PRIVATE WATER SUPPLY SYSTEMS

[HISTORY: Adopted by the Board of Health of the Town of Middleton 10-01-2008. Amendments noted where applicable.]

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I. PURPOSE

These regulations are intended to protect the public health and general welfare of the residents of the Town of Middleton by ensuring that private wells producing water for human consumption, irrigation purposes, and/or heating/cooling wells (ground source heat pump wells/geothermal) are constructed in a manner, which will protect the groundwater resources and the quality of water derived from these private wells.

II. AUTHORITY

These regulations are adopted by the Middleton Board of Health, as authorized by Massachusetts General Laws, Chapter 111, Section 31. These regulations supersede all previous regulations adopted by the Board of Health pursuant to the construction of private wells.

III. 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 local 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.

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.

Alteration means a major change in the type of construction or configuration of a private water system, including but not limited to, adding a disinfection or treatment device, converting a water well with a buried seal to a well with a pitless adapter, extending a distribution system, converting a well using a well pit to a well with a pitless adapter, extending the casing above ground; deepening a well, changing the type of pumping equipment when that requires making new holes or sealing or plugging existing holes in the casing or wall of a well, and repairing, extending or replacing any portion of the inside or outside casing or wall.

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

Annular space means the space between two cylindrical objects, one of which surrounds the other. For example, the space between the wall of a drillhole and a casing pipe, or between an inner and an outer well casing.

API means American Petroleum Institute.

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.

Artesian aquifer means an aquifer that is bounded above and below by impermeable materials or materials of distinctly lower permeability than the aquifer itself. The water in an aquifer confined in this manner will rise in a drilled hole or well casing above the point of initial penetration (above the bottom of the confining, or impermeable, layer overlying the aquifer).

Artesian well means a well producing from an artesian aquifer. The term includes both flowing wells and nonflowing wells.

ASTM means American Society for Testing and Materials.

AWWA means American Water Works Association.

Backflow means the flow of water or other liquids, mixtures or substances into the distribution pipes of a potable water supply from any source other than the intended source.

Bedrock see "Consolidated formation".

Bentonite means a mixture of swelling clay minerals containing at least eighty-five percent of the mineral montmorillonite (predominantly sodium montmorillonite) which meets the specifications of the most recent revision of API Standard 13A.

Bentonite grout means 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 *Middleton* 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 means an 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.

CMR means *Code of Massachusetts Regulations.*

Community water system means a public water system which serves at least fifteen (15) service connections used by year-round residents or regularly serves at least twenty-five (25) year-round residents.

Concrete means 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.

Confined aquifer means an aquifer in which the groundwater is under pressure greater than atmospheric pressure: the static water level in a well tapping a confined aquifer rises to a level above the top of the aquifer.

Confining bed means a layer or body of soil, sediment, or rock with low vertical permeability relative to the adjacent aquifers above or below it.

Consolidated formation means any geologic formation in which the earth materials have become firm and coherent through natural rock forming processes. The term is sometimes used interchangeably with the word "bedrock" and includes, but is not limited to, basalt, granite, limestone, sandstone, and shale. An uncased drillhole will normally remain open in these formations.

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 actual or potential connection between a distribution pipe of potable water from a public water system and any waste pipe, soil pipe, sewer, drain, or other unapproved source. Without limiting the generality of the foregoing, the term “cross connection” shall also include any by-pass arrangements, jumper connections, removal sections, swivel or changeover connection and other temporary or permanent connection through which backflow can or may occur.

Curbing means either precast or poured-in-place, concrete well casing used to construct dug wells.

Department means the Massachusetts Department of Environmental Protection

Department’s Designee or “Designee” shall mean any water supplier to whom, upon written request of said water supplier, the Department delegates any portion of its authority to act under 310 CMR 22.22

Domestic water supply means "private water supply."

Drawdown means the difference between the static and pumping water levels.

Drilled well means a well in which the hole is excavated using mechanical means such as rotary, cable tool, or auger rigs.

Drive shoe means a forged or tempered steel collar, with a cutting edge, attached to the lower end of a casing by threading or welding, to protect the lower edge of the casing as it is driven.

Flushing means the act of causing a rapid flow of water from a well by pumping, bailing or similar operation.

Formation means an assemblage of earth materials grouped together into a unit that is convenient for description or mapping.

Ground Source Heat Pump (GSHP) System: A heating and/or cooling system that transfers heat to or from the earth in which the naturally occurring, ambient ground (prior to GSHP operations) is 90 degrees Fahrenheit or less.

Ground Source Heat Pump (GSHP) Well: Any excavation by any method for the purpose of transferring heat to or from the earth for heating and cooling purposes in which the ambient ground temperature (prior to GSHP operations) is 90 degrees Fahrenheit or less.

Groundwater means subsurface water in the zone of saturation.

Grout means a stable impermeable bonding material, which is capable of providing a watertight seal.

Grouting means the process of mixing and placing grout.

Health Hazard means an actual or potential threat of contamination to the potable water in a public water system, which in the opinion of the Department or its Designee would endanger health.

Hydrofracturing means a process whereby water is pumped under high pressure into a well to fracture the surrounding rock thereby increasing the well yield.

MGL means *Massachusetts General Laws.*

Neat cement grout means 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.

Non-community water system means a public water system that is not a community water system.

Owner means any person maintaining a cross connection installation or occupying premises on which cross connections can or do exist.

Owner' Agent means any person or body designated by the owner to act as his or her representative.

Overburden see "Unconsolidated formation.

Person means an individual, corporation, company, association, trust, partnership.

Pitless adapter means a commercially manufactured device, which attaches to a well casing and provides watertight subsurface connections for suctions lines or pump discharge and allows vertical access to the interior of the well casing for installation or removal of the pump or pump appurtenances.

Potable Water means water from a source, which has been approved by the Department or Board of Health for human consumption.

Private water supply means a system that provides water for human consumption, 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.

Private water system means "private water supply."

Private Well: Any driven or drilled hole, with a depth greater than its largest surface diameter developed to supply water intended for human consumption, irrigation purposes, and heating/cooling purposes (geothermal) and not subject to regulation by 310 CMR 22.00. Dug wells are not allowed

Public water system means a system for the provision to the public of piped water for human

consumption, as defined in 310 CMR 22.22 (8).

Pumping test means a procedure used to determine the characteristics of a well and adjacent aquifer by installing and operating a pump.

Registered well driller means any person registered with the Department of Environmental Management/Division of Water Supply Protection to dig or drill wells in the Commonwealth of Massachusetts.

Sand cement grout means a mixture consisting of Portland cement (ASTM Standard C150, Type I or API Standard 10, 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.

Septic tank means a watertight receptacle, which receives the discharge of sewage from a building sewer and is designed and constructed so as to permit the retention of scum and sludge, digestion of the organic matter, and discharge of the liquid portion to a leaching facility.

Static water level means the level of water in a well under non-pumping conditions.

Structure means 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.

Supplier of Public Water means any person who owns or operates a public water supply system.

Surface water means water that rests or flows on the surface of the Earth.

Thermoplastic casing means ABS (acrylonitrile-butadiene-styrene), PVC (poly-vinyl chloride) or SR (styrene rubber) casing specified in the most recent revision of ASTM Standard F480.

Tremie pipe means a device, usually a small diameter pipe, that carries gravel pack or grouting materials to the bottom of a drillhole or boring and which allows pressure grouting from the bottom up without introduction of appreciable air pockets.

Unapproved Source means the source distribution system for any water or other liquid or substance, which has NOT been approved, by the Department or Board as being of safe and sanitary quality for human consumption.

Unconfined aquifer means an aquifer in which the static water level does not rise above the top of the aquifer.

Unconsolidated formation means any naturally occurring uncemented, unlithofied material such as sand, gravel, clay, or soil.

Water Quality Notice means a notice that is recorded at the registry of deeds stating the purpose of the well, its physical location and a copy of the water test results pursuant to section VIII of these regulations.

Water table means the upper surface of the zone of saturation in an unconfined formation at which the pressure is atmospheric.

Watertight means a condition that does not allow the entrance, passage or flow of water or other fluids under normal operating conditions.

Watertight casing means a water well casing that has a wall thickness of 1/8 inch or more, has no

seams or has welded seams, and has sections that can be joined together by watertight threads, by a weld, rubber gasket, or by cement that is not limestone or clay based that seals the well against the entrance of surface water into the groundwater.

Watertight construction means cased and grouted construction through firm formations like clay or rock. Through granular material like sand or gravel, it means that the casing pipe is of approved quality and assembled watertight.

Well development means a procedure consisting of the removal of fine sand and drilling fluid from the water bearing sand, gravel, or rock materials opposite the well screen.

Well vent means an outlet at the upper end of a well casing or basement end of a non-pressure conduit to allow equalization of air pressure in a well but at the same time so constructed as to prevent entry of water and foreign material into the well.

Yield means the quantity of water per unit of time, which may flow or be pumped from a well under specified conditions.

Zone of saturation means the zone below the water table in which all interstices are filled with groundwater.

IV. WELL CONSTRUCTION PERMIT

The property owner or his designated representative shall obtain a permit from the Board of Health prior to the commencement of construction of a private well.

Each permit application to construct a well shall include the following:

1) the property owner's name and address
2) the well driller's name and proof of valid state registration
3) For new construction, a plan with a specified scale, signed and stamped by a registered land surveyor, showing the location of the proposed well in relation to existing and proposed above and below ground structures and systems. For existing developed sites, a plan if one exists, with a specified scale, such as a certified plot plan, septic system asbuilt, certified plan of land, showing the location of the proposed well in relation to existing and proposed above and below ground structures and systems.
4) 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 disposal systems
    c) subsurface fuel storage tanks
    d) public ways
    e) utility rights-of-way
    f) any other potential sources of pollution
5) a permit fee of $200

No application shall be considered complete until items 1-5 listed directly above have been furnished and submitted. The Board of Health has no obligation to act on an incomplete application.

The permit shall be on site at all times that work is taking place. Each permit shall expire one (1) year from the date of issuance unless revoked for cause. Permits may be extended for one additional six (6) months period provided that a written request is received by the Board prior to the one-year expiration date. No additional fee shall be charged for a permit extension, provided there is no change in the plans for the proposed well.

Well Construction Permits are not transferable between installers.

V. WATER SUPPLY CERTIFICATE

The issuance of a Water Supply Certificate by the Board shall certify that the private well may be used as a drinking water supply. A Water Supply Certificate must be issued for the use of a private well prior to the issuance of an occupancy permit for an existing structure or prior to the issuance of a building permit for new construction, which is to be served by the well. A water supply certificate shall not be permitted until a wastewater disposal system plan has been submitted to the Board of Health and such plan has been approved.

The following shall be submitted to the Board of Health to obtain a Water Supply Certificate:

a) a copy of the Water Well Completion Report as required by the DEM Office of Water Resources (313 CMR 3.00)
b) a copy of the Water Quality Report required pursuant to Section VIII of these regulations

Upon the receipt and review of the above fully completed documents, the Board shall make a final decision on the application for a Water Supply Certificate. A final decision shall be in writing and shall comprise
one of the following actions:

a) Issue a Water Supply Certificate
b) Deny the applicant a Water Supply Certificate and specify the reasons for the denial.
c) Issue a conditional Water Supply Certificate with those conditions, which the Board deems necessary to ensure fitness, purity and quantity of the water, derived from that private well. Said conditions may include but not be limited to requiring treatment or additional testing of the water.

A construction permit for a wastewater disposal system shall not be issued until the Board of Health issues a Water Supply Certificate.

VI. WELL LOCATION, USE REQUIREMENTS, SETBACK DISTANCES

In locating a well, the applicant shall identify all potential sources of contamination which exist or are proposed within two hundred (200) feet of the site. When possible, the well shall be located upgradient of all potential sources of contamination and shall be as far removed from potential sources of contamination as possible, given the layout of the premises.

Each private well shall be accessible for repair, maintenance, testing, and inspection. The well shall be completed in a water bearing formation that will produce the required quantity of water under normal operating conditions.

Each private well shall be located at least twenty-five (25) feet from any property line/road right-of-way. The centerline of a well shall, if extended vertically, clear any projection from an adjacent structure by at least five (5) feet.

Each private well shall be located at least 25 feet, laterally, from the normal high water mark of any lake, pond, river, stream, ditch, or slough. When possible, private water systems shall be located in areas above the 100-year floodplain.

All wells and/or suction lines shall be located a minimum of 10 feet from a building sewer constructed of durable corrosion resistant material with watertight joints, or 50 feet from a building sewer constructed of any other type of pipe; 50 feet from a septic tank; 100 feet from a leaching field and soil absorption system; and 100 feet from a privy.

If the 100' radius of the well extends onto an abutting property(s), the well applicant shall send a certified registered letter to the abutting property owner(s). The letter shall indicate that the abutting property owner(s) contact the Board of Health with 10 business days if the applicant has an issue with the well radius extending onto his/her property. A copy of the letter must be provided to the Board of Health and approved together with evidence of receipt by the abutting owner prior to issuance of a well construction permit.

Water supply lines shall be installed at least 10 feet from and 18 inches above any sewer line. 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.

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.

1. Irrigation Wells

    a) Irrigation wells are subject to the same standards as drinking water wells. The Board may, but is not required to, issue variances for irrigation wells, and may require additional

information to be in place prior to these wells being placed into service. Some of the requirements may be, 1) If possible, all connections between the well and irrigation system must be outside the dwelling, 2) Any connection, such as a faucet may require a visible label that states "NON POTABLE WATER, DO NOT DRINK", or other similar wording, and 3) a) All irrigation wells must be connected directly to either a pressurized holding tank or, the irrigation system. This should be determined by the intended use and installer recommendations.

b) All plumbing and electrical work on the irrigation system needs to be done by licensed individuals and conform to all State regulations and codes. The local plumbing inspector must inspect all installations.

c) If a property owner wishes to discontinue using water supplied by the Town of Middleton Water Department, then the well needs to meet the criteria for drinking water wells in these regulations. The termination of the public water supply needs to comply with M.G.L. chapter 111, sec. 160A and 310 CMR 22.22.

2. . Cross Connections

Cross Connections are prohibited

a) No person shall maintain upon premises which they own or occupy, a cross connection between the distribution system of a public water supply, the water of which is being used for drinking, domestic, or culinary purposes, and the distribution system of any UNAPPROVED water source, unless the installation has been reviewed and approved by the appropriate reviewing authority and permits have been issued as described in 310 CMR 22.22.

b) The Middleton Board of Health or it's agent, and/or the Middleton Water Department, shall, without notice, have the authority to terminate any water service connection to any facility where cross connections are maintained without required backflow prevention devices which have been approved by the reviewing authority.

c) Whoever maintains such a connection in violation of M.G.L. c. 111, §160A may be subject to a fine of not more than twenty-five thousand dollars ($25,000) for each day of the violation occurs or continues, and/or by imprisonment for not more than one year.

3. Ground Source Heat Pump (GSHP) Well / System, aka Geothermal Wells

Ground Source Heat Pump Wells are subject to the same standards at drinking water wells. The installation of these GSHWs require adherence to Underground Injection Control (UIC) requirements that are administered by the UIC Program or the Groundwater Discharge Program (as applicable) in the Massachusetts Department of Environmental Protection (MassDEP), Bureau of Resource Protection (BRP) and the Well Driller Registration Program in Massachusetts Department of Conservation and Recreation (DCR), Office of Water Resources.

GSHP wells that also serve as potable water supply wells shall meet the minimum setback requirements within this document and/or MassDEP's *Private Well Guidelines* or MassDEP's *Guidelines and Policies for Public Water Systems*, whichever is more stringent.

The Board may issue variances, but is not required to, for these wells, and at their discretion, may require additional information to be submitted and approved prior to these wells being placed into service.

VII. WATER QUANTITY REQUIREMENTS

In order to demonstrate the capacity of the well to provide the required flow rates of water, a pumping test, witnessed by the Board of Health's representative, shall be conducted in the following manner:

1. The flow test shall be performed with the well rig on site (air lift pumping).

   The required flow rates are as follows:

   Well depth up to 300 feet, minimum 5 gallons per minute
   Well depth up to 400 feet, minimum 3 gallons per minute
   Well depth up to 500 feet, minimum 2 gallons per minute
   Well depth up to 600 feet, minimum 1 gallon per minute, but needs to be conducted after a 500-gallon pump down.

2. If a flow test, as listed above, is not performed: The well must be able to pump 3 gpm throughout four-hour periods on two consecutive days, with 720 gallons each day. Alternately, the well must be able to produce 1,440 gallons in a single 8-hour period.

VIII. WATER QUALITY TESTING REQUIREMENTS

After the well has been completed and disinfected, and prior to using it as a drinking water supply, or irrigation, a water quality test shall be conducted.

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 certified well driller or an independent contractor, not the homeowner, shall collect the water sample. 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.

The water quality test, utilizing an applicable US EPA approved method for drinking water testing shall be conducted by an EPA or Massachusetts certified laboratory and shall not exceed Massachusetts primary water standards for public water supplies and shall include analysis for

the following parameters, but not limited to, Total Coliform, Calcium, Copper, Iron, Magnesium, Manganese, Potassium, Sodium, Alkalinity, Ammonia, Chloride, Chlorine, Color, Conductivity, Hardness, Nitrates, Nitrites, pH, Odor, Sulfates, Turbidity, Sediment, Lead, Arsenic, Fluoride, Radon Volatile Organic Compounds (VOC), and Total Organic Halides (TOX). EPA method 524 or its equivalent shall be used to measure VOC levels, which must not exceed the maximum levels allowed by 310 CMR 22.00. If the test result reveals that some of the parameters fail the secondary drinking water standards, it is recommended that the owner consult with a certified lab and/or a water treatment company to discuss treatment options.

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.

IX. WELL CONSTRUCTION REQUIREMENTS

Pursuant to 313 CMR 3.00, no person in the business of drilling shall construct a well unless registered with the Department of Environmental Management/Office of Water Resources.

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.

A physical connection is not permitted between a water supply, which satisfies the requirements of these regulations, and another water supply that does not meet the requirements of these regulations without prior approval of the Board. (See Cross Connection, Section, VI(2).

A. General Well Design and Construction

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.

Permanent construction materials shall not impart toxic substances taste, odors, or bacterial contamination to the water in the well.

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.

Well construction design shall insure that surface water does not enter the well through the opening or by seepage through the ground surface. Construction site waste and materials shall be disposed of in such a way as to avoid contamination of the well and the aquifer. 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.

Well yield shall be measured and recorded at least every fifty (50) feet during drilling.

All water used for drilling, well development, or to mix a drilling fluid shall be obtained from a potable water source, which will not result in contamination of the well or the water bearing zones penetrated by the well.

Water from wetlands, swamps, ponds and other similar surface features is prohibited.

All drilling equipment. including pumps and down hole tools, shall be cleaned and disinfected prior to drilling each new well or test hole.

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. The use of biodegradable organic polymers shall, when possible, be avoided.

All wells, including those that have been hydrofractured, shall be developed in order to remove fine materials introduced into the pore spaces or fractures during construction. One or more of the following methods shall be used for development: overpumping, backwashing, surging, jetting, air-lift pumping.

The completed well shall be sufficiently straight so that there will be no interference with installation, alignment, operation or future removal of the permanent well pump.

B. Well casing

Private water supply wells shall be constructed using steel well casing. 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.

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.

Installation of water well casing shall be done in a manner that does not alter the shape, size, or strength of the casing and does not damage any of the joints or couplings connecting sections of the casing. A standard driveshoe shall be used when casing is installed. The drive shoe shall be either welded or threaded to the lower end of the string of casing and shall have a beveled metal cutting edge forged, cast, or fabricated for this specific purpose.

Upon completion of the installation procedure, the entire length of the casing above the intake shall be watertight.

For wells completed above grade, the casing shall extend at least 12 inches above the finished ground surface unless the well is located in a floodplain. For wells constructed in a floodplain, the casing shall extend at least two feet above the level of the highest recorded flood. The top of the casing shall be reasonably smooth and level.

Steel casing shall consist of schedule 40 pipe that complies with materials standards approved by the American Water Works Association.

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.

C. Well screen

A well screen is necessary for all drilled wells that are completed in unconsolidated formations. Wells completed in bedrock do not require a screen unless the bedrock formation is brittle in nature or has a potential for collapse. 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.

D. Grouting and sealing

Private wells drilled in bedrock shall be grouted from the top of the weathered rock interface to A minimum of 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 DEP Private Well Guidelines (most recent).

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.

E. Pumps and pumping equipment

All pumps shall be installed either below the frost line with a pitless adapter or in some other heated and protected sanitary location. Above ground pumps shall be installed in sheltered, dry, accessible locations and shall be protected from freezing.

Shallow-well pumps shall be installed as near the well or water source as possible to minimize suction lift.

Deep-well reciprocating pumps shall be installed directly over the well. Submersible and helical rotor pumps must be installed in the well. A deep-well jet pump may be offset from the well.

F. Wellhead completion

Well casing shall not be cut off below the land surface unless the well is being abandoned and permanently plugged. Well casing terminating above-grade shall extend at least 12 inches above the predetermined ground surface at the wellhead except when the well is located in a floodplain. 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. The top of the well casing shall be reasonably smooth and level.

All wells shall be equipped with a sanitary seal or watertight cap designed to prevent surface water and foreign matter from entering the well. A flowing artesian well shall be equipped with a shut-off valve and backflow preventer so that the flow of water can be stopped completely when the well is not in use.

All wells except flowing artesian and dug wells shall be vented. 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. The vent pipe shall terminate in a downward position at or above the top of the casing.

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."

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.

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

G. Disinfection

Upon completion of well construction, the well contractor shall disinfect the well. 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.

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.

When a well is disinfected, the initial chlorine concentration shall be 100 mg/l throughout the entire water column.

For newly constructed or altered wells in which the pump is not immediately installed, the chlorine concentration used to disinfect the well shall be 100 mg/l. Upon installation of the pump, disinfection of the well, the pumping equipment, and the distribution system, if connected, shall be accomplished with a chlorine concentration of 100 mg/l.

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 new wells, the sample shall be tested pursuant to Section VIII of these regulations, and a "Water Quality Notice" must be issued by the Board of Health prior to use of the well. For wells, which have undergone repair, the sample shall be tested for coliform bacteria and any other parameters deemed appropriate by the Board.

X. DECOMMISSIONING REQUIREMENTS

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 all-owing the vertical movement of water.

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 and the decommission of the well is properly registered on the appropriate completion report with the Department of Environmental Management/Office of Water Resources.
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
5) 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

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. Only registered well drillers may plug abandoned wells, test holes, and borings.

In the case of new well construction, all test holes and borings shall be plugged before the well driller completes work at the site.

Abandoned wells or borings shall be completely filled with a grout, which cures with a final permeability of less than IXIO-7 cm/sec. Wells shall be plugged with neat cement grout, sand cement grout, concrete, or bentonite grout.

Regardless of the type used, the grout:

1) shall be sufficiently fluid so that it can be applied through a tremie pipe from the bottom of the well upward
2) shall remain as a homogeneous fluid when applied to the subsurface rather than disaggregating by gravity into a two phase substance
3) shall be resistant to chemical or physical deterioration
4) shall not leach chemicals, either organic or inorganic, that will adversely affect the quality of the groundwater where it is applied

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. Sealing materials shall never be poured from the land surface into the well, borehole, or annular space being sealed.

The contractor shall emplace the surface seal no sooner than 24 hours after the well or boring has been plugged. Before the surface seal is placed, casing remaining in the hole shall be cut off. The remaining four feet at the top of the well or boring shall then be filled with concrete. The top of the seal shall comprise a concrete slab above the top of the plugged well or boring. This concrete slab shall be at least six inches thick and shall be at least two feet greater in diameter than the well casing or borehole wall.

XI. ENFORCEMENT

The Board shall investigate violations of these regulations and/or violations of any Water Supply Certificate conditions and may take such actions as the Board deems necessary for the protection of the public health and the enforcement of these regulations.

If any investigation reveals a violation of these regulations or the Water Supply Certificate Conditions, the Board shall order the private well owner to comply with the violated provisions(s).

These orders shall be in writing and served in the following manner:

(a) personally, by any person authorized to serve civil process, or;
(b) by any person authorized to serve civil process by leaving a copy of the order at the well owner's last and usual place of abode, or
(c) by sending the well owner a copy of the order by registered or certified mail, return receipt requested, if the well owner is within the Commonwealth, or

(d) if the well owner's last and usual place of abode is unknown or outside the Commonwealth, by posting a copy of the order in a conspicuous place on or about the premises and by advertising it for at least three out of five consecutive days in one or more newspapers of general circulation within the municipality wherein the private well affected is situated.

XII. HEARING

The private well owner to whom any order has been served may request a hearing, pursuant to Article X1 Supra, before the Board by filing with the Board within 7 days after the day the order was served, a written petition requesting a hearing on the matter. Upon receipt of such petition, the Board shall set a time and place for such hearing and shall inform the well owner thereof in writing. The hearing shall be commenced not later than 30 days after the day on which the order was served. The Board, upon application of the well owner, may postpone the date of hearing for a reasonable time beyond such 30-day period if in the sole discretion of the Board the well owner has submitted a good and sufficient reason for such postponement. At the hearing the well owner shall be given an opportunity to be heard and show why the order should be modified or withdrawn. After the hearing, the Board shall sustain, modify, or withdraw the order and shall inform the well owner its decision. If the Board sustains or modified the original order, it shall be carried out within the time period allotted in the original order or in the modification.

Every notice, order, or other record prepared by the Board in connection with the hearing shall be entered as a matter of public record in the office of the clerk of the city or town, or in the office of the Board.

In a written petition for a hearing is not filed with the Board within 7 days after the day an order has been served or if after a hearing, the order has been sustained in any part. each day's failure to comply with the order as issued or modified shall constitute an additional offense.

XIII. APPEAL

Any person aggrieved by the final decision of the Board may seek relief there from within thirty (30) days in any court of competent jurisdiction, as provided by the laws of this Commonwealth.

XIV. PENALTIES

Any person who violates any provision of these regulations, herein, or who fails to comply with any town bylaw or order by the Board, for which a penalty is not otherwise provided in any of the General Laws shall upon conviction be fined not less than two hundred and fifty nor more than five hundred dollars. Each day's failure to comply with an Order shall constitute a separate violation.

XV. VARIANCE

After a public hearing, the Board may, but is not required to, grant a variance to the application of these regulations when, in its opinion, the enforcement thereof would do manifest injustice, and the applicant has demonstrated that a compelling hardship and that the equivalent degree of protection will still be provided to the private water supply without strict application to particular provisions of these regulations.

Every request for a variance shall be made in writing and shall state the specific variance sought and the reasons therefore. The writing shall contain all the information needed to assure the Board that, despite the issuance of a variance, the public health and environment will be protected. Notice of the hearing shall be given by the Board, at the applicant's expense, at least ten (10) days prior thereto, by certified mail to all direct abutters or abutters adjacent to a common right-of-way of the property upon which the private well is located and by publication in a newspaper of general circulation in the town or city in which the private well is located. The notice shall include a statement of the variance sought and the reasons therefore. Any grant or denial of a variance shall be in writing and shall contain a brief statement of the reasons for approving or denying the variance.

Any variance may be subject to such qualification, revocation, suspension, condition, or expiration as is provided in these regulations or as the Board expresses in its grant of the variance. A variance may otherwise be revoked, modified or suspended, in whole or in part, only after the holder thereof has been notified in writing and has been given an opportunity to be heard, pursuant to Section XI of these regulations.

XVI. SEVER-ABILITY:

If any provision of these regulations or the application thereof is held to be invalid by a court of competent jurisdiction, the invalidity shall be limited to said provision(s) and the remainder of these regulations shall remain valid and effective. Any part of these regulations subsequently invalidated by a new state law or modification of an existing state law shall automatically be brought into conformity with the new or amended law and shall be deemed to be effective immediately, without recourse to a public hearing and the customary procedures for amendment or repeal of such regulation.

XVII. EFFECTIVE DATE

These regulations were adopted by vote of the *Middleton,* Massachusetts Board of Health, at their regularly scheduled meeting held on October 1, 2008 and are to be in full force and effect on and after October 3, 2008. Before said date, these regulations shall be published and a copy thereof be placed on file in the Board of Health Offices and filed with the Department of Environmental Protection, Division of Wastewater Management (formerly Division of Water Pollution Control) in Boston. These regulations or any portions thereof may be amended, supplemented or repealed from time to time by the Board, with notice as provided by law, on its own motion or by petition.

XVIII. DISCLAIMER

The issuance of a well permit shall not be construed as a guarantee by the Board or its agents that the water system will function satisfactorily nor that the water supply will be of sufficient quality or quantity for its intended use.