Secretary of the State File Number
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Regulation of the

Department of Consumer Protection

Concerning

Well Drilling and Geothermal Systems

Regulations adopted after July 1, 2013, become effective upon posting to the Connecticut eRegulations System, or at a later date if specified within the regulation.

Posted to the Connecticut eRegulations System on **July 8, 2022**

EFFECTIVE DATE
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Approved by the Attorney General on
June 4, 2022

Approved by the Legislation Regulation Review Committee on
June 28, 2022

Electronic copy with agency head certification statement electronically submitted to and received by the Office of the Secretary of the State on
July 6, 2022

Form ICM-ECOPY (NEW 6/2015)
State of Connecticut
Secretary of the State

IMPORTANT NOTICE FOR CONNECTICUT STATE AGENCIES
This form should be used only for regulations first noticed *on and after March 23, 2015.*

Electronic Copy Certification Statement

(Submitted in accordance with the provisions of section 4-172 of the Connecticut General Statutes)

Regulation of the
Department of Consumer Protection
Concerning
Well Drilling and Geothermal Systems

Approved by the Legislative Regulation Review Committee: **June 28, 2022**
eRegulations System Tracking Number: **PR2020-017**

I hereby certify that the electronic copy of the above-referenced regulation submitted herewith to the Secretary of the State is a true and accurate copy of the regulation approved in accordance with sections 4-169 and 4-170 of the *Connecticut General Statutes*.

And I further certify that in accordance with the approval of Legislative Regulation Review Committee, all required technical corrections, page substitutions and deletions, if any, have been incorporated into said regulation.

In testimony whereof, I have hereunto set my hand on **July 6, 2022**.

Julianne Avallone
Legal Director
Department of Consumer Protection

State of Connecticut

REGULATION

of the

NAME OF AGENCY:

DEPARTMENT OF CONSUMER PROTECTION

Concerning

SUBJECT MATTER OF REGULATION:

Well Drilling and Geothermal Systems

[Description of Organization, Rules of Practice,]
Industry Standards of Practice, Registration Requirements, and Regulations for [the] Well Drilling [Industry] and Geothermal Systems

Section 1. Section 25-128-33 of the Regulations of Connecticut State Agencies is amended to read as follows:

Sec. 25-128-33. Title of regulations

[These regulations, together with the regulatory] The provisions of [Chapter] chapter 482 of the Connecticut General Statutes[,] and [the section of the Public Health Code]sections 25-128-33 to 25-128-64, inclusive, of the Regulations of Connecticut State Agencies relating to wells, shall be collectively known as the Connecticut Well Drilling Code.

Sec. 2. Section 25-128-34 of the Regulations of Connecticut State Agencies is amended to read as follows:

Sec. 25-128-34. Purpose of regulations

The purpose of the regulations shall be to govern the construction, repair, development, and abandonment of wells and geothermal systems[,] in order to safeguard the public health, [and] to provide an adequate supply of clean and uncontaminated water for all persons in the state of Connecticut[.], and to provide for the safe and efficient use of the heating and cooling properties of the Earth.

Sec. 3. Section 25-128-35 of the Regulations of Connecticut State Agencies is amended to read as follows:

Sec. 25-128-35. Scope of regulations

(a) **Well [Contractors and Drillers] drilling contractors and registered drillers**. The regulations shall apply to any person who engages in the industry, procedures, or operation, full time or part-time, for compensation or otherwise, of obtaining water from a well or wells

by drilling[,] or other methods[.], or of drilling geothermal bore holes. A well drilling contractor is any person regularly offering to the general public [the] such person's own services, [of his] or the services of any such person's employees, [or himself] in the industry of obtaining water from a well for any purpose or use [.], or in the industry of drilling geothermal bore holes.

(b) **Abandoned wells or geothermal bore holes**. The regulations shall apply to any person who abandons and permanently discontinues the use of a well or geothermal bore hole, or to any person who is responsible by law for the abandonment of a well or geothermal bore hole except as provided by [Section] section 25-134 of the Connecticut General Statutes.

(c) **Special exception for farmers**. The regulations shall not require a person who personally constructs a well on [his own or leased] property owned or leased by such person, intended for use only for farming purposes on [his] such person's farm, to obtain a certificate of registration or a permit, as provided by [Section] section 25-132 of the Connecticut General Statutes. A completion report shall be filed pursuant to section 25-128-62 of the Regulations of Connecticut State Agencies. A well that is constructed pursuant to this special exception shall not be converted to a public well unless such well was constructed by a registered well driller contractor, has a well drilling permit issued by the local director of health and a completion report, and such conversion is approved by the Department of Public Health.

(d) **Well development**. The regulations shall apply to any person who performs work on a well for the purpose of increasing the yield of a well or otherwise improving the quality or quantity of water that might be obtained from [the] a well.

[(e) **Non water-supply wells**. Pursuant to Section 25-133 of the General Statutes, non water-supply wells are exempt from these regulations except for sections 25-128-35, 25-128-58b, and 25-128-60b. Non water-supply wells shall be constructed according to the public health code, and any and all municipal ordinances. For the purposes of these regulations the term "non water-supply well" includes peizometers, containment recovery wells, and monitor wells.]

Sec. 4. Section 25-128-36 of the Regulations of Connecticut State Agencies is amended to read as follows:

Sec. 25-128-36. Definitions

(a) Unless expressly stated otherwise, the following terms shall, for the purpose of the Connecticut Well Drilling Code and any permit or completion report filed pursuant to said code, have the meanings indicated in this section.

(b) Words used in the present tense include the future; words used in the masculine gender include the feminine and neuter; the singular number includes the plural and the singular.

(c) Where the terms are not defined in this section or in [Section] section 25-126 of the Connecticut General Statutes, they shall have their ordinarily accepted meanings or such as

the context may imply.

(1) Access port: A suitable opening into [the] a well to allow measurement of the water level.

(2) Annular space: The space between two objects, one of which is surrounded by the other. This includes the space between the wall of an excavation and the wall of a pit; between the wall of an excavation and the casing or piping of a well or geothermal bore hole; or between two casings.

(3) Aquifer: A water bearing [earth material] strata that [which] can transmit water in significant quantity. It can be either consolidated rock, such as [ledge rock] bedrock, or unconsolidated material, such as sand, gravel, or soil with boulders.

(4) Artesian well: A well in which static water level rises above the top of the aquifer. The aquifer is confined by an impermeable geologic formation overlying the aquifer.

[(5) Bentonite clay grout: A mixture of bentonite clay and water with not less than two pounds of bentonite clay for every gallon of water.]

[(6)] (5) Board: The State Plumbing and Piping Work Examining Board.

[(7)] (6) Casing: A pipe placed in a well or geothermal bore hole to prevent the walls from caving, or to seal off surface drainage and other contaminants, so that they cannot enter the well or bore hole.

(7) Closed-loop geothermal fluid: The heat transfer fluid circulating within the piping and associated components of a closed-loop geothermal system. Such fluid serves to transfer energy between the Earth or water surrounding the piping and the heat exchange components of the geothermal system. Fluids that have been approved for use by the department are set forth in section 25-128-39b of the Regulations of Connecticut State Agencies.

(8) Closed-loop geothermal surface water body: A surface water body, such as a pond, stream or lake, that is utilized as a heat source or heat sink for a closed-loop geothermal system. No public drinking water reservoir, lake, pond or stream tributary to a public drinking water reservoir, or water body that has direct influence to a public well, shall be utilized as a heat source or heat sink for a closed-loop geothermal system.

(9) Closed-loop geothermal surface water system: A closed-loop geothermal system that utilizes a closed-loop geothermal surface water body as a heat source or heat sink.

(10) Closed-loop geothermal system: A heat exchange system consisting of piping buried or placed in a geothermal bore hole, trench, or closed-loop geothermal surface water body. These self-contained systems are intended to transfer energy between the Earth or water surrounding the piping and the geothermal fluid circulating within the piping.

[(8) Construction of well: All acts necessary to construct or repair wells for any intended purpose of use, including the location and excavation of the well, placement of casings, screens, and fittings, and well development and testing.]

[(9)] (11) Contamination: The act of introducing into water, foreign materials of such nature, quality, and quantity as to cause degradation of the quality of the [water] groundwater, such as in a bore hole or aquifer, or a surface water body.

(12) Department: The Department of Consumer Protection.

(13) Direct exchange geothermal system: A heat exchange system that employs a refrigerant geothermal fluid that changes its physical state between liquid, vapor and gas as the fluid circulates through closed-loop geothermal piping (also known as direct expansion).

[(10)] (14) Disinfection: The inactivation of harmful organisms present in water, through use of an accepted chlorine solution or other [accepted]disinfection material or procedure accepted by the Commissioner of Consumer Protection.

[(11)] (15) Drawdown: The extent of lowering of the water table or piezometric surface within or adjacent to the well, resulting from the discharge of water from the well. [Draw down] Drawdown is measured between the static water level and the pumping water level. The quantity of water available in the well from the static water level to the pump intake is known as the [draw down] drawdown available storage.

(16) Dug well: Has the same meaning as provided in section 19-13-B51b of the Regulations of Connecticut State Agencies.

[(12)] (17) Established grade[ground surface]: The permanent elevation of the surface of the ground at the site of the well after completion of grading, excavation[;], or other land movements.

(18) Geothermal bore hole: A bore hole that is used solely for the purpose of heat transfer and is fitted with closed-loop or open-loop heat exchange piping in accordance with section 25-128-39a of the Regulations of Connecticut State Agencies.

(19) Geothermal system: A closed-loop or open-loop heat system used for the purpose of exchanging heating or cooling by utilizing the relatively constant temperature of the Earth as a heat source or heat sink.

(20) Global Positioning System (GPS): A location-finding method whereby a user-operated receiver determines such receiver's position by communicating with satellites. The United States Department of Defense developed this system, which is officially known as the "Navigation Satellite Timing and Ranging Global Positioning System."

[(13)] (21) [Ground water] Groundwater: Water encountered below the ground surface of the [earth] Earth within the zone of saturation that can supply wells and springs.

[(14)] (22) Grout or grouting material: A low permeability material placed in the annular space between the casing and the formation or within [the borehole] a geothermal bore hole which is at least as impermeable as the soil formation. The purpose of the grout is to resist the migration of pollutants into the annular space.

[(15) Cement grouts: A mixture of Portland cement, sand, and water. The mixture is usually composed of one bag of Portland cement weighing ninety-four (94) pounds, an equal volume of dry sand, and five to six gallons of water.

(A) Neat cement grout: A mixture of not more than six gallons of clear water to one bag of Portland cement.

(B) Sand cement grout: A mixture of not more than two parts sand to one part Portland cement, and not more than six gallons of clear water to each bag of cement.

(C) Concrete grout: A mixture of Portland cement, sand, gravel and water.

(D) Bentonite grout: mined processed bentonite clay.

(E) Bentonite cement grout: A mixture of cement grout or sand cement grout with approximately ten per cent (10%) bentonite added to reduce shrinkage.

(F) Natural grout: A mixture of water and natural materials excavated during drilling of the well. The materials shall be placed by whatever techniques are effective for the existing conditions to achieve maximum density, strength, and impermeability of the fill material.

(G) Sand clay grout: A mixture of bentonite clay and sand in equal proportions.]

[(16)] (23) Flowing artesian well: A well in which the static water level is higher than the top of the casing and water flows from the well.

(24) Gravel well: Has the same meaning as provided in section 19-13-B51b of the Regulations of Connecticut State Agencies.

(25) Hazardous Substance: Has the same meaning as provided in 42 USC 13101, et seq., and 49 USC 101, et seq., and the regulations promulgated thereunder.

(26) High water mark: The upper limit of any land area that water may cover, either standing or flowing, at any time during the year.

(27) Hydrofracturing: A method of well development used to improve the specific capacity of a new or existing drilled well whereby certain zones within the well are pressurized in an effort to force open fractures in the bedrock.

[(17)] (28) Installation of pumps and pumping equipment: The procedure employed in the

placement and preparation for operation of pumps and pumping equipment, including all construction involved in making entrances to the well and to the building, establishing seals, installing pump piping, valves, wiring, electrical controls and tanks.

[(18)] (29) Liner pipe: Pipe that is installed inside a completed and cased well for the purpose of sealing off undesirable water or for repairing ruptured or punctured casing or screens. The liner pipe and screens may be constructed of PVC schedule forty (40) plastic that meets or exceeds American Society for Testing and Materials standard D-1785.

(30) Non-hazardous substance: Has the same meaning as provided in 42 USC 13101, et seq., and 49 USC 101, et seq., and the regulations promulgated thereunder.

(31) Non-water-supply well: Has the same meaning as provided in section 25-126 of the Connecticut General Statutes.

(32) Open-loop geothermal well: A well within which a supply of groundwater from an aquifer is directly withdrawn and employed as the heat transfer fluid in a geothermal system. Geothermal systems employing open-loop geothermal wells include pump and discharge geothermal systems, pump and recharge geothermal systems and standing column wells depending upon the discharge or return point of the water.

[(19)] (33) Owner: Any person or [his] such person's agent who holds the title or other rights of property where a well or geothermal system is constructed, repaired, or abandoned.

[(20)] (34) Potable water: Water free from impurities in amounts sufficient to cause disease or other harmful physiological effects, with the minimum or maximum bacteriological, physical, and chemical composition as required in section 19-13-B102 of the Regulations of Connecticut State Agencies for public wells or section 19a-37 of the Connecticut General Statutes for private wells and semipublic wells [defined by the applicable laws and regulations of the Department of Health Services].

(35) Private well: Has the same meaning as provided in section 19a-37 of the Connecticut General Statutes.

(36) Public water system: Has the same meaning as provided in section 19-13-B102 of the Regulations of Connecticut State Agencies.

(37) Public well: Has the same meaning as provided in section 19a-37 of the Connecticut General Statutes.

(38) Pump and discharge geothermal system: A type of open-loop geothermal system where groundwater from an aquifer is pumped directly from a water supply well to a building, where it transfers its heat energy to a heat pump. After leaving the building, the water is discharged to a permitted discharge point.

(39) Pump and recharge geothermal system: A type of open-loop geothermal system where

groundwater from an aquifer is piped directly from a water supply well to a building, where it transfers its heat energy to a heat pump. The water is then pumped back into the same aquifer via a second discharge or diffusion well with an immediate hydraulic connection to the source water supply.

[(21)] (40) Repair: Any work involved in the reaming, sealing, installing, changing of casing [depths] depth or height, perforating, screening, cleaning, [acidizing] acid washing, surging, [hydrofracting] hydrofracturing or other redevelopment of a well.

(41) Semipublic well: Has the same meaning as provided in section 19a-37 of the Connecticut General Statutes.

[(22)] (42) Specific capacity: The yield of a well expressed in gallons per minute per foot of drawdown, as abbreviated "gpm/ft."

(43) Standing column wells: A type of open-loop geothermal system where temperate water is withdrawn from a water supply well, circulated through a heat pump exchanger and returned to the water column in the same well.

[(23)] (44) Static water level: The depth to the surface of the water in a well measured from the land surface or other convenient, permanent, and specified datum, when no water is being discharged from the well and the water level has reached equilibrium.

(45) Surface water body: Water located on the surface of the Earth in bodies such as lakes, rivers, streams, ponds, and reservoirs.

[(24)] (46) Water supply well: Has the same meaning as provided in section 19a-37 of the Connecticut General Statutes.

[(a) Well bored or augered: Any excavation made for water, or in exploration for water, using power driven equipment, where the drill consists of a continuous spiral of metal or a hollow cylinder or bucket attached to a shaft, and where the excavated material is brought to the ground service by upward movement along the surface of the spiral or removed by the bucket.]

[(b) Well gravel: A well constructed into unconsolidated material. In the zone immediately surrounding the well screen more permeability is obtained by hydraulic action or by removing the finer formation material and replacing it with artificially graded coarser material.]

[(c) Well drilled rock: A well drilled into consolidated rock in which that portion of the well drilled into the overlying unconsolidated material is supported by a casing.]

[(d) Well dug: A well excavated into a shallow aquifer.]

[(e) Well monitor: A well constructed for the purpose of aquifer testing, obtaining samples of

ground water quality and/or measurement of ground water level.]

[(25) Well-seal: An approved arrangement or device used to cap a well or to establish and maintain a junction between the casing or curbing of a well and the pipe or equipment installed therein, the purpose or function of which is to prevent contaminants from entering a well at the upper terminal.

(26) Well vent: An outlet at the upper terminal of a well casing to allow equalization of air pressure in a well but at the same time so constructed as to avoid entry of water and foreign material into the well.

(27) Well yield: The quantity of water per unit of time which may flow or be pumped continuously from a well.

(28) Well hydrofracturing: A method of well development used to improve the specific capacity of new or existing drilled wells. Certain zones within the well are pressurized in excess of one hundred (100) psi with water in an effort to force open fractures in the bedrock.]

(47) Well: Any water supply well or non-water-supply well.

[(29)] (48) Well abandonment: Actions taken to ensure that a well [which] that is no longer in use shall not be a source or conduit for contamination of [ground water] groundwater resources.

[(30)] (49) Well contractor: A [well drilling contractor is any] person regularly offering to the general public the personal services of [his employees or himself] such contractor or the services of such contractor's employees in the industry of obtaining water from a well for any purpose or use.

(50) Well vent: An outlet at the upper terminal of a well casing to allow equalization of air pressure in a well, but at the same time so constructed as to avoid entry of water and foreign material into the well.

(51) Yield: Has the same meaning as provided in section 19-13-B51b of the Regulations of Connecticut State Agencies.

[(31) Master well driller: A master well driller is any person experienced and skilled in the industry of obtaining water from a well for any purpose or use.]

Sec. 5. Section 25-128-37 of the Regulations of Connecticut State Agencies is amended to read as follows:

Sec. 25-128-37. Manner of construction

(a) The construction of any well or geothermal bore hole shall be planned and carried out in a manner to guard against waste and contamination of [ground water] groundwater resources.
(b)Standing column wells shall not be configured to be used concurrently as a potable water

supply and a geothermal heating or cooling source. Any dual-use wells existing on or before the effective date of this subsection may remain active and shall be properly maintained.

Sec. 6. Section 25-128-38 of the Regulations of Connecticut State Agencies is amended to read as follows:

Sec. 25-128-38. Application of public health [code] regulations

The regulations for the construction of water supply wells [, as provided herein,] shall be construed in a manner consistent with the provisions of [Sections 19-13-B51] sections 19-13-B51a to 19-13-B51m, inclusive, of the [Public Health Code]Regulations of Connecticut State Agencies. In the event any conflict shall appear, the interpretation of sections 25-128-33 to 25-128-63, inclusive, of the Regulations of Connecticut State Agencies [the regulations] shall be made which affords the greater protection of the public health.

Sec. 7. Section 25-128-39 of the Regulations of Connecticut State Agencies is amended to read as follows:

Sec. 25-128-39. [Adequate relations of diameter,]Diameter, depth, and yield of water supply wells

(a) [Wells] All new water supply wells shall be of adequate diameter and depth to be capable of yielding the quantity of water required by the user. For the use of an individual household, a bedrock well [of six (6) inches in diameter] shall be satisfactory when it is capable of [yielding]:

[(a) five] (1) Yielding five (5) gallons per minute and, in a six inch well, has a storage available of seventy-five (75) gallons. [or has a water column depth of one hundred (100) feet, whichever is greater] In wells with a diameter other than six (6) inches, an equivalent storage shall be required;

[(b) three] (2) Yielding three and one half (3 1/2) gallons per minute and, in a six inch well, has a storage available of one hundred fifty (150) gallons. [or has a water column depth of one hundred fifty (150) feet, whichever is greater] In wells with a diameter other than six (6) inches, an equivalent storage shall be required.

[(c) two] (3) Yielding two (2) gallons [(2)] per minute and has a storage available of two hundred twenty-five (225) gallons. [or has a water column depth of two hundred (200) feet, whichever is greater] In wells with a diameter other than six (6) inches, an equivalent storage shall be required;

[(d) one] (4) Yielding one (1) gallon per minute and has a storage available of four hundred (400) gallons. [or has a water column depth of three hundred seventy-five (375) feet, whichever is greater] In wells with a diameter other than six (6) inches, an equivalent storage shall be required; or

[(e) one] (5) Yielding one half (1/2) gallon per minute and [has a water column depth of four

hundred fifty (450) feet or] has a storage available of six hundred (600) gallons. [, whichever is greater] In wells with a diameter other than six (6) inches, an equivalent storage shall be required.

[(f)] (b) [storage] Storage available shall be the volume of water from the level of the pump intake to the static water level of the well plus any usable water in a storage tank. Storage tanks may be provided using [combinations] any combination of hydropnuematic tanks [and/or] and non-pressurized tanks with booster pumps.

[(g)] (c) [wells] Water supply wells yielding less than one half (1/2) [gallons] gallon per minute shall be pump tested for at least eighteen (18) hours [(18)] to prove the water supply well yield. It is not recommended that a water supply well with less than one half (1/2) gallon per minute of yield be used as the only supply for an individual household.

(d) In the event[, however] that [in the opinion of] the Board[,] determines that a special or unusual geological, hydrological, or other [circumstances shall exist] circumstance exists in the construction of any well, the Board may determine the minimum requirements of diameter, depth, and yield for the water supply well and shall render a final decision. The decision of the board shall be the final decision in accordance with section 4-180 of the Connecticut General Statutes for purposes of reconsideration in accordance with section 4-181a of the Connecticut General Statutes or appeal to the Superior Court in accordance with section 4-183 of the Connecticut General Statutes.

Sec. 8. The Regulations of Connecticut State Agencies are amended by adding sections 25-128-39a to 25-128-39d, inclusive, as follows:

(NEW) **Sec. 25-128-39a. Geothermal bore holes**

(a) The inside diameter of closed-loop geothermal bore holes shall be in accordance with the geothermal system manufacturer's specifications to allow for the proper installation of piping and grout. Where a single heat exchange pipe with no u-bend is in contact with the grout, as in a concentric system where an internal supply pipe is suspended and completely surrounded by an external heat exchange pipe, the size of the bore hole shall be in accordance with the manufacturer's specifications in order to provide for proper grouting via the tremie method.

(b) Open-loop geothermal bore holes shall be constructed in a manner that complies with all water supply well requirements, including the separating distances to sources of pollution set forth in section 19-13-B51d of the Regulations of Connecticut State Agencies.

(NEW) **Sec. 25-128-39b. Closed-loop geothermal system fluid**

(a) All chemicals used or added to fluids circulating through a closed-loop geothermal system for heat exchange, and the amount of chemicals used or added, shall be those specified by the manufacturer and shall be subject to industry approved standards for geothermal system

efficiency.

(b) A well contractor shall only use the following closed-loop geothermal system fluids in closed-loop geothermal systems:

(1) The refrigerants commonly referred to as R-134A, R-407C, and R-410A;

(2) Drinking water, as defined in section 19-13-B102 of the Regulations of Connecticut State Agencies;

(3) Heat transfer fluids containing potable water combined with a maximum of twenty-five (25) per cent propylene glycol that has been approved by the federal Food and Drug Administration; and

(4) Other geothermal system fluids or additives approved by the department and the Department of Public Health.

(NEW) **Sec. 25-128-39c. Closed-loop geothermal system piping**

(a) The only acceptable materials for the underground portion of a closed-loop geothermal system are as follows:

(1) Copper, that has a cathodic protection system;

(2) High density, polyethylene extrusion compound having a cell classification of PE 345434c or PE 355434c with an ultraviolet stabilizer of C, D or E as specified in American Society for Testing and Materials ("ASTM") standard D-3350 with the following exception: This material shall exhibit zero (0) failures when tested for one hundred ninety-two (192) hours or more under ASTM standard D-1693, condition C, as required in ASTM standard D-3350. This material shall maintain a one hundred sixty (160) pounds per square inch ("psi") hydrostatic design basis at 73.4 degrees Fahrenheit per ASTM standard D-2837, and shall be listed in PPI TR4 as a PE 3408 piping formulation; and

(3) Those materials approved by the department in consultation with the Department of Public Health and the Department of Energy and Environmental Protection.

(b) The only acceptable methods for joining sections of buried geothermal piping are as follows:

(1) For copper piping assemblies, by the use of brazed joints;

(2) For polyethylene piping assemblies, by use of the heat fusion process in accordance with the pipe manufacturer's specifications, or by use of mechanical stab fittings approved by the International Ground Source Heat Pump Association ("IGSHPA");

and

(3) For piping made of materials approved pursuant to subsection (a)(3) of this section, by the use of those methods approved by the department in consultation with the Department of Public Health and the Department of Energy and Environmental Protection.

(c) All geothermal systems shall be pressure tested with water, air, or an inert gas to a minimum of one hundred fifty (150) per cent above the heat pump manufacturer's operating specifications for a minimum period of thirty (30) minutes before being put into service. Any system found to leak shall be repaired or replaced and then retested before being put into service.

(NEW) **Sec. 25-128-39d. Fluids used in open-loop geothermal systems**

Open-loop geothermal wells shall use only the natural groundwater, and no additives or other fluids are permitted.

Sec. 9. Section 25-128-40 of the Regulations of Connecticut State Agencies is amended to read as follows:

Sec. 25-128-40. Pumps and pumping equipment

(a) Pumps and pumping equipment shall be installed in the well to make the most efficient use of well storage.

(b) Pumps and pumping equipment shall be located to permit convenient access for inspection, maintenance and repair.

(c) In the event the base plate of a pump is placed directly over the well, the base plate shall be of a type designed to form a watertight seal with the well casing or pump foundation, as provided by [Section]section 19-13-B51j of the [Public Health Code] Regulations of Connecticut State Agencies.

(d) The well shall be properly vented at the well head to allow for pressure changes within the well.

(e) The electrical wiring used in connection with the pump shall conform to specifications of the Connecticut State [Basic]Building Code.

(f) Contaminated water shall not be used for the purpose of priming any pump.

(g) No connections shall be made between a geothermal system and a water supply well or the water distribution system connected to the water supply well.

Sec. 10. Section 25-128-41 of the Regulations of Connecticut State Agencies is amended to read as follows:

Sec. 25-128-41. Location and protection of water supply wells

The location of any water supply well upon premises shall be subject to approval by the local health officer of the municipality in which [the said] such premises are located, and shall be as provided by [Section 19-13c] section 19a-39 of the Connecticut General Statutes, and by [Sections 19-13-B50 to 19-13-B51, inclusive, of the Public Health Code] section 19-13-B51d of the Regulations of Connecticut State Agencies.

Sec. 11. The Regulations of Connecticut State Agencies are amended by adding section 25-128-41a as follows:

(NEW) **Sec. 25-128-41a. Location of closed-loop geothermal systems**

(a) The following are the separating distance specifications for all closed-loop geothermal systems. Distances cited are minimum separating distances based on horizontal measurements. Non-vertical closed-loop geothermal bore holes shall maintain the minimum separation distances when measured from any point along the borehole.

(1) Separating distances to subsurface sewage disposal systems shall be as prescribed in Section II of the Technical Standards for Subsurface Sewage Disposal Systems published by the Commissioner of Public Health pursuant to section 19-13-B103d(b) of the Regulations of Connecticut State Agencies.

(2) 25 feet from a below ground tank containing a non-hazardous substance. 50 feet from a below ground tank containing a hazardous substance.

(3) 10 feet from surface water or groundwater drainage structures or piping, water supply piping, public sewer laterals or mains, and fuel or utility piping. Stone below a foundation floor is not considered part of the groundwater drainage system relative to this separation distance.

(4) 10 feet from the high water mark of any body of water, except when the subject body of water is employed in a closed-loop geothermal surface water system.

(5) 50 feet from a private well or a semipublic well. The distance may be reduced to be no closer than 25 feet from a non-borehole system. When a closed-loop geothermal system is located on the same property as a private well or semipublic well, the distance may be reduced to be no closer than 25 feet to such private well or semipublic well.

(6) 75 feet from a public well with a withdrawal rate of less than 10 gallons per minute. Such distance shall not be reduced.

(7) 150 feet from a public well with a withdrawal rate of 10 to 50 gallons per minute. Such distance shall not be reduced.

(8) 200 feet from a public well with a withdrawal rate greater than 50 gallons per minute. Such distance shall not be reduced.

(b) Sources of pollution, for the purposes of this section, shall not include curtain drains, foundation drains, gutter drains, and similar drains that may carry water.

Sec. 12. Section 25-128-42 of the Regulations of Connecticut State Agencies is amended to read as follows:

Sec. 25-128-42. Drilling[, general] <u>of water supply wells</u>

(a) [The well] <u>Water supply wells</u> shall be so constructed that a pump of capacity equal to the desired yield can be installed and operated for different yields.
(b) Any water used shall be disinfected or of drinking water quality.

(c) Any chemicals or other additives used in drilling shall be cleaned out from the well.

(d) Rock cuttings shall be cleaned out of the well.

(e) [The well shall be tested as provided by Section 19-13-B51of the Public Health Code.] <u>Water supply wells shall be tested in accordance with section 19-13-B102 of the Regulations of Connecticut State Agencies for public wells and section 19-13-B101(d) of the Regulations of Connecticut State Agencies for private and semipublic wells</u>.

[(f) The well driller shall prepare and maintain a log on forms supplied by the Board, and shall submit copies of the log to the Board and to the owner or owners of the well, respectively. The log shall clearly identify the location of the well upon the premises.]

[(g)] <u>(f)</u> Well development shall be performed only by properly registered persons.

[(h)] <u>(g)</u> Subcontracted work shall be performed only by properly registered persons.

[(i)] <u>(h)</u> No solder containing more than 0.2 per cent lead shall be used in making joints and fittings in any public <u>water system</u> or private potable water supply system or any water user's pipelines <u>and shall conform to the specifications of the Connecticut State Building Code</u>.

Sec. 13. Section 25-128-43 of the Regulations of Connecticut State Agencies is amended to read as follows:

Sec. 25-128-43. Casing of drilled wells

(a) The bottom end of the primary casing shall be equipped with a hardened drive shoe of the appropriate size.

(b) The casing shall extend at least six (6) inches above the land surface. Annular space shall be grout filled from the frost level to the bottom of the casing, except that, where special or unusual conditions exist, the annular space shall be <u>filled with</u> grout [filled]from the frost level to a distance of at least ten (10) feet below the land surface.

(c) Upon completion of the well unit and until such time as the well is equipped with a pump, the top of the casing shall be a metal cap fixed to prevent unwarranted access.

(d) The primary casing shall be new steel and shall be free of pits, breaks, or other serious imperfections. All casing pipes and couplings used shall have minimum weights and wall thicknesses per diameter, as specified in Table 1.

(e) In the event casing pipes are assembled together, they shall be joined by means of watertight welded joints, screw coupling joints, or slip joints. In the use of welded joints, the weld shall be at least as thick as the wall thickness of the well casing.

(f) In the event the diameter of a casing is reduced at any point along its length, the annular space between the larger and smaller casings shall be made watertight.

Sec. 14. Section 25-128-48 of the Regulations of Connecticut State Agencies is amended to read as follows:

Sec. 25-128-48. Gravel packed wells, construction

In a gravel packed well in which the top of the gravel does not extend inside the outer casing, a [cement group] bentonite plug of at least five (5) feet in thickness shall be placed in the annular space directly on top of the gravel. The remaining space shall be filled with grout except that the upper ten (10) feet below the frost level shall be filled with cement grout. Centering guides shall be attached to pipe extensions about the well screen and to blank pipes separating different screened sections. The gravel filled pipes shall be properly capped.

Sec. 15. Section 25-128-48a of the Regulations of Connecticut State Agencies is amended to read as follows:

Sec. 25-128-48a. Annular space

(a) Unless otherwise specified in section 19-13-B51f of the Regulations of Connecticut State Agencies, any[Any] annular space between the outside of the piping or casing and the natural materials penetrated by [the] a well or geothermal bore hole shall be filled with suitable material to make this space as impervious to the movement of fluids and competent to support the piping or casing as are the natural materials surrounding the well or geothermal bore hole. The annular space for a geothermal bore hole shall be grouted in accordance with subsection (g) of this section. The driller may fill the annular space with the natural materials excavated during the drilling of a water supply [the] well to meet the following requirements:

(1) [the] The annular space shall be [fitted] filled as completely as possible from the bottom of the casing to the land surface without any depressions, voids, holes or channels;

(2) [the] The driller shall employ whatever techniques are effective for the existing conditions to achieve maximum density, strength and impermeability of the fill material; and

(3) [the] The surface of the fill material shall be sloped away from the casing.

(b) In [cases] locations where potentially contaminating or corrosive fluids are encountered, or impermeable natural materials cannot be adequately placed and compacted to where geologic conditions or the isolation distance may not be adequate, the annular space shall be grouted for the full length of the casing, or the portion thereof below the frost line or pitless adaptor, so that no fluids may move in the zone needing to be grouted.

(c) A well driller shall only use the following grouts in the process of drilling wells or geothermal bore holes, or in the abandonment of wells or geothermal bore holes:

(1) Bentonite cement grout: A mixture of cement grout or sand cement grout with a minimum of ten (10) per cent bentonite added to reduce shrinkage.

(2) Bentonite clay grout: A mixture of mined, processed bentonite clay and potable water with not less than two (2) pounds of bentonite clay for every gallon of water.

(3) Cement grout: A mixture of portland cement, sand, and potable water. The mixture is commonly composed of one (1) bag of portland cement weighing ninety-four (94) pounds, an equal volume of dry sand, and five (5) to six (6) gallons of water.

(4) Concrete grout: A mixture of portland cement, sand, gravel and water.

(5) Natural grout: A mixture of water and natural materials excavated during drilling of a well. The materials shall be placed by whatever techniques are effective for the existing conditions to achieve maximum density, strength, and impermeability of the fill material.

(6) Neat cement grout: A mixture of not more than six (6) gallons of water to one (1) bag of portland cement weighing ninety-four (94) pounds.

(7) Sand cement grout: A mixture of not more than two (2) parts sand to one (1) part portland cement, and not more than six (6) gallons of water to each ninety-four (94) pound bag of portland cement.

(8) Sand clay grout: A mixture of bentonite clay and sand in equal proportions, and water.

(d) Notwithstanding subsection (c) of this section, a well driller shall use salt water resistant grout to seal the annular spaces in a water supply well when such water supply well is located within seventy-five (75) feet of a roadway where road salt is applied or in a coastal area in which the water supply well may be subject to brackish or salt water. Any additives to the grout other than silica sand and water shall meet NSF International/American National Standards Institute standard 60.

(e) All closed-loop geothermal bore holes, upon installation of loop piping, shall be grouted with one of the following grouting materials:

(1) Grout 111, as developed by Brookhaven National Laboratories for use with copper piping typically employed in a direct exchange geothermal system, or as directed per manufacturer recommendations;

(2) High grade bentonite or thermally enhanced bentonite compounds based upon the manufacturer's recommendation; or

(3) Other grouting materials approved by the department in consultation with the Department of Public Health.

(f) Grouts shall be mixed and installed in accordance with the manufacturer's specifications. Grouts may be used whether consolidated or unconsolidated formations are encountered. All closed-loop geothermal system bore holes shall be grouted within seven (7) days of the completion of drilling. After installation of piping, the bore hole shall be covered with a protective layer of grout at least one (1) foot thick and three (3) feet in diameter, centered over the bore hole. Detectable underground tape shall be installed above all bore hole locations.

(g) All closed-loop geothermal system bore holes shall be filled using the tremie method. The entire bore hole shall be filled with grout beginning at the bottom of the bore hole. The tremie employed shall be properly sized for the type of grout used, the ground conditions encountered, and the type of loop system installed. The minimum bore hole diameter shall be that specified by the manufacturer and subject to industry approved standards. Drilling mud and cuttings shall not be mixed into the bore hole.

Sec. 16. Section 25-128-49 of the Regulations of Connecticut State Agencies is amended to read as follows:

Sec. 25-128-49. Well head completion and equipment

The completion of the well head and the equipment used shall be as follows:

(a) The top of the casing shall be cut off reasonably smooth and level.

(b) In the event the well head is enclosed, the enclosure shall be adequately drained. In the event a well pit is used, it shall be [drained] constructed in the manner provided by [Section 19-13-B51 of the Public Health Code] sections 19-13-B51h and 19-13-B51i of the Regulations of Connecticut State Agencies.

(c) All water piping shall be protected against freezing.

(d) The well shall be equipped with a tightly fixed vented cap or a sanitary seal with an access port for ventilation. The access port shall have a minimum, inside diameter of one quarter (1/4) inch. It shall be installed and maintained in such a manner as to prevent the entrance of water, dust, insects, or other foreign material, and to permit ready access for the purpose of water level measurement.

Sec. 17. The Regulations of Connecticut State Agencies are amended by adding section 25-128-49a as follows:

(NEW) **Sec. 25-128-49a. Geothermal bore hole termination**

Geothermal bore holes shall be terminated a minimum of four (4) feet below the proposed finished grade and shall be fed to the point of termination. If piping running between bore holes and the heated structure is shallower than four (4) feet below finished grade, measures shall be taken to prevent long term damage to the tubing from freeze-thaw cycles and accidental damage. Bore holes terminating in a structure shall be terminated flush with the finished floor. Casing, if used during bore hole drilling, shall be capped from the time of installation until the installation of the geothermal system piping. As the bore hole is being grouted, the casing may be withdrawn. Figures 6 and 7 in section 25-128-64 of the Regulations of Connecticut State Agencies set forth examples of bore hole termination for geothermal bore holes.

Sec. 18. Section 25-128-51 of the Regulations of Connecticut State Agencies is amended to read as follows:

Sec. 25-128-51. Tests of yield

All new and repaired water supply wells, with the exception of repairs limited to well casing extensions, shall be tested for yield and capacity, as provided by [Section 19-13-B51 K (b) of the Public Health Code] section 19-13-B51k of the Regulations of Connecticut State Agencies, and all static and pumping water levels and well discharge shall be measured and recorded, with the pumping rate held constant. The test shall be made by one of the following methods: the pump method, the bailer-recovery method, the air rotary drill method, or the air lift method. For wells serving a single family the well may be tested for yield by removing as much water as is practicable from the well and measuring the rate of recovery. Geothermal bore holes for closed-loop geothermal systems are not required to be yield tested.

Sec. 19. Section 25-128-52 of the Regulations of Connecticut State Agencies is amended to read as follows:

Sec. 25-128-52. Disinfection of wells

All wells shall be disinfected by chlorination as provided by [Section 19-13-B51 K (c) of the Public Health Code]section 19-13-B51k (c) of the Regulations of Connecticut State Agencies when such wells are constructed, repaired or developed.

Sec. 20. Section 25-128-53 of the Regulations of Connecticut State Agencies is amended to read as follows:

Sec. 25-128-53. Construction of non-water-supply wells and geothermal boreholes

All non-water-supply wells [used for other purposes than the supply of water for human

consumption] and all geothermal bore holes shall be constructed, repaired, and maintained in such a manner that they are not a source or cause of [ground water] groundwater contamination.

Sec. 21. Section 25-128-54 of the Regulations of Connecticut State Agencies is amended to read as follows:

Sec. 25-128-54. Maintenance and repair of wells, geothermal systems and pumping equipment

All wells and geothermal systems shall be maintained in a proper condition to conserve and protect [ground water] groundwater resources, and shall not be a source or cause of contamination or pollution of the water supply of any aquifer. All materials and construction practices used in the maintenance, repair, or replacement of any well shall be the same as those required for the construction of a new well or geothermal system. All maintenance, repair, hydrofracturing, developing, and replacement work shall be done only by a [registered well driller] person holding the appropriate registration issued by the department pursuant to section 25-129 of the Connecticut General Statutes, or by a licensed plumber or electrician acting within the scope of the person's license, as provided by [Section] section 25-129 of the Connecticut General Statutes[, and Articles 5 and 6 of the regulations].

Sec. 22. Section 25-128-55 of the Regulations of Connecticut State Agencies is amended to read as follows:

Sec. 25-128-55. Promulgation of construction standards

The regulations for the construction, maintenance, and repair of wells and geothermal systems, [as provided herein] shall be promulgated in cooperation with the [State] Department of Public Health [Services] and the Department of Energy and Environmental Protection.

Sec. 23 Section 25-128-56 of the Regulations of Connecticut State Agencies is amended to read as follows:

Sec. 25-128-56. Abandonment of wells, responsibility

(a) Any well that is abandoned shall not be a source or cause of contamination or pollution of [ground water] groundwater resources. Abandonment procedures shall be performed or directed only by a registered well driller contractor. The registered well [drilling] driller contractor who performs the work of abandonment shall be responsible for compliance with the procedure of abandonment of the well, as provided in [this part and shall notify the local health authority of the abandonment of the well] section 25-128-57 of the Regulations of Connecticut State Agencies.

(b) A registered well driller contractor shall, within 60 days of completion of a well

abandonment, file a completion report on a form and in a manner prescribed by the Commissioner of Consumer Protection in accordance with section 25-128-62 of the Regulations of Connecticut State Agencies. Copies of such report shall be concurrently submitted to the owner, the Departments of Consumer Protection, Public Health and Energy and Environmental Protection, and the local health department or district.

Sec. 24. Section 25-128-57 of the Regulations of Connecticut State Agencies is amended to read as follows:

Sec. 25-128-57. Procedure of abandonment

In the event of abandonment of any water supply well or other type of well the proper procedure and materials shall be used as follows:

(a) The well shall be plugged to prevent the entrance of surface water, circulation of water between or among producing zones, or any other process resulting in the contamination or pollution of [ground water] groundwater resources.

(b) In the event of temporary abandonment or discontinuance of the use of any well, the well shall be sealed with a watertight cap or seal, as provided [by Section 25-128-42(c)] in subsection (e) of this section.

(c) The well shall be chlorinated prior to abandonment using a chlorine solution with a minimum concentration of one hundred fifty parts per million (150 ppm) of chlorine. [This is equivalent to 5.5 quarts of bleach at 2.25% available chlorine to five hundred (500) gallons of water or three hundred thirty-three (333) feet of six (6) inch diameter well.]

(d) The well shall be checked from land surface to the entire depth of the well before it is sealed, to insure against the presence of any obstruction that will interfere with sealing operations.

(e) The well bore shall be filled and sealed with any of the following materials: [heat] neat cement grout, sand cement grout, bentonite clay grout, or sand clay or bentonite cement grout. Dug wells may be abandoned with clean sand and gravel.

(f) The grout material shall be placed in such a way to prevent voids in the grout or dilution of the grout.

(g) Any well constructed in a consolidated rock formation, may be filled with fine sand in the zone or zones of consolidated rock. The top of the sand fill shall be at least ten (10) feet below the bottom of the casing, and the remaining portions of the well shall be filled with [any of the materials specified in subsection (e).] neat cement grout, sand cement grout, bentonite clay grout, or sand clay or bentonite cement grout.

(h) Any test well or bore shall be abandoned in such a manner that it does not become a channel for the vertical movement of water or other substance to the potable [ground water]

groundwater resources.

(i) Deep waste disposal or oil wells with casings free of any breaks, and extending below the potable [ground water] groundwater zones, may be sealed with a watertight cap or welded plate.

(j) Upon completion of abandonment of the well, the top of the casing or grout material may be terminated at least four (4) feet below the ground surface.

Sec. 25. The Regulations of Connecticut State Agencies are amended by adding section 25-128-57a as follows:

(NEW) **Sec. 25-128-57a. Abandonment of geothermal systems**

When abandoning a geothermal system, closed-loop geothermal fluid shall be displaced with bentonite grout or a substance approved by the Department of Consumer Protection in consultation with the Department of Public Health and the Department of Energy and Environmental Protection, or otherwise be evacuated from the geothermal system by a process approved by the Department of Consumer Protection. After displacement or evacuation of the fluid, the bore hole and excavation shall be filled and covered with grout to provide a cap at least twelve (12) inches thick over the bore hole. All fluids or gases shall be contained and properly disposed of.

Sec. 26. Section 25-128-62 of the Regulations of Connecticut State Agencies is amended to read as follows:

Sec. 25-128-62 [Contents of permit application] Completion reports

[The application for a permit by a registered well driller shall include an appropriate map or plot plan, showing the location of the proposed well and the premises on which the well is located, in relation to roads, intersections, and other permanent land features. All permit applications shall be signed by a master driller, as representative of the registered well-drilling contractor.]

(a) A contractor shall, within 60 days of completion of a water supply well or a geothermal system, file a completion report on a form and in a manner prescribed by the Commissioner of Consumer Protection. The completion report shall be concurrently submitted to the owner and the department. Such report shall include but not be limited to the following:

(1) Contractor information: Name of the contractor; address; registration number; and type of work completed (e.g., drill bore holes, install and grout loops, bore hole abandonment, etc.).

(2) Water supply well or system location: Town; driller map number; GPS coordinates to the nearest fifth decimal; address; zip code; nearest two cross streets; casing details (length, diameter, weight per foot, manner of connection sections of casing, information on use of a drive shoe, information on grouting of well casing and

type of grout used); yield test information (bailed, pumped, compressed air, duration of yield test in hours, yield in gallons per minute); water level information (static water level, water levels during yield test); depth of completed well; well screen details; geological materials and thickness of materials penetrated in feet; date well was completed; permit number; registration number; date of report; signature of well driller; and schematic diagram showing location of completed well with measurements to at least two fixed points.

(3) Well or system owner: Name; address; town; state; zip code; and telephone number.

(4) When applicable, bore hole specifications: Date first bore hole drilled; date last bore hole drilled; total number of bore holes drilled; total number of bore holes used in system; diameter of bore holes; depth of bore holes in feet; spacing intervals of bore holes in feet; average depth to bedrock in feet; geologic materials and thickness of materials penetrated; amount and type of casing, if any; static water levels; type of grout used; and amount of grout used.

(5) When applicable, loop field installation: Installer name; registration number; piping loop material used; number of loops installed; depth of closed-loop in feet; date last loop installed; date bore hole grouted; type of grout used; average number of bags to grout each loop; pounds per bag of grout; and cubic feet of grout used for each bore hole. The type and volume of closed-loop geothermal fluid to be used in closed loops shall be denoted, and the form shall provide for a confirmation that detectable underground tape has been installed above the bore hole location.

(b) Attached to each form shall be a diagram prepared or approved by the contractor showing geothermal bore holes, major buildings, septic systems, and water supply wells on site.

Sec. 27. Section 25-128-63 of the Regulations of Connecticut State Agencies is amended to read as follows:

Sec. 25-128-63. Exemption from construction standards

As provided by [Section]section 25-133 of the Connecticut General Statutes, as where the Board finds that compliance with the regulations and construction standards adopted [herein] would result in undue hardship, an exemption from any one or more of the standards may be granted by the Board to the extent necessary to ameliorate such undue hardship, and to the extent such exemption can be granted without impairing the intent and purpose of the regulations. An application for a special exemption shall be made [at the office of the Board, and shall be] in writing on a form to be [supplied by the Board] prescribed by the department. The application shall include all information regarding circumstances and conditions of construction of the well as the Board deems necessary. The decision of the Board to grant or deny the exemption requested, in whole or in part, shall be made within thirty (30) days, and the Board shall notify the applicant [by certified mail]in writing of its decision. Exemptions may only be granted by the Board pertaining to the requirements of chapter 482 of the Connecticut General Statutes and the regulations promulgated thereunder, and without violating chapter 368a of the Connecticut General Statutes and the regulations promulgated thereunder.

Sec. 28. Section 25-128-64 of the Regulations of Connecticut State Agencies is amended to read as follows:

Sec. 25-128-64 [Emergency permits] Figures and Drawings

[Notwithstanding any provision of this article, the Board may grant a permit for the construction, repair, or abandonment of any well by its informal, verbal authorization, if it determines that an emergency situation exists with respect to the necessity for the construction, repair, or abandonment of the well. The well drilling contractor shall also obtain the approval of the local director of health or his agent, for the work intended to be done. Within a reasonable time after giving its authorization, the Board shall require that a written application for a permit, and, if necessary, a written application for a special exemption shall be made, in compliance with the provisions of this article and Sections 25-130 and 25-133 of the General Statutes. In the event the formal application for the permit or exemption is refused, the well drilling contractor shall, upon written notification by the Board, immediately cease all work on the well.]

Table 1

CASING PIPE WEIGHTS AND DIMENSIONS

Size In Inches	Wt. Lbs. Per Ft. Threads and Couplings	Pipe			Threads per Inch	Couplings	
		Thickness in Inches	Diameter-Inches			Length in Inches	External Diameter Inches
			External	Internal			
1--	1.68	.133	1.315	1.049	11 1/2	1 7/8	1.556
1 1/4	2.28	.140	1.660	1.380	11 1/2	2 1/8	1.907
1 1/2	2.73	.145	1.900	1.610	11 1/2	2 3/8	2.218
2	3.68	.154	2.375	2.067	11 1/2	2 5/8	2.760
2 1/2	5.82	.203	2.875	2.469	8	2 7/8	3.276
3	7.62	.216	3.500	3.068	8	3 1/8	3.948
3 1/2	9.20	.226	4.000	3.548	8	3 5/8	4.531
4	10.89	.237	4.500	4.026	8	3 5/8	5.091
4 1/2	12.64	.247	5.000	4.506	8	4 1/8	5.591
5	14.81	.258	5.563	5.047	8	4 1/8	6.296
*6	19.18	.280	6.625	6.065	8	4 1/8	7.358
7	23.769	.301	7.625	7.023	8	4 1/8	8.358
8	25.00	.277	8.625	8.071	8	4 5/8	9.420
10	35.00	.307	10.750	10.136	8	6 1/8	11.721
12	45.00	.330	12.750	12.090	8	6 1/8	13.958
14 OD	57.00	.375	14.000	13.250	8	7 1/8	15.446
15 OD	61.15	.375	15.000	14.250	8	7 1/8	16.446
16 OD	65.30	.375	16.000	15.250	8	7 1/8	17.446
17 OD	73.20	.375	17.000	16.250	8	7 1/8	18.683
18 OD	81.20	.375	18.000	17.250	8	7 1/8	19.921
20 OD	90.00	.375	20.000	19.250	8	7 5/8	21.706
*6	17.00	.250	6.625	6.375	(also acceptable)		

FIG. 1 CONSTRUCTION OF BEDROCK WELLS

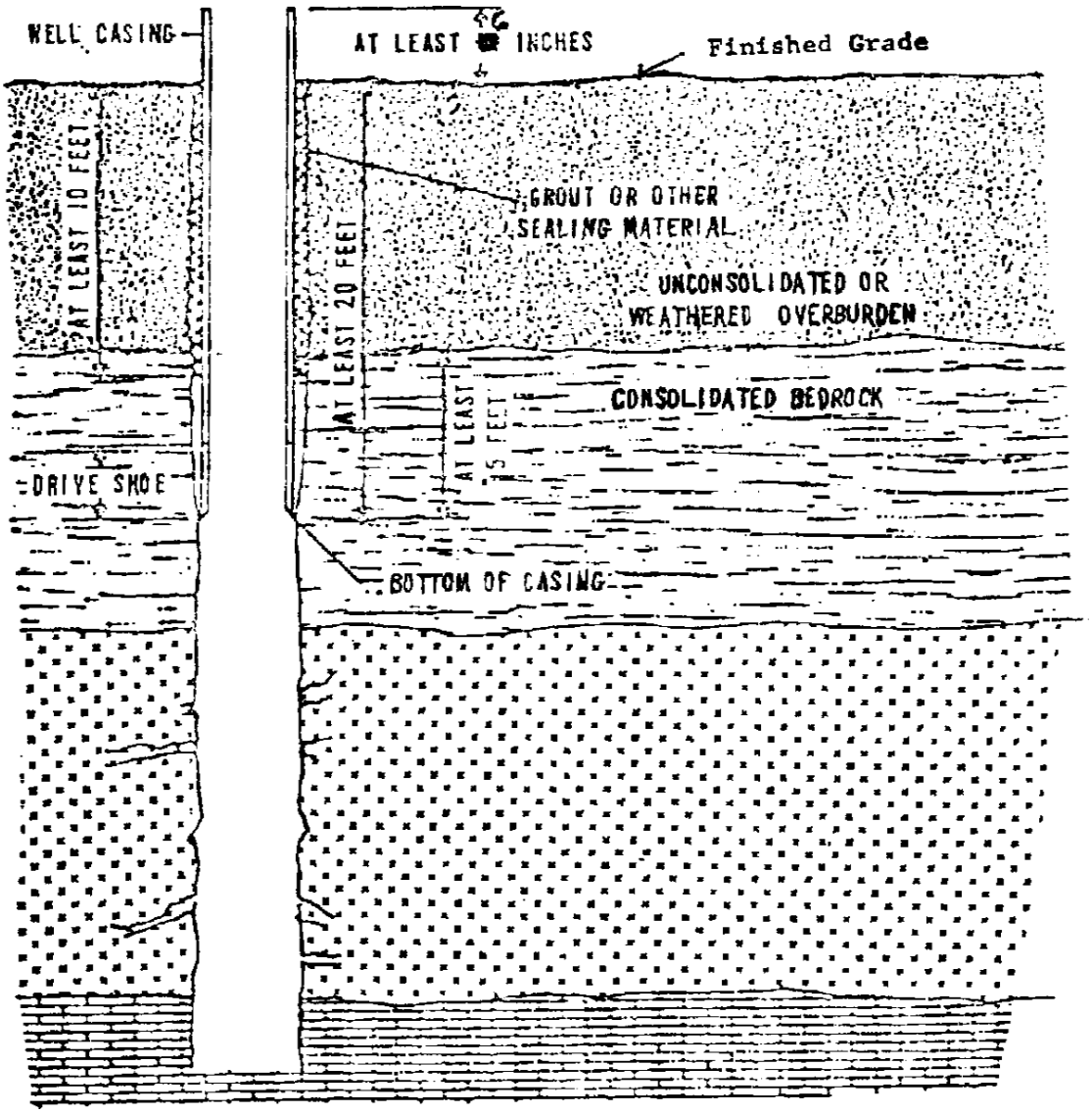


FIG. 2 CONSTRUCTION OF WELLS IN AQUIFERS WITH ALTERNATING BEDS OF SILT AND CLAY

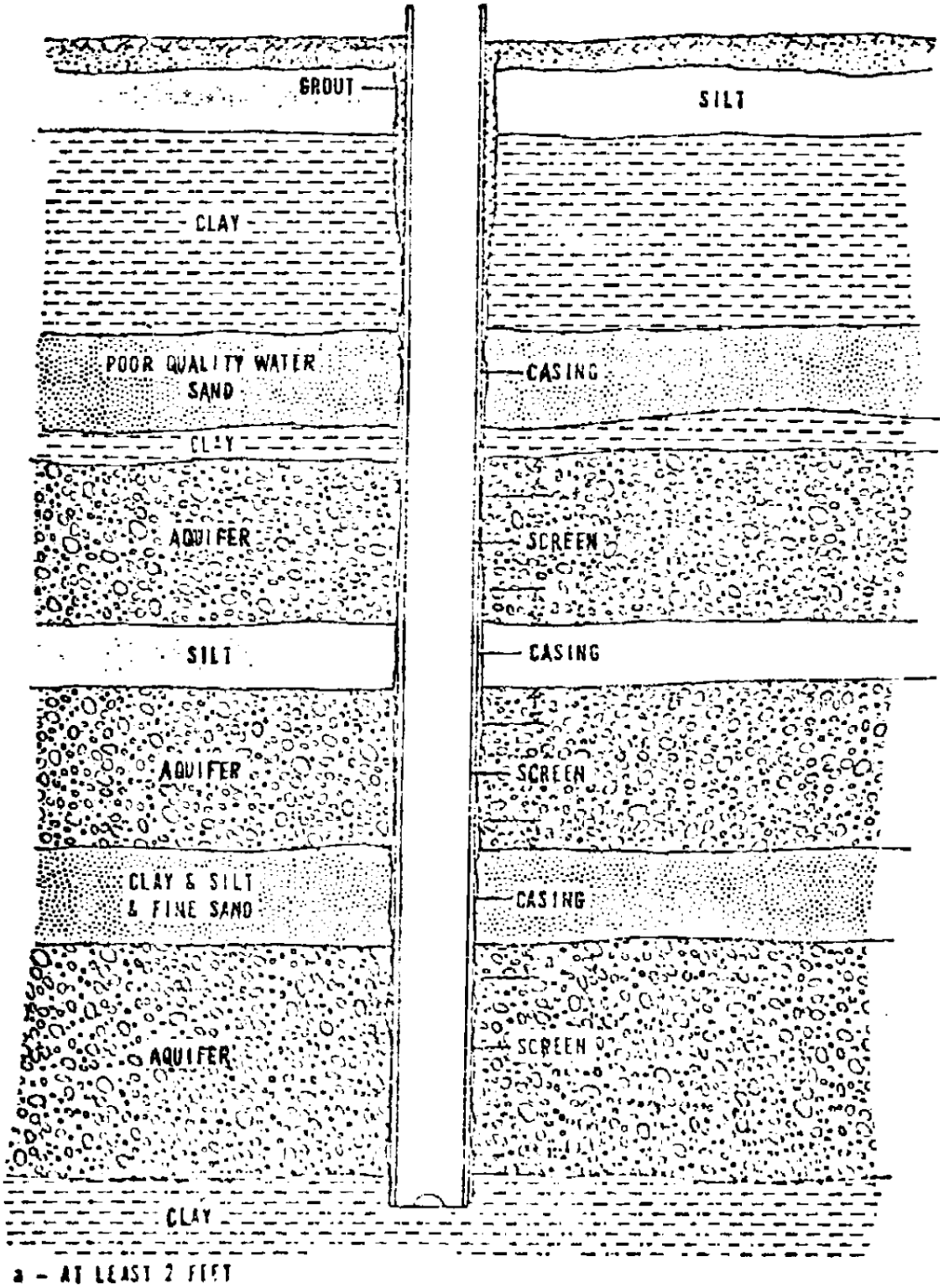


FIG. 3 CONSTRUCTION OF WELL IN AQUIFER OVERLAIN BY CLAY, SILT AND FINE SAND

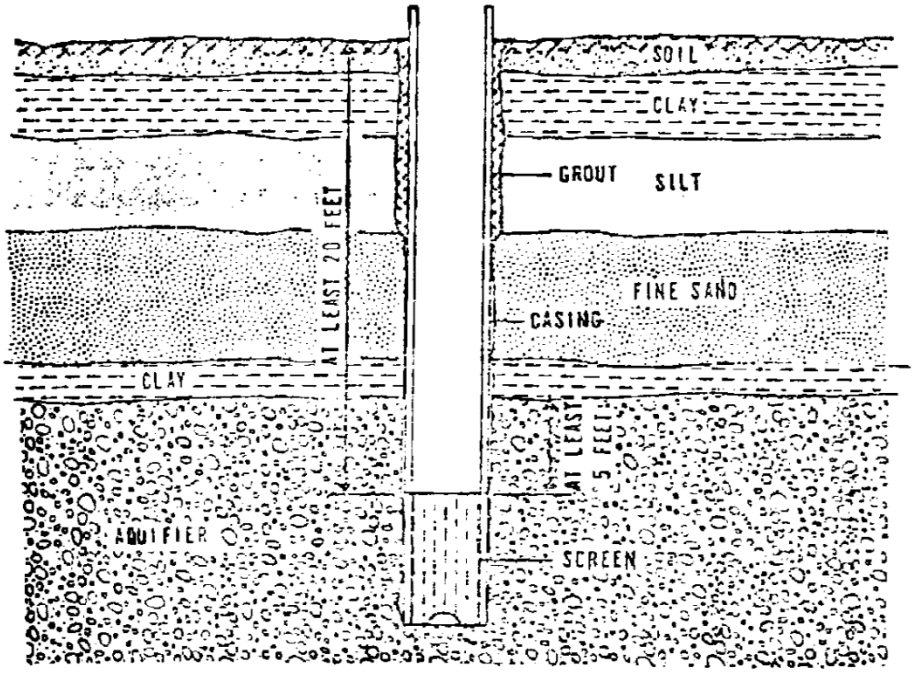


FIG. 4 CONSTRUCTION OF WELL IN AN AQUIFER OVERLAIN BY TILL

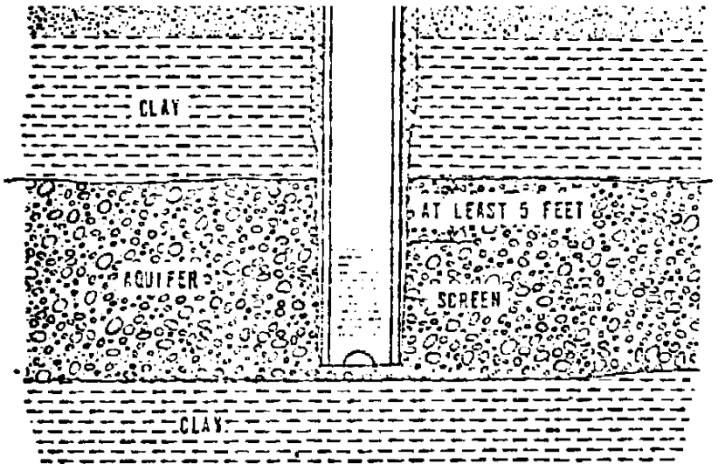


FIG. 5 CONSTRUCTION OF WELL IN AOUIFER OVERLAIN BY CLAY

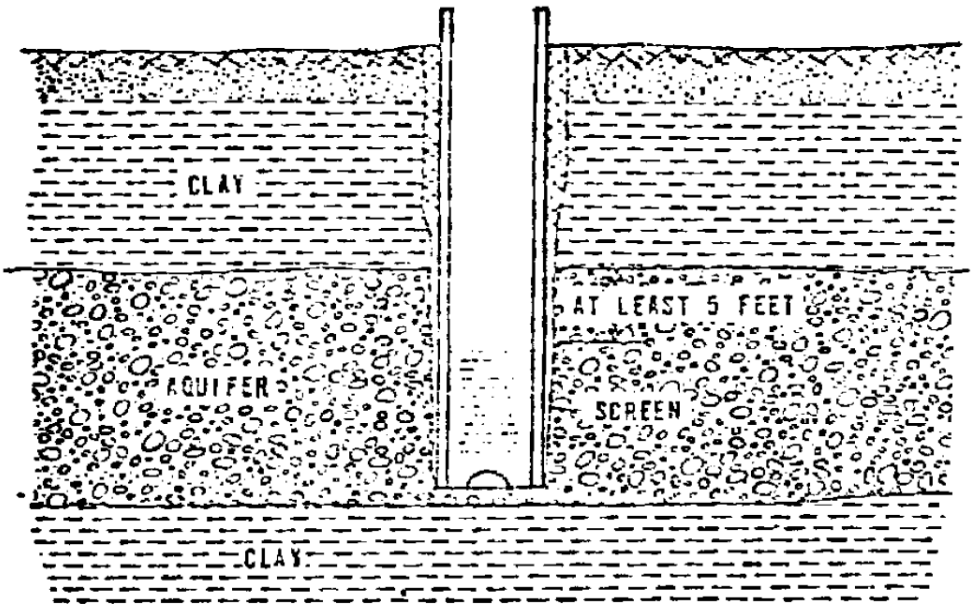


FIG. 6 TERMINATION OF EXTERIOR GEOTHERMAL BORE HOLES

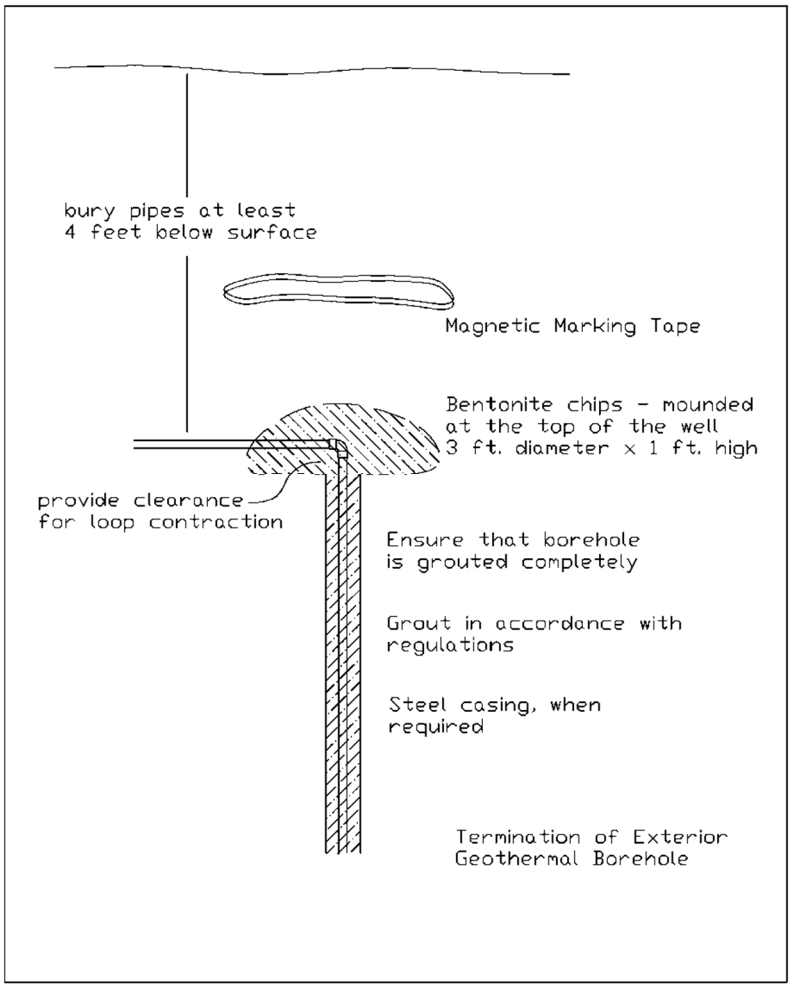
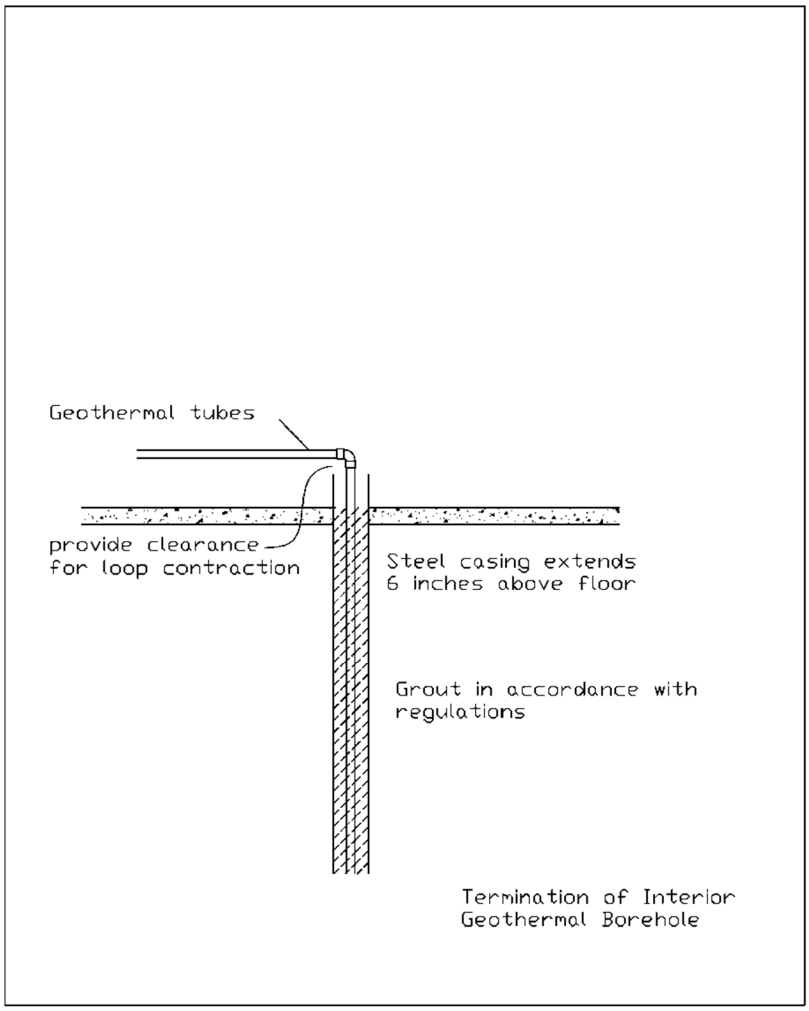

bury pipes at least
4 feet below surface
Magnetic Marking Tape
Bentonite chips - mounded
at the top of the well
3 ft. diameter x 1 ft. high
provide clearance
for loop contraction
Ensure that borehole
is grouted completely
Grout in accordance with
regulations
Steel casing, when
required
Termination of Exterior
Geothermal Borehole

FIG. 7 TERMINATION OF INTERIOR GEOTHERMAL BORE HOLES



Sec. 29. Section 25-129-1 of the Regulations of Connecticut State Agencies is amended to read as follows:

Sec. 25-129-1. [Contractor-limited to well casing extension W-5] Unlimited well driller contractor W-1

[The requirements for the registration of a contractor-limited to well casing extension W-5 shall be a contractor's license to perform plumbing and piping work pursuant to chapter 393 of the Connecticut General Statutes. This registration permits the registrant to perform well casing extension, repair and maintenance work. The application shall demonstrate knowledge of well casing extension, repair and maintenance work by passing a written examination conducted pursuant to section 20-333 of the Connecticut General Statutes.]

(a) A person holding a W-1 registration may perform any work as described in section 25-129 of the Connecticut General Statutes. Such registration permits the registrant to construct a well. Before any registration is issued to any individual, the department or Board shall require that the applicant submit an application, on a form and in a format prescribed by the Commissioner of Consumer Protection, demonstrating that such person has met certain education, job training and test requirements. Registrants shall maintain insurance as specified in section 25-129 of the Connecticut General Statutes.

(b) Each applicant shall provide documentation that the applicant has been actively engaged in well drilling as a well driller for a period of twenty-four (24) months prior to the date of application or has held a valid W-2 registration for at least two (2) years.

(c) Each applicant shall evidence that he or she has passed a written examination conducted pursuant to sections 21a-7(a)(1) and 21a-8(a)(5) of the Connecticut General Statutes.

Sec. 30. Section 25-129-2 of the Regulations of Connecticut State Agencies is amended to read as follows:

Sec. 25-129-2. [Journeyperson-limited to well casing extension W-6] Unlimited well driller W-2

[The requirements for the registration of a journeyperson-limited to well casing extension W-6 shall be a journeyperson's license to perform plumbing and piping work pursuant to chapter 393 of the Connecticut General Statutes. This registration permits the registrant to perform well casing extension, repair and maintenance work only while in the employ of a contractor licensed for such work. The applicant shall demonstrate knowledge of well casing extension, repair and maintenance work by passing a written examination conducted pursuant to section 20-333 of the Connecticut General Statutes.]

The requirements for registration as an unlimited well driller W-2 shall be twenty-four (24) months as a driller trainee or possessing equivalent experience and training. Such registration as an unlimited well driller W-2 permits the registrant to construct a well, including, but not limited to, the installation, repair and maintenance of pumps, pump motors, pump piping, valves, wiring, electric controls and tanks only while the registrant is in the direct and regular employment of a contractor registered for such work. The applicant shall demonstrate knowledge of well drilling by passing a written examination conducted pursuant to sections 21a-7(a)(1) and 21a-8(a)(5) of the Connecticut General Statutes.

Sec. 31. The Regulations of Connecticut State Agencies are amended by adding sections 25-129-3 to 25-129-11, inclusive, as follows:

(NEW) **Sec. 25-129-3. Limited non-water-supply contractor W-3**

As provided by section 25-129 of the Connecticut General Statutes, the department establishes certain requirements for registration as a limited non-water-supply contractor W-3. Such registration permits the registrant to construct a non-water-supply well, as defined in

section 25-128-36(c) of the Regulations of Connecticut State Agencies, including, but not limited to, the installation, repair and maintenance of pumps, pump motors, pump piping, valves, wiring, electric controls and tanks. Before any registration is issued to any individual, the applicant shall submit in a form and manner prescribed by the department, documentation that the applicant has been actively engaged in the well drilling trade as a well driller for a period of at least twenty-four (24) months prior to the date of application or has held a valid W-4 registration for at least two years. The applicant shall demonstrate knowledge of well drilling by passing a written examination conducted pursuant to sections 21a-7(a)(1) and 21a-8(a)(5) of the Connecticut General Statutes.

(NEW) **Sec. 25-129-4. Limited non-water-supply driller W-4**

The requirements for registration as a limited non-water-supply driller W-4 shall be one (1) year as a driller trainee or possessing equivalent experience and training. Such registration as a limited non-water-supply driller W-4 permits the registrant to construct a non-water-supply well, as defined in section 25-128-36(c) of the Regulations of Connecticut State Agencies, including, but not limited to, the installation, repair and maintenance of pumps, pump motors, pump piping, valves, wiring, electric controls and tanks, only while the registrant is in the direct and regular employment of a contractor registered for such work. The applicant shall demonstrate his or her knowledge of well drilling by passing a written examination conducted pursuant to sections 21a-7(a)(1) and 21a-8(a)(5) of the Connecticut General Statutes.

(NEW) **Sec. 25-129-5. Limited well casing extension contractor W-5**

The requirements for registration as a limited well casing extension contractor W-5 shall be a contractor license to perform plumbing and piping work pursuant to chapter 393 of the Connecticut General Statutes. Such registration as a limited well casing extension contractor W-5 permits the registrant to perform well casing extension, repair and maintenance work. The applicant shall demonstrate knowledge of well casing extension, and repair and maintenance work by passing a written examination conducted pursuant to section 20-333 of the Connecticut General Statutes. The W-5 registrant's ability to repair shall be limited solely to the well casing extension and shall exclude any other parts of a well.

(NEW) **Sec. 25-129-6. Limited well casing extension journeyperson W-6**

The requirements for the registration of a journeyperson limited to well casing extension W-6 shall be a journeyperson's license to perform plumbing and piping work pursuant to chapter 393 of the Connecticut General Statutes. Such registration permits the registrant to perform well casing extension, repair and maintenance work only while in the employ of a contractor licensed for such work. The applicant shall demonstrate knowledge of well casing extension, repair and maintenance work by passing a written examination conducted pursuant to section 20-333 of the Connecticut General Statutes.

(NEW) **Sec. 25-129-7. Limited geothermal contractor W-7**

Registration as a limited geothermal contractor W-7 permits the registrant to construct a geothermal bore hole or geothermal system, as defined in section 25-128-36(c) of the Regulations of Connecticut State Agencies, up to and including the manifold connection, including, but not limited to, the installation, repair, and maintenance of piping, casing, heat transfer media, pumps, pump motors, and valves, but excluding direct exchange systems, as defined in section 25-128-36(c) of the Regulations of Connecticut State Agencies. Before any registration is issued to any individual, the Board shall require that the applicant submit documentation that the applicant has been actively engaged in the geothermal bore hole drilling trade as a geothermal driller for a period of twenty-four (24) months prior to the date of application or has held a valid W-8 registration for at least two years. The applicant shall evidence that he or she has passed a written examination conducted pursuant to sections 21a-7(a)(1) and 21a-8(a)(5) of the Connecticut General Statutes.

(NEW) **Sec. 25-129-8. Limited geothermal driller W-8**

The requirements for registration as a limited geothermal driller W-8 shall be one (1) year as a geothermal driller trainee or possessing equivalent experience and training. Such registration as a limited geothermal driller W-8 permits the registrant to construct a geothermal bore hole or geothermal system, as defined in section 25-128-36(c) of the Regulations of Connecticut State Agencies, up to and including the manifold connection, including, but not limited to, the installation, repair and maintenance of piping, casing, heat transfer media, pumps, pump motors, and valves, but excluding direct exchange systems, as defined in section 25-128-36(c) of the Regulations of Connecticut State Agencies, only while the registrant is in the direct and regular employment of a contractor registered for such work. The applicant shall demonstrate knowledge of well drilling by passing a written examination conducted pursuant to sections 21a-7(a)(1) and 21a-8(a)(5) of the Connecticut General Statutes.

(NEW) **Sec. 25-129-9. Limited direct exchange geothermal contractor W-9**

Registration as a limited direct exchange geothermal contractor W-9 permits the registrant to construct a geothermal bore hole or geothermal system up to and including the manifold connection, but limited to those geothermal bore holes employing direct exchange or direct expansion technology, as defined in section 25-128-36(c) of the Regulations of Connecticut State Agencies, including, but not limited to, drilling associated with the installation of copper or other piping containing a direct exchange heat transfer medium, the installation, repair and maintenance of piping, casing, and heat transfer media. Before any registration is issued to any individual the Board shall require that the applicant submit documentation that the applicant has been actively engaged in the geothermal bore hole drilling trade as a direct exchange driller for a period of twenty-four (24) months prior to the date of application or has held a valid W-10 registration for at least two (2) years. The applicant shall evidence that he or she has passed a written examination conducted pursuant to sections 21a-7(a)(1) and 21a-8(a)(5) of the Connecticut General Statutes.

(NEW) **Sec. 25-129-10. Limited direct exchange geothermal driller W-10**

The requirements for registration as a limited direct exchange geothermal driller W-10 shall be one (1) year as a direct exchange geothermal driller trainee or possessing equivalent experience and training. Registration as a limited direct exchange geothermal driller W-10 permits the registrant to construct a geothermal bore hole or geothermal system up to and including the manifold connection, but limited to those bore holes employing direct exchange or direct expansion technology, as described in section 25-128-36(c) of the Regulations of Connecticut State Agencies, and associated components of a direct exchange geothermal system, including, but not limited to, drilling associated with the installation of copper or other piping containing a direct exchange heat transfer medium, the installation, repair and maintenance of piping, casing, heat transfer media, only while the registrant is in the direct and regular employment of a contractor registered for such work. The applicant shall demonstrate knowledge of direct exchange geothermal bore hole drilling by passing a written examination conducted pursuant to sections 21a-7(a)(1) and 21a-8(a)(5) of the Connecticut General Statutes.

(NEW) **Sec. 25-129-11. Driller trainee**

(a) Driller trainees may perform the work for which they are being trained, but only in the presence and under the supervision of a properly registered contractor driller. Nothing in chapter 482 of the Connecticut General Statutes shall be construed to prohibit the employment of one driller trainee by a registered contractor and an additional driller trainee or apprentice for each person employed by a contractor who holds a drilling registration for such work.

(b) Driller trainees, under the supervision of a registered contractor or the holder of a driller registration, may do minimal cleaning work not in the presence of such supervising contractor or driller.

Sec. 32. The Regulations of Connecticut State Agencies are amended by adding section 25-130-1 as follows:

(NEW) **Sec. 25-130-1. Permit requirements**

(a) Before commencing work on the construction, repair, development, hydrofracturing or abandonment of any well or geothermal system, a well contractor shall complete an application for a permit in a format acceptable to the Commissioner of Consumer Protection, and such application shall be filed with the authority having jurisdiction for the issuance of a permit, as provided by section 25-130 of the Connecticut General Statutes. By filing such application, the applicant agrees that all work under the permit shall be done in strict compliance with the Connecticut Well Drilling Code, unless a special exemption from one or more of the applicable regulations has been granted by the Department of Consumer Protection.

(b) The contractor shall submit the completed, signed permit application for each well or

geothermal system, with the proper fee, to the local director of health or the director's agent. The local director of health or the director's agent shall approve such permit if the proposed work to each new or existing water supply well or geothermal system conforms to sections 19-13-B51a to 19-13-B51m, inclusive, of the Regulations of Connecticut State Agencies for wells, or section 25-128-41a of the Regulations of Connecticut State Agencies. No well or geothermal system shall be installed, repaired or altered until such a permit has been approved and issued.

(c) Water supply well permits shall be evaluated according to their content with regard to proper separating distances as outlined in the Connecticut Well Drilling Code and section 19-13-B51d of the Regulations of Connecticut State Agencies for water supply wells. The local director of health may approve a permit for repair to an existing private well or semipublic well that does not conform to the Regulations of Connecticut State Agencies when the repair allows for better protection of public health.

(d) The application for a permit by a well contractor shall include an appropriate map or plot plan, showing the location of each proposed well or geothermal bore hole on the premises in relation to roads, intersections, and other permanent land features. The Commissioner of Consumer Protection or local director of health may request other information for inclusion on the map or plot plan as deemed necessary to protect public health and safety. All permit applications shall be signed by an appropriately registered well contractor.

(e) Notwithstanding any provision of this section, the local director of health may grant an emergency request to construct, repair, or abandon a well or bore hole if the director determines that an emergency situation exists with respect to the necessity for the construction, repair, or abandonment of the well or bore hole and the application complies with the provisions of this subsection. A well contractor shall submit a written request, which may be electronic and sent by electronic mail, to the department and the local director of health for the municipality in which the well or bore hole that is the subject of the emergency request is located. The electronic request shall contain information regarding the precise location of the subject well or bore hole, the specific proposed work to be performed on the well or bore hole and the reason that is necessary to complete the work on an emergency basis. No work contemplated by the emergency request shall be started or completed until the well contractor has received approval from the local director of health or the director's agent. The local director of health shall send written approval to the well contractor. After work completion, the well contractor shall provide the department and the local director of health with written documentation attesting to and detailing the specific form and manner of the work that was completed in connection with the emergency request. Any work that is not completed in compliance with this subsection and the specific approval granted may be subject to an order of removal or other remedial action.

(f) Permit applications, permits, and completion reports may be filed or transmitted electronically as required by each recipient.

Sec. 33. Sections 25-128-58a, 25-128-58b and 25-128-60a to 25-128-61, inclusive, of the Regulations of Connecticut State Agencies are repealed.

Statement of Purpose

Pursuant to CGS Section 4-170(b)(3), "Each proposed regulation shall have a statement of its purpose following the final section of the regulation." Enter the statement here.

(A) **Purpose:** The purpose of this regulation is to update the Connecticut Well Drilling Code to conform with current industry practices, to incorporate standards related to geothermal bore hole drilling and system installation, including four new geothermal-specific limited license categories, to make technical changes to existing language for clarity, to re-number existing sections to more properly track the applicable underlying statutes, and to provide gender neutrality in the language employed.

(B) **Summary:** These regulations provide for updated definitions which conform to current industry practice, and also to incorporate specific definitions for geothermal bore hole drilling. Additional provisions are added to regulate geothermal systems to help assure that the water supply is not contaminated due to substandard drilling practices or component installation. The Department believes these regulation changes will protect the public health and safety, and in particular, help to protect the water supply from contamination.

(C) **Legal Effects:** The regulation implements changes to the Well Drilling Code, which is part of the regulatory structure of the Department of Consumer Protection.

Form Agency-Cert-PR-TA-ICM (Rev 11/2017)
State of Connecticut
Secretary of the State

IMPORTANT NOTICE FOR CONNECTICUT STATE AGENCIES
This form is to be used for proposed permanent and technical amendment regulations only and must be completed in full.

AGENCY CERTIFICATION

Department of Consumer Protection

Proposed Regulation Concerning

Well Drilling and Geothermal Systems

eRegulations System Tracking Number **PR2020-017**

I hereby certify the following:

(1) The above-referenced **regulation** is proposed pursuant to the following statutory authority or authorities: **Conn. Gen. Stat. sections 25-128 and 25-129**

For technical amendment regulations proposed without a comment period, complete #2 below, then skip to #8.

(2) As permitted by Section 4-168(h) of the *Connecticut General Statutes*, the agency elected to proceed without prior notice or hearing and posted the text of the proposed technical amendment regulation on eRegulations System website on **and N/A**.

For all other non-emergency proposed regulations, complete #3 - #7 below, then complete #8)

(3) The agency posted notice of intent with a specified comment period of not less than 30 days to the eRegulations System website on **October 19, 2021**.

(4) *(Complete one)* ☒ No public hearing held or was required to be held. **OR** ☐ One or more public hearings were held on: **N/A**.

(5) The agency posted notice of decision to move forward with the proposed regulation to the eRegulations System website on **January 12, 2022**.

(6) *(Complete one)* ☐ No comments were received. **OR** ☒ Comments were received and the agency posted the statements specified in subdivisions (1) and (2) of CGS Section 4-168(e) to the eRegulations System website on **January 12, 2022**.

(7) The final wording of the proposed regulation was posted to the eRegulations System website on **May 25, 2022**.

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(8) Subsequent to approval for legal sufficiency by the Attorney General and approval by the Legislative Regulation Review Committee, **the final regulation shall be effective**

(Check one and complete as applicable)

☒ When posted to the eRegulations System website by the Secretary of the State.

OR ☐ On _____
(Date must be a specific calendar date not less than 11 days after submission to the Secretary of the State)

SIGNED *(Head of Board, Agency or Commission, or duly authorized deputy)*	Legal Director OFFICIAL TITLE	6/2/2022 DATE

OFFICE OF THE ATTORNEY GENERAL
REGULATION CERTIFICATION

Agency: Connecticut Department of Consumer Protection

***REGULATION NUMBER* PR2020-017**

This Regulation is hereby APPROVED by the Attorney General as to legal sufficiency in accordance with Connecticut General Statutes § 4-169.

DATE: June 4, 2022

Signed: /s/ Michael C. Wertheimer

Michael Wertheimer, Deputy Associate Attorney General and Section Chief for Consumer Protection Department

The Connecticut General Assembly

Legislative Regulation Review Committee

Senator James Maroney
Senate Chair

Representative Nicole Klarides-Ditria
House Chair

Official Record of Committee Action

June 28, 2022

Agency:	Department of Consumer Protection
Description:	Well Drilling and Geothermal Systems
LRRC Regulation Number:	2022-006A
eRegulation Tracking Number:	PR2020-017

The above-referenced regulation has been

Approved with Technical Corrections

by the Legislative Regulation Review Committee in accordance with CGS Section 4-170.

Kirstin L. Breiner
Committee Administrator

State of Connecticut
Office of the Secretary of the State

Confirmation of Electronic Submission

Re: Regulation of the Department of Consumer Protection concerning Well Drilling and Geothermal Systems
eRegulations System Tracking Number PR2020-017
Legislative Regulation Review Committee Docket Number 2022-006A

The above-referenced regulation was electronically submitted to the Office of the Secretary of the State in accordance with Connecticut General Statutes Section 4-172 on July 6, 2022.

Said regulation is assigned Secretary of the State File Number 6364.

The effective date of this regulation is July 8, 2022.

Mark F. Kohler
Secretary of the State
July 8, 2022

By:

/s/ Christopher R. Drake
Christopher R. Drake
Director, Business Services Division