluidity and/or control setting time.

Person: An individual, corporation, company, association, trust, or partnership.

Private Water Supply Well: Any dug, driven, or drilled hole, with a depth greater than its largest surface diameter developed to supply water intended and/or used for human consumption and/or other domestic purposes if such system has less than fifteen (15) service connections and either (1) serves less than twenty-five individuals or (2) serves an average of twenty-five (25) or more individuals for less than sixty (60) days of the year and therefore not subject to regulation by 310 CMR 22.00. The system shall include all of the sources, treatment works, and distribution lines to the point where distribution takes place within the building.

Pumping Test: A procedure used to determine the characteristics of a well and adjacent aquifer by installing and operating a pump.

Registered Well Driller: Any person registered with the Department of Environmental Protection to dig or drill wells in the Commonwealth of Massachusetts.

Sand Cement Grout: A mixture consisting of Portland cement (ASTM Standard CI50, Type 1 or API Standard IO, Class A), sand, and water in the proportion of one part cement to three or four parts sand, by volume, and not more than six gallons of water per bag (94 pounds) of cement. Up to five percent, by weight of bentonite (API Standard 13A) shall be added to reduce shrinkage.

Static Water Level: The level of water in a well under non-pumping conditions.

Structure: A combination of materials assembled at a fixed location to give-support or shelter, such as a building, framework, retaining wall, fence, or the like.

Water System: Includes pipes, valves, fittings, tanks, pumps, motors, switches, controls, and appurtenances installed or used for the purpose of storage, distribution, filtration, treatment or purification of water for any use whether or not inside a building.

Well: Any drill hole, excavation, or opening deeper than it is wide constructed into the ground for the purpose of monitoring, observation, injecting or extracting fluids, or for the purpose of transferring heat. Not included are wells used on a temporary basis for the purpose of dewatering excavations, stabilizing hillsides or earth embankments, sampling soil vapors, or sampling groundwater if the installation tool is left in the ground less than 48 hours

7.04 Well Construction Permit

- (A) The property owner or his/her designated representative shall obtain a permit from the Board of Health prior to the commencement of construction of a private well.
- (B) Each permit application to construct a well shall be submitted on a Concord Board of Health "Form E" and, in addition, include the following:

- (1) A plan with a specified scale, signed by a registered surveyor or engineer, showing the location of the proposed well in relation to existing or proposed above or below ground structures.
 - (a) Copies of existing plans on file with the Concord Board of Health are acceptable at the discretion of the Agent of the Concord Board of Health.
 - (2) A description of visible prior and current land uses within two-hundred (200) feet of the proposed well location, which represent a potential source of contamination, including but not limited to the following:
 - (a) Existing and proposed structures
 - (b) Subsurface sewage disposals systems
 - (c) Subsurface fuel storage tanks
 - (d) Public and private ways
 - (e) Utility rights-of-way
 - (f) Any other potential sources of pollution
 - (3) A permit fee as set according to the Bylaws and Board of Health Regulations of the Town of Concord
 - (4) A listing of any hazardous waste sites regulated by 310 CMR 40.00 within 1000 feet of the proposed well.
 - (a) This section does not apply to monitoring well installation permit applications
 - (5) All applications for geothermal wells shall include the Underground Injection Control (UIC) registration number issued by the Massachusetts Department of Environmental Protection for the well.
 - (6) All applications for monitoring wells at sites subject to the jurisdiction of MGL Ch. 21E and/or 310 CMR 40.00 shall include the Release Tracking Number (RTN) issued to the site.
- (C) Each permit shall expire one (1) year from the date of issuance unless revoked for cause.
- (1) Permits may be extended for one additional six (6) month period provided that a written request is received by the Board prior to the one year expiration date.
 - (a) No additional fee shall be charged for a permit extension, provided there is no change in the plans for the proposed well.
- (D) Well Construction Permits are not transferable.

7.05 Well Location and Use Requirements

- (A) Each well shall be accessible for repair, maintenance, testing, and inspection.

- (B) A private water supply well shall be completed in a water bearing formation that will produce the required quantity of water under normal operating conditions.
- (C) Wells shall be subject to the setbacks as set forth in Table 1, below.

Table 1: Required Setbacks for Wells				
	Well Type			
	Private Water Supply	Irrigation	Geothermal	Monitoring
Property Line	10	10	10	N/A
Public or Private Way (edge of road)	25	25	25	N/A
100-year floodplain elevation	Above	Above	Above	N/A
Body of water	25	25	25	N/A
Wetland	25	25	25	N/A
Septic Tank/Pump Chamber	50	50	50	N/A
Soil Absorption System	100	50	50	N/A
Building sewer constructed of durable, corrosion-resistant material	10	10	10	N/A
Building sewer constructed of other materials	50	50	50	N/A
Structure with a foundation	20	20	20	N/A

- (D) Water supply lines shall be installed at least 10 feet from and 18 inches above any sewer line.
 - (1) Whenever water supply lines must cross sewer lines, both pipes shall be constructed of class 150 pressure pipe and shall be pressure tested to assure watertightness.
- (E) The Board reserves the right to impose minimum lateral distance requirements from other potential sources of contamination not listed above. All such special well location requirements shall be listed, in writing, as a condition of the well construction permit.
- (F) No well, or its associated distribution system, shall be connected to the distribution system of a public water supply system
- (G) Private water supply wells shall not be approved where a public water line is accessible in an abutting way and where permission to tie in such water line can be obtained from the authority having jurisdiction over it.
 - (1) The Board of Health may require the owner or occupant of an existing building or buildings, wherever a public water line is accessible in an abutting public or private way to cause such building or buildings to be connected with the public water line in a manner and within a period of time satisfactory to the Board of Health.

7.06 Water Quantity Requirements

- (A) The applicant shall submit to the Board for review and approval a Well Completion Report.

- (1) The report shall be on a form prescribed by the Massachusetts Department of Environmental Protection.
- (B) In order to demonstrate the capacity of the well to provide the required volume of water, a pumping test shall be conducted in the following manner:
 - (1) The volume of water necessary to support the household's daily need shall be determined using the following equation: (number of bedrooms plus one bedroom) x (110 gallons per bedroom) x (a safety factor of 2) = number of gallons needed daily.
 - (2) The storage capacity of the well shall be determined using the measured static water level and the depth and radius of the drillhole or casing.
 - (3) The Required Volume shall be calculated by adding the volumes of water in (1) and (2) above. It is this volume of water that must be pumped from the well within a 24-hour period.
- (C) The pumping test may be performed at whatever rate is desired. Following the pumping test, the water level in the well must be shown to recover to within eighty-five (85) percent of the pre-pumped static water level within a twenty-four (24) hour period.
- (D) A private water supply well shall not be allowed to have a pumping rate less than 0.5 gallons per minute

7.07 Water Quality Testing Requirements

- (A) After a private water supply or irrigation well has been completed and disinfected, and prior to use, a water quality test shall be conducted.
- (B) A water sample shall be collected either after purging three well volumes or following the stabilization of the pH, temperature and specific conductance in the pumped well. The water sample to be tested shall be collected at the pump discharge or from a disinfected tap in the pump discharge line. In no event shall a water treatment device be installed prior to sampling.
- (C) The initial water quality test for private water supply wells, utilizing applicable US EPA approved methods for drinking water testing shall be conducted by an EPA or Massachusetts certified laboratory and shall include analysis for the following parameters listed in Table 2, and the results shall not exceed Maximum Contaminant levels for public water supplies, as listed in 310 CMR 22.00.
- (D) Initial and routine testing of private water supply wells is required for the set parameters and frequency as listed in Table 2.
- (E) Initial testing and routine testing parameters and frequencies for irrigation wells are listed in Table 3.

Parameter	Frequency (after the initial test)
Alkalinity	Every 5 Years
Aluminum	Every 10 Years
Arsenic	Every 5 Years
Calcium	Every 5 Years
Chloride	Every 5 Years
Color	Every 5 Years
Copper	Every 5 Years
<i>Escherichia coli</i> bacteria	Every Year
Fluoride	Every 10 Years
Gross Alpha Activity	Every 10 Years
Hardness	Every 5 Years
Iron	Every 5 Years
Lead	Every 5 Years
Manganese	Every 5 Years
Nitrate	Every Year
Nitrite	Every Year
Odor	Every 5 Years
Perchlorate	Every 10 Years
pH	Every Year
Potassium	Every 5 Years
Radium – 226 & 228*	Every 10 Years
Radon – 222*	Every 10 Years
Sodium	Every 5 Years
Sulfate	Every 5 Years
Total <i>coliform</i> bacteria	Every Year
Total Dissolved Solids	Every Year
Uranium*	Every 10 Years
Volatile Organic Compounds (EPA Method 524)	Every 10 Years
Zinc	Every 10 Years

*These specific tests for radioactive isotopes are only required if the Gross Alpha Activity is above the currently recommended range published by the Massachusetts Department of Environmental Protection.

Parameter	Frequency (after the initial test)
<i>Escherichia coli</i> bacteria	Every 5 Years
Nitrate	Every 5 Years
Total <i>coliform</i> bacteria	Every 5 Years

(F) Following a receipt of the water quality test results, the applicant shall submit a Water Quality Report to the Board which includes:

- (1) A copy of the certified laboratory's test results
 - (2) The name of the individual who performed the sampling
 - (3) Where in the system the water sample was obtained
- (G) The Board reserves the right to require retesting of the above parameters, or testing for additional parameters when, in the opinion of the Board, it is necessary due to local conditions or for the protection of the public health, safety, and welfare. All costs and laboratory arrangements for the water testing are the responsibility of the applicant.
- (H) The Board may choose to collect the water sample or may require that the water sample be collected by the Board's agent or by an employee of the certified lab performing the analyses.

7.08 Well Construction Requirements

- (A) Pursuant to 313 CMR 3.00, no person in the business of digging or drilling shall construct a well unless registered with the Department of Environmental Protection.
- (B) Any work involving the connection of the private well to the distribution system of the residence must conform to the local plumbing code. All electrical connections between the well and the pump controls and all piping between the well and the storage and/or pressure tank in the house must be made by a pump installer or registered well driller, including the installation of the pump and appurtenance in the well or house.
- (C) A physical connection is not permitted between a well as permitted under these regulations these regulations and a public water supply as regulated by 310 CMR 22.00.
- (D) All private water supply wells shall be designed such that:
- (1) The materials used for the permanent construction are durable in the specific hydrogeologic environment that occurs at the well site.
 - (2) No unsealed opening will be left around the well that could conduct surface water or contaminated groundwater vertically to the intake portion of the well or transfer water from one formation to another.
 - (3) Permanent construction materials shall not impart toxic substances taste, odors, or bacterial contamination to the water in the well.
- (E) The driller shall operate all equipment according to generally accepted standards in the industry and shall take appropriate precautions to prevent damage, injury or other loss to persons and property at the drilling site.
- (F) Well construction shall insure that surface water does not enter the well through the opening or by seepage through the ground surface.

- (G) Construction site waste and materials shall be disposed of in such a way as to avoid contamination of the well and the aquifer.
- (H) During any time that the well is unattended, the contractor shall secure the well in a way as to prevent either tampering with the well or the introduction of foreign material into the well.
- (I) Well yield shall be measure and recorded at least every fifty (50) feet during drilling.
- (J) All water used for drilling, well development, or to mix a drilling fluid shall be obtained from a source which will not result in contamination of the well or the water bearing zones penetrated by the well.
 - (1) Water shall be conveyed in clear sanitary containers or water lines and shall be chlorinated to an initial concentration between 50 mg/l and 100 mg/l.
 - (2) A free-chlorine residual of 10 mg/l shall be maintained in any water used at the drill site. Water from wetlands, swamps, ponds and other similar surface features shall not be used.
- (K) All drilling equipment including pumps and down hole tools, shall be cleaned and disinfected prior to drilling each new well or test hole.
- (L) All drilling fluids shall be nontoxic. Drilling fluid additives shall be stored in clean containers and shall be free of material that may adversely affect the well, the aquifer, or the quality of the water to be pumped from the well, surfactants should be biodegradable.
- (M) The completed well shall be sufficiently straight so that there will be no interference with installation, alignment, operation or the future removal of the permanent well pump.
- (N) Private water supply wells shall be constructed using either steel or thermoplastic well casing.
 - (1) The casing shall be of adequate strength and durability to withstand anticipated formation and hydrostatic pressures, the forces imposed on it during installation, and the corrosive effects of the local hydrogeologic environment.
 - (2) Steel casing shall be used with cable tool drilling or when the casing is installed in an open drillhole in which formation materials may suddenly collapse against the casing.
 - (a) Steel casing shall consist of schedule 40 pipe that complies with materials standards approved by the American Water Works Association.
 - (b) Segments of steel casing shall be coupled by using threaded casing, coupling, or by welding the joint. Recessed or reamed and drifted couplings shall be used on threaded casing and no threads shall be left exposed once the joint is completed. When welded casing joints are used, they shall conform to the most recent revision of AWWA C206, "Standard for Field Welding of Steel Water Pipe." The weld shall be at least as thick as the wall thickness of the well casing and shall be fully penetrating. When completed, a welded casing joint shall have a tensile strength equal to or greater than that of the casing.

- (3) Thermoplastic casing used in the construction of private water supply wells shall be capable of withstanding pressures equal to or greater than 200 pounds per square inch and shall conform to the most recent revision of ASTM Standard F480, "Specification for Thermoplastic Water Well Casing Pipe and Couplings Made in Standard Dimension Ratios (SDR)."
 - (a) The casing and couplings shall meet the requirements of the most recent revision of National Sanitation Foundation Standard Number 14, entitled "Plastics Piping System Components and Related Materials." Materials complying with Standard Number 14 can be recognized by the marking "NSF-WC."
- (4) All casing used in the construction of private water supply wells shall be free of pits, breaks, gouges, deep scratches and other defects. If previously used casing is installed, it shall be decontaminated and disinfected prior to installation.
- (O) Wells completed in bedrock do not require a screen unless the bedrock formation is brittle in nature or has a potential for collapse.
 - (1) The well screen aperture openings, screen length, and diameter shall be selected so as not to limit the aquifers' water yielding characteristics while preventing access of soil particles that would detract from well efficiency and yield.
- (P) Wells drilled in bedrock shall be grouted from the top of the weathered rock interface to fifteen (15) feet into competent bedrock. Either neat cement grout or sand Cement grout shall be used and it shall be emplaced using standard grouting techniques as described in the Massachusetts Department of Environmental Protection Private Well Guidelines.
- (Q) All wells completed with the casing extending above grade shall have a surface seal designed to eliminate the possibility of surface water flowing down the annular space between the well casing and the surrounding backfilled materials. The surface seal shall extend to a depth below the local frost line.
- (R) All pumps shall be installed either below the frost line with a pitless adapter or in some other heated and protected sanitary location.
 - (1) Above ground pumps shall be installed in sheltered, dry, accessible locations and shall be protected from freezing
- (S) Well casing terminating above-grade shall extend at least 12 inches above the predetermined ground surface at the wellhead.
 - (1) Well casing shall not be cut off below the land surface unless a pitless adapter or a pitless unit is installed or an abandoned well is being permanently plugged
 - (2) When a well is located in a floodplain, the well casing shall extend at least 2 feet above the level of the highest recorded flood

- (3) The top of the well casing shall be reasonably smooth and level.
 - (4) All connections to a well casing made below ground shall be protected by either a pitless adapter or a pitless unit that complies with the most recent revision of National Sanitation Foundation Standard Number 56, entitled "Pitless Well Adapters."
 - (5) Above-grade connections into the top or side of a well casing shall be at least 12 inches above the established ground surface or two feet above the level of the highest known flood. Whichever is higher. Above-grade connections shall be sealed so that they are watertight.
 - (6) The ground immediately surrounding the well casing shall be sloped downward and away from the well in all directions to eliminate the possibility of surface water ponding
 - (7) Any well that does not terminate at the ground surface in the base of a pump shall be equipped with a sanitary seal or watertight cap designed to prevent surface water and foreign matter from entering the well.
 - (8) All private water supply and irrigation wells shall be vented.
 - (a) The opening of the vent pipe shall be covered with a 24 mesh corrosion resistant screen and shall be large enough to prevent water from being drawn into the well through electrical conduits or leaks in the seal around the pump when the pump is turned on
 - (b) The vent pipe shall terminate in a downward position at or above the top of the casing
- (T) Upon completion of well construction, the well contractor shall disinfect the well.
- (1) If a pump is to be installed by the well contractor immediately upon completion of the well, the contractor shall disinfect the well and the pumping equipment after the pump has been installed.
 - (2) If the pump is not installed upon completion of the well, the pump contractor shall, upon installation, disinfect the well and the pumping equipment. The pump contractor shall also disinfect the entire water supply system after any maintenance or repair work is done on the pump.
 - (3) When a well is disinfected, the initial chlorine concentration shall be 100 mg/l throughout the entire water column.
 - (4) The disinfectant solution shall remain, undisturbed, in the well for a minimum of two (2) hours. After all the chlorine has been flushed from the water supply system, a water sample shall be collected and submitted to a state certified laboratory for water quality analysis pursuant to section 7.07 of these regulations.

- (U) Geothermal wells developed as part of the ground-source heat pump system shall be developed and constructed in accordance with the most recent version of the Massachusetts Department of Environmental Protection *Guidelines for Ground Source Heat Pump Wells*.
- (V) Monitoring wells shall be constructed in accordance with the most recent version of *Standard References for Monitoring Wells* available from the Massachusetts Department of Environmental Protection.

7.09 Well Decommissioning Requirements

- (A) Abandoned wells, test holes, and borings shall be decommissioned so as to prevent the well, including the annular space outside the casing, from being a channel allowing the vertical movement of water.
- (B) The owner of the private well shall decommission the well if the well meets any of the following criteria:
 - (1) Construction of the well is terminated prior to completion of the well
 - (2) The well owner notifies the Board that the use of the well is to be permanently discontinued.
 - (3) The well has been out of service for at least three years
 - (4) The well is a potential hazard to public health or safety and the situation cannot be corrected
 - (5) The well is in such a state of disrepair that its continued use is impractical
 - (6) The well has the potential for transmitting contaminants from the land surface into an aquifer or from one aquifer to another and the situation cannot be corrected
- (C) The property owner shall be responsible for ensuring that all abandoned wells and test holes or borings associated with private well installation are properly plugged.
 - (1) Only registered well drillers may plug abandoned wells, test holes, and borings.
- (D) Abandoned wells or borings shall be completely filled with a neat cement grout, sand cement grout, concrete, or bentonite grout which cures with a final permeability of less than 1×10^{-7} cm/sec.
 - (1) Regardless of the type used, the grout:
 - (a) Shall be sufficiently fluid so that it can be applied through a tremie pipe from the bottom of the well upward
 - (b) Shall remain as a homogeneous fluid when applied to the subsurface rather than disaggregating by gravity into a two phase substance
 - (c) Shall be resistant to chemical or physical deterioration

- (d) Shall not leach chemicals, either organic or inorganic, that will adversely affect the quality of the groundwater where it is applied
- (E) The plugging materials shall be introduced at the bottom of the well or boring and placed progressively upward to a level approximately four (4) feet below the ground surface.
 - (1) Sealing materials shall never be poured from the land surface into the well, borehole, or annular space being sealed

7.10 Severability

- (A) Each section, paragraph, sentence, clause, phrase and any other portion of this regulation shall be construed as separate to the end that if any portion thereof shall be held invalid for any reason, then the remainder of the regulation shall remain in full force and effect.

7.11 Effective Date

- (A) This regulation was adopted by the Concord Board of Health at a public hearing on Tuesday, October 20, 2009 under the authority granted by MGL Ch. 111, s. 31 and MGL Ch. 44, s. 5.

