RULES
OF
TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
WATER RESOURCES DIVISION

CHAPTER 0400-45-09
WATER WELL LICENSING REGULATIONS AND WELL CONSTRUCTION STANDARDS

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0400-45-09-.01 DEFINITION OF TERMS.

"Abandoned well" means any well that has permanently been discontinued from further use. A well shall be declared abandoned when the pump has been disconnected or removed for reasons other than repair or replacement or when the well is in such a state of disrepair that continued use for the purpose intended is impracticable.

"Abandonment" means the act of properly sealing an abandoned well.

"Act" means the Water Wells Act of 1963 as amended (T.C.A. §§ 69-10-101 et seq.)

“Animal pen" means an enclosed area one-half (1/2) acre or less where ten or more animals congregate for feeding and watering where vegetation or ground cover has been destroyed or is missing and the area is covered with manure or mud.

"Aquifer" means a geologic formation, a group of such formations, or a part of a formation that will yield usable quantities of water to wells.

"Artesian" means ground water confined under sufficient hydrostatic pressure to rise above the aquifer containing it.

"Beneficial Use" means application of a resource to a purpose that produces economic or other benefits, tangible or intangible, economic or otherwise, such as procurement of water for domestic, industrial, or agricultural use or for a municipal water supply.

"Bentonite" means a clay derived from volcanic ash consisting of at least 85% montmorillonite. Bentonite is available in the following forms:

(a) "Bentonite granules" means 8 mesh pure bentonite, without additives.

(b) "Bentonite pellets" means commercially manufactured tablets made by compressing pure bentonite, without additives, into forms greater than 1/4 inch in size.

(c) "Bentonite chips" means commercially processed angular fragments of pure bentonite without additives.

“Board” means Board of Ground Water Management.

(Rule 0400-45-09-.01, continued)

"Borehole" means the cylindrical opening created by the action of a drill or auger as it penetrates the subsurface.

"Casing" means pipe or tubing, constructed of specified materials and having specified dimensions and weights, that is installed in a borehole during or after completion of the borehole to support the side of the hole and thereby prevent caving, to allow completion of the well, to prevent formation material from entering the well, and to prevent entry of undesirable water into the well.

"Certificate" means a written or printed statement or decal issued by the Department to the licensee which assigns a license number and license type to the license holder.

“Closed loop geothermal borehole” means a cylindrical opening created by the action of a drill or auger as it penetrates the subsurface greater than twenty feet in depth used to either extract or transfer heat from the earth for heating or cooling. This is also referred to as a geothermal well in the T.C.A. § 69-10-101 et seq.

“Closed Loop Installer” means a person who installs and grouts droplines or closed loops in closed loop geothermal boreholes. This may also be referred to as a looper.

“Commissioner" means the Commissioner of Environment and Conservation, the Commissioner’s duly authorized representative and, in the event of his absence or a vacancy in the office of Commissioner, the Deputy Commissioner of Environment and Conservation.

“Completion date of well" means the date that drilling equipment leaves or is removed from the well site. For closed loop geothermal borehole systems, the completion date of the borehole shall be the date of the drilling equipment is removed from the property.

"Completion of drilling" means the date that drilling equipment leaves or is removed from the well site. For closed loop geothermal boreholes, the completion of drilling shall be the date that the drilling equipment is removed from the property.

"Consolidated rock" means rock that is firm and coherent, solidified or cemented, such as granite, gneiss, limestone, slate or sandstone, which has not been decomposed by weathering.

"Contamination" means the act of introducing into water foreign materials of such nature, quality, and quantity as to cause degradation of the quality of the water.

"Department" means the Department of Environment and Conservation.

"Director" means the Director of the Tennessee Division of Water Resources.

"Domestic use" means the use of water for drinking, bathing, or culinary purposes.

“Drill” means to dig, drill, re-drill, construct, deepen or alter a well.

“Driller” means any person with knowledge and skill gained through practical experience in drilling operations who manages or supervises the digging, drilling, or redrilling of a well or borehole.

“Dropline” in the context of closed loop geothermal boreholes means the u-bend closed loop piping material placed in a closed loop borehole to circulate a liquid to transmit heat to a

(Rule 0400-45-09-.01, continued)

geothermal exchange unit. In the context of water wells the “dropline” means the piping which conveys water obtained from the water well to land surface.

“Employee” means a person hired by the license holder under the Act to work for wages or salary where the license holder has submitted for such person, a notarized affidavit of supervision.

“Experience” means the skill and knowledge derived from the actual direct participation and practice gained in a specific occupation. For drillers, experience includes the skill and knowledge gained in operating drilling equipment to drill and construct a well or closed loop geothermal borehole. For installers, experience includes the skill, knowledge and actual direct participation in determining the equipment required and installing equipment either in or on wells or closed loop geothermal boreholes. Such skill and knowledge must qualify the individual to deal with circumstances and problems that may be encountered by an occupation.

“Geothermal well” means a hole drilled into the earth, by boring or otherwise, greater than twenty feet in depth constructed for the primary purpose of adding or removing British Thermal Units (BTU) from the earth for heating or cooling. This is also referred to as a closed loop geothermal borehole.

“Grout" means a stable, impervious, minimum shrinkage bonding material that is capable of producing a watertight seal required to protect against the intrusion of contamination.

“Inactive well” means any well not in use and does not have functioning equipment, including bailers, associated either in or attached to the well.

“Installation of pumps" means the procedure employed in the placement and preparation for operation of pumps and pumping equipment in water wells, including all construction involved in making entrances to the well and establishing seals.

“Installer” means any person who installs or repairs well pumps or who installs filters or water treatment devices.

"Liner casing" means 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.

“Log” means a record of the consolidated or unconsolidated formations penetrated in the drilling of a well, and includes general information concerning construction of a well.

“Monitoring well” means a hole drilled into the earth, by boring or otherwise, constructed for the primary purpose of obtaining information on the elevation or physical, chemical, radiological or biological characteristics of the ground water and/or for the recovery of ground water for treatment.

"Overburden” means unconsolidated earth material that overlies consolidated rock material.

“Open loop borehole” means a water well designed to produce source water above land surface to provide heat transfer to a geothermal unit.

"Person" means any individual, organization, group, association, partnership, corporation, limited liability company, utility district, state or local government agency or any combination of them.

(Rule 0400-45-09-.01, continued)

"Pit" means a cavity or hole in the ground, the bottom of which is below the level of the surrounding turf.

"Pitless Adapter" or "pitless unit" means a device specifically manufactured for the purpose of allowing a below ground lateral connection between a well and its plumbing appurtenances.

"Potable water" means water that is not brackish or saline and does not contain total coliform bacteria or chemical constituents in such quantity or type as to render the water unsafe, harmful or generally unsuitable for human consumption.

“Production of water” means withdrawing water from the ground for beneficial use.

(a) Wells for the production of water include, but are not limited to, the following:

1. Borings that are used to locate, divert, withdraw, develop or manage ground water supplies for beneficial uses;

2. Test holes drilled to determine the availability of water supplies for beneficial uses; and

3. Wells drilled to supply water for ground water open loop heat pumps and air conditioners.

(b) The following are not wells for the production of water as used in these rules:

1. Post holes;

2. An excavation for the purpose of obtaining or prospecting for oil, natural gas, minerals other than water, products of mining and quarrying;

3. Injection wells regulated under Chapter 0400-45-06 of the rules of the Water Quality Control Board;

4. Cathodic protection wells;

5. Wells used for dewatering purposes in construction work;

6. Monitor wells, geographical test borings and piezometers that are regulated by rules of the Water Quality Control Board or otherwise by the Department;

7. Ponds, pits, sumps and drainage trenches;

8. Contaminant recovery wells otherwise regulated by the Department; and

9. Closed loop geothermal boreholes.

"Pumps and pumping equipment" means any equipment or materials utilized or intended for use in withdrawing or obtaining ground water, including well seals in a water well. Closed loops or droplines installed in closed loop geothermal boreholes are not considered pumping equipment.

"Recovery well" means any well constructed for the purpose of removing contaminated groundwater or other liquids from the subsurface.

(Rule 0400-45-09-.01, continued)

"Repair" means work involved in deepening, reaming, sealing, installing, or changing casing depths, perforating, screening, or cleaning, acidizing, or redevelopment of a well excavation, or any other work which results in breaking or opening a well seal.

"Standard Dimension Ratio (SDR)" means the quotient obtained when the outside diameter of thermoplastic well casing is divided by the wall thickness.

"Static water level" means the level at which the water stands in the well when the well is not being pumped and is expressed as the distance from a fixed reference point to the water level in the well.

"Supervision" means the act of directing and managing full or part time unlicensed employees engaged in the business of constructing wells, or installing pumps, closed loops in closed loop geothermal boreholes or installing water treatment devices on wells.

“Water Treatment Equipment” means any equipment, devices or filters utilized in altering the characteristics or quality of ground water for its intended use.

“Water Well” means a hole drilled into the earth, by boring or otherwise, for the production of water.

“Well” means one of the three types of holes in the earth: geothermal well, a monitoring well, or a water well.

“Well closure” means the act of backfilling and sealing a well either active or abandoned in accordance with well abandonment standards.

"Well construction" means all acts necessary to construct a well including, but not limited to the location and excavation of the borehole; placement of casings, screens and fittings; development and testing.

“Well development" means the procedures used to remove mud or fine material from the drilled borehole, to correct any damage to the aquifer that occurred during drilling a water well and to improve the water passageways into the well from the aquifer.

"Well driller" means an individual, firm or corporation engaged in the business of constructing wells.

“Wellhead" means the upper terminal of the well including adapters, ports, valves, seals, and other attachments.

“Well owner” means the person who owns the real property on which a well exists or is to be drilled provided however, in the case of any monitoring well or remediation required by the Department or the Commissioner, the well owner shall be the person responsible for such monitoring or remediation.

“Well seal" means an approved arrangement or device used to cap a well or to establish and maintain a junction between the casing of a well and the piping or equipment installed therein, the purpose or function of which is to prevent pollutants from entering the well at the upper terminal.

Authority: *T.C.A. §§ 69-10-101 et seq. and 4-5-201 et seq.* ***Administrative History:*** *Original rule filed October 16, 2012; effective January 14, 2013. Rule renumbered from 1200-04-09.*

0400-45-09-.02 REQUIREMENTS.

Applicants for driller's and installer's licenses shall meet the following requirements to qualify for licensing under the Act:

(1) Be at least 18 years of age;

(2) Have a minimum of two (2) years experience, prior to the date of application, working in the occupation for which a license is being sought;

(3) Complete grade 10 in high school or submit proof of equivalent achievement demonstrated by successful completion of approved short courses or written examinations. Up to four years of full-time employment may be substituted for equal years of education. This shall be in addition to the experience requirements in paragraph (2) of this rule; and

(4) Pass an examination as prescribed by the Board.

Authority: *T.C.A. §§ 69-10-101 et seq. and 4-5-201 et seq.* ***Administrative History:*** *Original rule filed October 16, 2012; effective January 14, 2013. Rule renumbered from 1200-04-09.*

0400-45-09-.03 SATISFACTORY PROOF OF EXPERIENCE.

Satisfactory proof of experience shall consist of either of the following methods.

(1) A list of ten (10) wells the applicant has constructed or worked on during a minimum of the last two years prior to the date of making the application for a license. The information shall include for each well the following:

(a) Name and address of the owner or owners of each well;

(b) Location and intended use of each well;

(c) Major construction features such as depth, type of casing, backfill, yield and water quality;

(d) Date of completion; and

(e) Work done by applicant and approximate customer cost.

(2) Copies of occupational licenses or certificates covering two years and indicating that the applicant has been engaged in the occupation for which a license is being sought.

Authority: *T.C.A. §§ 69-10-101 et seq. and 4-5-201 et seq.* ***Administrative History:*** *Original rule filed October 16, 2012; effective January 14, 2013. Rule renumbered from 1200-04-09.*

0400-45-09-.04 APPLICATIONS.

(1) All applications for licensing shall be submitted to the Director on the form prescribed by the Board and provided by the office of the Director.

(2) An application will not be accepted for processing unless the application is complete, accompanied by the fee required, and signed by the applicant. The following fee schedules are assigned for each license application and renewal of license category:

Water Well Driller License (W)	$100

(Rule 0400-45-09-.04, continued)

Monitor Well Driller License (M)	$100
Geothermal Driller License (G)	$100
Geothermal Borehole Only Drilling License (B)	$100
Well Closure License (C)	$100
Pump Installer License (P)	$50
Water Treatment Installer License (T)	$50
Close Loop Installer License (L)	$50

(3) No fee received with an application will be returned. This includes the fee received from an applicant who fails to pass an examination or meet the requirements of paragraphs (1), (2) and (3) of Rule 0400-45-09-.02.

(4) The individual who signs the application must meet the requirements of Rule 0400-45-09-.02 and paragraph (1) of Rule 0400-45-09-.05.

(5) Applicants who do not meet the requirements of paragraph (1), (2) and (3) of Rule 0400-45-09-.02 will be notified that their application has been denied and the reasons therefore.

(6) Any person whose application has been denied may request in writing to the Board within thirty (30) days of receipt of the letter of denial, an informal meeting with the Board for the purpose of explaining, or supplementing the application. Based on the person's explanation, the Board may accept the application for processing.

(7) An applicant whose application has been denied may not file a new application for a period of thirty (30) days following the date of the letter of denial. A new application must be resubmitted with the required application fee.

Authority: *T.C.A. §§ 69-10-101 et seq. and 4-5-201 et seq.* ***Administrative History:*** *Original rule filed October 16, 2012; effective January 14, 2013. Rule renumbered from 1200-04-09.*

0400-45-09-.05 EXAMINATIONS.

(1) All applicants who meet the requirements of paragraphs (1), (2) and (3) of Rule 0400-45-09-.02 will be required to take a written examination and thereafter appear before the Board for an interview.

(2) Written examinations to be given to applicants shall be approved by the Board.

(3) Applicants admitted to the written examination will be required to take a general examination related to borehole construction standards and related subjects including basic ground water hydrology. Closed loop installer applicants are not required to take a general exam. All applicants will be required to take one or more specialty examinations designed to test the competence and ability of the applicant to perform the work of a driller or installer. The specialty examinations may include, but are not limited to, the following:

(a) For Driller applicants:

1. Cable tool drilling;

2. Air rotary drilling;

3. Mud rotary drilling;

4. Reverse Circulation;

(Rule 0400-45-09-.05, continued)

5. Monitor well;

6. Geothermal well drilling for closed loop geothermal boreholes; and

7. Well closure and abandonment.

(b) For Installer applicants:

1. Pump installation for water wells;

2. Installation of water treatment devices; and

3. Closed loop installation for closed loop geothermal boreholes.

(4) Examinations shall be offered at least four times annually in a manner and at a time and place prescribed by the Director. Applicants will not be allowed to carry any reference materials into either the written examination room or oral interview area. Each examination shall be monitored by such person(s) as may be designated by the Director, or by one or more members of the Board. No persons, other than members of the Board, monitors, and examinees will be permitted in the room while the written examination is being administered.

(5) The grade scored by each applicant on the written examination shall be posted in the space provided upon the examinee's application form. Each applicant will be notified of his or her grade scored on the examination by first-class mail, sent to the address appearing on the application.

(6) A minimum grade of seventy (70) percent on the general and seventy (70) percent on any other specialty exam category is required to pass the written exam, and be eligible for an interview with the Board. Individuals whose license or combination of licenses have been revoked, refused to renew or suspended must retake and pass all applicable exams.

(7) A person failing an examination may apply for reexamination the next time examinations are offered by the Department, but no sooner than thirty (30) days from the date of the previous examination.

(8) Interviews of applicants will be conducted in accordance with paragraph (2) of Rule 0400-45-10-.05.

(9) Based on the applicant's answers to the questions in the interview, each Board member will vote for or against issuance of a license to the applicant. An applicant must receive a passing vote from a majority of the quorum present to be recommended for licensing.

(10) Applicants who pass both the written exam and interview with the Board will be recommended for licensing to the Commissioner.

(11) Holders of Tennessee Water Well Driller License who apply for a monitor or geothermal driller license before January 1, 2004, will not be required to appear for an oral interview provided they pass the required geothermal or monitor specialty exam.

(12) Experience as required in Rule 0400-45-09-.03 obtained in monitor well drilling or water well drilling by all applicants will satisfy the requirements of experience required for a geothermal well driller's license.

(Rule 0400-45-09-.05, continued)
Authority: *T.C.A. §§ 69-10-101 et seq. and 4-5-201 et seq.* ***Administrative History:*** *Original rule filed October 16, 2012; effective January 14, 2013. Rule renumbered from 1200-04-09. Amendment filed June 19, 2015; effective September 17, 2015.*

0400-45-09-.06 LICENSES.

(1) Issuance. An applicant recommended by the Board and approved by the Commissioner or the Commissioner's designee shall be issued a license to engage in the type of business for which he has applied and has demonstrated a satisfactory level of competency to perform. The Commissioner or the Commissioner's designee may issue a restrictive license, which may allow a license holder to operate under limited conditions such as well closure operations only.

(a) Driller applicants shall be issued either one or combination of four licenses:

1. A water well driller license to construct wells for the production of water, (W for water wells).

2. A geothermal well driller license to drill closed loop geothermal boreholes and install closed loops in closed loop geothermal boreholes, (G for geothermal).

3. A monitor well driller license to construct wells for monitoring ground water, (M for monitor).

4. A well closure license to close and abandon wells, (C for well closure and abandonment).

(b) Installer applicants shall be issued one or a combination of three licenses:

1. A license to install pumps on water wells, (P for pump installation on water wells).

2. A license to install closed loops or droplines for heat transfer in closed loop geothermal wells, (L for closed loop or dropline installation in closed loop geothermal boreholes).

3. A license to install water treatment on water wells, (T for Treatment on water wells).

(c) A wallet-sized card bearing the name of the licensee, type or class of license, expiration date, license number and signature of the Commissioner or the Commissioner's designee will be issued to the licensee and shall be carried on the person whenever engaged in the well or drilling contracting or installer business.

(d) All licenses issued pursuant to these rules shall be valid for a period not to exceed one year and shall expire on July 31 following the date of issuance.

(e) Reciprocity to drillers and installers licensed in other states will be granted by the Department provided the applicant makes a written request for reciprocity and the applicant meets the requirements of the written exam as required under paragraph (6) of Rule 0400-45-09-.05, the applicant is currently licensed in the state for the same category and in good standing in that state and reciprocal privileges have been granted by that state to a licensee in Tennessee. An oral interview will not be required.

(f) A licensee shall not allow any individual to operate under his license unless the individual to be supervised by the licensee is employed by the licensee and holds an

(Rule 0400-45-09-.06, continued)

installer or rig operator card. Proof of employment must be on file with the Department prior to commencement by the employee of any activities requiring supervision. Proof of employment shall consist of a notarized Affidavit of Supervision.

(g) All persons licensed by the Department under these rules shall keep the Department advised of their current address and must readily accept all mail sent to them by the Department.

1. The Department shall be notified of any change of address, phone number, company name or addition of a company name within thirty (30) days of the change.

2. For purposes of these rules, registered or certified mail sent with proper postage to the licensee's last known address shall be considered adequate notification regardless of whether it is accepted or returned unclaimed.

3. Because of the Department's duty to supervise license holders and because written communication is a necessary aspect of such supervision, a licensee's refusal to accept mail or failure to claim registered or certified mail is a violation of these regulations and may result in enforcement action.

(h) All holders of licenses shall, when requested by the Director, give twenty-four (24) hour advance notice to the Division of Water Resources upon which any well construction or reconstruction for any part thereof, any well closure, well development or the installation of any pumping equipment or water treatment devices shall take place. This notification shall include the owner's name, address and location of the work site.

(i) In order to renew any license or combination of licenses, the licensee shall submit to the Commissioner satisfactory proof of the required credit hours of training approved by the Board of Ground Water Management or Director completed during the previous license year. Five (5) credit hours will be required to renew any license for the license period beginning August 1 through July 31 of the following year. First year license holders not previously licensed for any installer or driller category will not be required to obtain continuing education credits for their first year of renewal. Second and subsequent year license holders will be required to obtain continuing education credits thereafter to renew a license or combination of licenses.

(j) Approved training shall be designed to improve, advance or extend the licensee's professional skill and knowledge relating to the ground water industry such as well drilling, pump installation and water treatment courses. Training may consist of any of the following, provided there is satisfactory proof of completion acceptable to the Commissioner or Board:

1. Courses, seminars, workshops or lectures;

2. Extension studies and correspondence courses;

3. Papers published in professional journals and requiring peer review;

4. Lectures and scheduled courses at national or regional meetings of the National Ground Water Association, Tennessee Water Well Association or its successors;

5. College-level or postgraduate course work given by accredited college or university.

(Rule 0400-45-09-.06, continued)

6. Assignment of Credit

(i) For courses for which continuing education units (CEUs) have been assigned, one CEU is equal to fifty minutes of instruction, that is approved by the Board;

(ii) Credits shall be approved on an hour for hour basis for attendance at an approved training program;

(iii) Credits are approved on a two for one hour basis for the instructor of an approved program;

(iv) One credit hour is approved for attendance at the annual National Ground Water Association Convention or South Atlantic Jubilee;

(v) One credit hour is approved for attendance at a state association convention;

(vi) Credits are approved on a credit hour for credit hour basis for a course, seminar or workshop approved by the National Water Well Association for continuing education;

(vii) Credit hours may not be carried over to a new CEU cycle.

7. Procedures for Approval of Activities

(i) Activities submitted for approval shall be on a form provided by the Director and shall include the following information:

(I) Description of course or activity matter;

(II) Length of activities in hours;

(III) Name of instructor and qualifications;

(IV) Date, time and location.

(ii) A change in subject matter, length or instructor requires approval by the Director.

8. Proof of Continuing Education

(i) The licensee is responsible for the submission of proof of all approved training. Inability of the applicant to substantiate credit hours submitted is grounds for disallowance of the credits in question.

(ii) Proof of continuing education consists of:

(I) Official transcripts from educational institution;

(II) A certificate or other documentation signed by the instructor or sponsor of the training attesting to the satisfactory completion of the training;

(Rule 0400-45-09-.06, continued)

(III) Other documentation determined by the Director in light of the nature of training, to establish that training was actually received by the applicant.

(iii) A licensee who fails to satisfactorily complete the required continuing education credits due to an unusual event such as an incapacitating illness or similar unavoidable circumstances may make a written request to the Board of Ground Water Management for an extension of time. The board may set conditions as deemed appropriate to renew a license. All requests by licensees for an extension of time must be made in writing with supporting documentation.

(2) Renewal. Before a license can be renewed, a license holder in good standing must file an application for renewal on a form made available by the Director and submit with the completed application the annual fee as specified in the Act and continuing education credits on or before July 31 of each year.

(a) Upon approval by the Commissioner a renewal license will be issued for a period not to exceed one year and shall expire on July 31.

(b) A renewal certificate shall consist of a wallet-sized card in duplicate containing at least the name of the license, type or class of license, license number, expiration date and signature of the Commissioner or the Commissioner designee. One section of the card shall be kept with the original license certificate and the duplicate shall be carried by the licensee whenever engaged in the water well business.

(c) If the application and fee for renewal of a licensee is not received by the Director by the date of expiration, that license cannot be renewed and the license holder must file a new application to obtain a valid license.

(d) A duplicate license to replace any lost, destroyed or mutilated license will be issued by the Director upon receipt of written request from the licensee and a payment of fifteen dollars ($15) to cover the cost of reissuance.

(e) If a licensee's employees will at any time be in charge of well or borehole construction, or pump or water treatment installation, or closed loop installation in the absence of the licensee, he shall request the Director to issue a wallet-sized identification operator card for them. This card shall bear the name of the employee to whom it is being issued and the signature and license number of the licensee under whose supervision the work is being performed. The card shall be carried by the licensee's employee at all times at the work site.

(f) A decal shall be issued for identification purposes for each drilling rig, water truck, pump truck, and water treatment equipment vehicle used by a drilling contractor or installer. The decal shall be prominently displayed where it can be seen at all times from outside the vehicle.

(g) Decals furnished for drilling rigs and service vehicles are not transferable. The decals shall be removed and destroyed when a drilling rig or service vehicle is sold, traded or otherwise disposed of. A new decal for a newly acquired drilling rig or service vehicle will be provided without cost upon receipt of a written notice of acquisition of a different drilling rig or service vehicle.

(h) All drill rigs, water trucks, pump trucks, and water treatment equipment vehicles used by drillers and installers shall be permanently and prominently marked on the driver

(Rule 0400-45-09-.06, continued)

side door of the rig or vehicle for easy identification with the company name or name of the license holder. The letters shall be bold in print, on a background of contrasting color, and not less than two (2) inches in height. Portable magnetic signs will not be allowed unless the signs are permanently attached to the vehicle.

(i) If the application, renewal fee or requirements for continuing education are not received by the Director by the date of expiration, the license shall expire. Expired licenses may be reissued without examination or board appearance if the renewal fee and application are submitted within twelve (12) months of the date of expiration, all requirements for continuing education have been met and no additional monies are owed to the Department.

Authority: *T.C.A. §§ 69-10-101 et seq. and 4-5-201 et seq.* ***Administrative History:*** *Original rule filed October 16, 2012; effective January 14, 2013. Rule renumbered from 1200-04-09. Amendment filed June 19, 2015; effective September 17, 2015.*

0400-45-09-.07 SUSPENSION AND REVOCATION.

(1) The Commissioner may suspend or revoke a license or operator card and/or refuse to issue or renew a license or operator card if he finds that the applicant for, or holder of such license:

(a) Has intentionally made a material misstatement in the application for such license;

(b) Has willfully violated any provision of this chapter or any rule or regulation promulgated pursuant thereto;

(c) Has obtained or attempted to obtain, such license by fraud or misrepresentation;

(d) Has been guilty of fraudulent or dishonest practices;

(e) Has demonstrated a lack of competence as a driller of wells or as an installer;

(f) Has failed to comply with an order or assessment issued by the Commissioner; or

(g) Has been convicted of a felony.

(2) A holder of a license which has been revoked in accordance with this rule, after a waiting period of not less than one (1) year after the license was revoked, may petition the Commissioner for a hearing for reinstatement of his license.

(3) Upon suspension, revocation or non-renewal of a license or combination of licenses, the Commissioner may with advice from the Board, impose such terms and conditions as in his judgment shall be considered just.

(4) Any person whose license is suspended, revoked or non-renewed shall not perform the duties of a well driller or installer in the State of Tennessee, or work under the supervision of a licensed driller or installer.

Authority: *T.C.A. §§ 69-10-101 et seq. and 4-5-201 et seq.* ***Administrative History:*** *Original rule filed October 16, 2012; effective January 14, 2013. Rule renumbered from 1200-04-09.*

0400-45-09-.08 ROLE OF COMPLAINTS IN ENFORCEMENT DECISIONS RELATED TO LICENSEES.

(1) In making determinations as to whether to issue an order for corrective action, a penalty assessment, or a license revocation, the Commissioner may utilize information obtained from complaints by any persons.

(2) The Board may utilize its expertise to evaluate any complaints received from the public. The Board may then make a recommendation to the Commissioner as to what enforcement options are appropriate.

(3) In reaching these conclusions about enforcement action, the Commissioner and the Board may, in addition to any other investigation conducted by the Division, interview both the complainant and the licensee who is the subject of the complaint.

(4) If a licensee takes action to correct any violation of the Act or rules that is the subject of a complaint, such action and the degree of the effectiveness of the action are factors to be considered by the Commissioner and the Board in their decisions regarding appropriate enforcement action.

Authority: *T.C.A. §§ 69-10-101 et seq. and 4-5-201 et seq.* ***Administrative History:*** *Original rule filed October 16, 2012; effective January 14, 2013. Rule renumbered from 1200-04-09.*

0400-45-09-.09 APPEALS.

Any person whose application is denied for any reason may request a review of the denial in accordance with the provisions of the Uniform Administrative Procedures Act (T.C.A. §§ 4-5-101 et seq.) by filing that request with the Commissioner within thirty (30) days of receipt of the denial.

Authority: *T.C.A. §§ 69-10-101 et seq. and 4-5-201 et seq.* ***Administrative History:*** *Original rule filed October 16, 2012; effective January 14, 2013. Rule renumbered from 1200-04-09.*

0400-45-09-.10 WELL CONSTRUCTION STANDARDS.

These rules will apply solely to wells constructed for the production of water from underground sources and have no application to wells constructed for quarry blast holes or mineral prospecting, or any purpose other than production of water.

(1) Requirements

(a) No person shall construct, reconstruct, or repair, or cause to be constructed or reconstructed or repaired any water well; nor shall any person install, repair, or cause to be installed or repaired any pump, pumping equipment, water filter or water treatment device to be used on a water well except in accordance with the provisions of the Wells Act (T.C.A. §§ 69-10-101 et seq.) and these rules.

(b) Every well driller, within sixty (60) days after completion of a water well, shall submit a report on the construction or reconstruction of the well to the Department. The well completion report shall be made on a form provided by the Department or a reasonable facsimile approved by the Department.

(c) A Notice of Intent to drill a water well must be submitted by the property owner or the licensed well driller to the Director in the manner prescribed by the Department, prior to commencement of drilling a water well in Tennessee. The licensed driller is required to have sufficient documentation that a Notice of Intent was submitted to the Division of

(Rule 0400-45-09-.10, continued)

Water Resources before beginning operations at a drill site. Sufficient documentation for a Notice of Intent being filed may include one of the following:

1. Fee receipt of the Notice of Intent.

2. Confirmation number of the Notice of Intent or other approved format approved by the Director and issued by the Department.

(d) The Notice of Intent fee or copy of the receipt for a Notice of Intent fee shall accompany the submission of the driller's report. No well or borehole shall be drilled unless the driller has documentation that a Notice of Intent has been filed. All well reports shall be submitted with documentation of the Notice of Intent fee being paid. Documentation of the fee being paid shall consist of the receipt originating from a Notice of Intent or money collected and enclosed with the original driller's report by the driller for the Notice of Intent. A Notice of Intent and fee is not required for well closure, deepening or reworking any water well or closed loop geothermal borehole. The amount of the Notice of Intent fee shall be reviewed by the Department at least every five (5) years and shall currently be scheduled as follows:

1. Water wells for production of water per property site $75

(e) The requirement to furnish the Department a Notice of Intent fee payment shall not apply to water wells drilled in any local jurisdiction which is authorized, by private act or pursuant to the provisions of an adopted "home rule" charter, to regulate the location and construction of these wells and which has established a fee for the inspection of both geothermal and water wells approved by the Commissioner.

(f) A Notice of Intent fee shall not apply to any property owner, who within the past five years has filed a notice of intent and paid the fee for the same property. The property owner or driller must identify on the new Notice of Intent submitted for the property the identification number from the first Notice of Intent fee submitted.

(g) Checks returned for insufficient funds will be charged an established check processing fee and the Division will seek payment from the individual responsible for writing the check.

(h) A Notice of Intent shall expire one hundred and eighty days from the original date filed by the well driller or homeowner.

(i) When strict compliance with these standards is impractical, the driller or installer shall make application to the Department for approval of an alternative standard prior to the work being done. The Department may grant the request for an alternative standard if it determines the proposed standards offer an equivalent or higher level of protection to the environment. In an emergency or in exceptional instances, the Department will respond to a verbal request provided the applicant submits a written application within ten (10) days of the verbal application.

(j) Every well driller or person holding a well closure license, within sixty (60) days of abandonment of a water well, shall submit a report of the abandonment of the well or borehole to the Department. The abandonment report shall be made on a form provided by the Department or a reasonable facsimile approved by the Department. The report shall include the same information as required on the completion report and shall include specific information on how the well was closed and the placement and type of backfill placed in the well bore. The abandonment report shall be signed by the licensed driller or person holding a well closure license. All well closure reports shall

(Rule 0400-45-09-.10, continued)

include a diagram showing the location and distance in feet of the closed well from one specific landmark and septic system or sewer systems on the property.

(2) Location

(a) The construction of a water well is prohibited at other than a safe distance from any known potential source of contamination. The minimum safe distances shown in Table A shall apply for the sources of contamination listed therein.

(b) A water supply well may be constructed in an area subject to flooding provided the top of the water tight casing extends not less than two (2) feet above the one hundred (100) year flood plain.

(c) Relation to buildings, pits, and basements:

1. A well located adjacent to a building shall be so located that the center line of the well extended vertically will clear any projection from the building by not less than five (5) feet.

2. New wells shall not be constructed in pits or basements.

(d) New wells shall not be located closer than ten (10) feet from a property line. New wells located from ten (10) feet to twenty-five (25) feet from a property line shall require a minimum of thirty-five (35) feet of casing installed below land surface with impervious material such as cement grout or bentonite chips, tablets or bentonite grout backfilled in the annular space to a depth of thirty-five feet.

TABLE A
MINIMUM DISTANCES TO SEPARATE WATER WELLS
FROM POTENTIAL SOURCES OF CONTAMINATION

SOURCES OF CONTAMINATION	MINIMUM DISTANCES
Animal pens or feed lots	100 feet
Leaching Pits; sewage lagoons	200 feet
Pit Privys	75 feet
Sewer lines	50 feet
Sludge and septage disposal sites	100 feet
Septic tanks and drain fields	50 feet
House to septic tank connections, if the line is tight	10 feet
House to sewer line, if the line is tight	10 feet

(3) Source of Water Supply

(a) The source of water for any well shall be at least nineteen (19) feet below the surface of the ground.

1. In the event that no other ground water source is available, a source of less than nineteen (19) feet deep may be developed provided that:

(i) Prior to the installation of the casing in the well, the Division of Water Resources Central Office is notified by phone regarding:

(I) County and street address of the well

(Rule 0400-45-09-.10, continued)

(II) Name and phone number of the well owner

(III) Street address of owner if different from address of the well

(ii) A minimum of ten (10) feet of casing is installed below ground surface.

(iii) The well is sealed from land surface to a minimum ten (10) feet below ground with either cement grout or bentonite.

(iv) The owner of the well is advised by the driller concerning the development of a water bearing zone less than nineteen (19) feet deep by sending a written report to the homeowner and to the Division, at the time the completion report is submitted, containing the following advisory:

(I) The owner may need to place a chlorinator on the well to treat the water for potential problems with microbiological contamination.

(II) A shallow water bearing zone may be more subject to surface contamination surrounding the well and the well yield may diminish over time.

(III) The homeowner should provide a copy of the report and disclaimer to any prospective buyer prior to any resale of the property where the well is located.

(b) The driller shall develop the most favorable water-bearing zone(s) and seal off any source(s) of less desirable quality.

(c) It shall be the duty of any person attempting to construct a water well to seal off salt water, oil, gas, or any other fluid or material which might contaminate a source of fresh water.

(4) Drilling Fluids for Water Wells

(a) Water used during the construction of a water well shall be obtained from a public water supply, water well or protected spring box. Water taken from ponds, lakes, streams or other surface sources shall not be used.

(b) All water used shall also be treated with enough liquid bleach or hypochlorite granules to retain a free chlorine residual of at least two (2) parts per million.

(c) The driller shall denote on the water well report submitted to the Department from what source his drilling process water was obtained.

(d) Drilling fluids and additives shall be materials specified by the manufacturer for use in water well construction and approved by the Department.

(e) During the course of drilling a water well with air rotary equipment, a minimum of one (1) gallon of water per minute must be injected or added into the air stream. The amount of water injected shall be sufficient to control dust and to keep the hole cleaned out.

(Rule 0400-45-09-.10, continued)

(f) The amount of rock drill oil used to lubricate down hole drilling hammers shall not exceed hammer manufacturer's recommendations. The oil used to lubricate the hammer shall be specifically designed for that purpose.

(g) Petroleum based products or byproducts spilled or leaked from a drill rig or pump truck in any quantity greater than one (1) quart shall be removed from the area within a twenty-five (25) foot radius around the well by the driller or installer responsible for the spill before the drill rig or pump truck leaves the site.

(5) Casing

(a) Wells drilled for the production of water shall be cased with watertight casing extending from at least nineteen (19) feet below the land surface to a minimum of six (6) inches above land surface. For wells located in areas subject to flooding, see subparagraph (2)(b) of this rule. For water sources less than nineteen (19) feet deep see subparagraph (3)(a) of this rule.

1. The watertight casing in wells constructed to obtain water from a consolidated rock formation shall be firmly seated and sealed below all crevices that release inferior quality water or mud into the well or to a depth of at least five (5) feet below the top of the consolidated rock whichever is greater.

2. The watertight casing in wells constructed to produce water from an unconsolidated aquifer (such as saturated gravel or sand) shall extend at least to the top of the aquifer or to a depth of nineteen (19) feet which ever is greater.

(b) Except as otherwise specified in these regulations, the permanent well casing shall:

1. Casing shall be new or in like new condition. Such casing or pipe shall not be used unless free of leaks, corrosion, and dents; is straight and true, and not out of round, seamless or welded, black or galvanized steel pipe conforming to the weights and dimensions given in Table B and meeting the American Society for Testing and Materials (ASTM) Standards A53-87b or A589-85. Reject pipe shall not be used;

2. Have watertight joints that may be welded, or threaded and coupled; and

3. Be equipped with a drive shoe if the casing is to be driven.

4. Pipe sizes that are not listed in Table B and are less than ten (10) inches in diameter shall match listed values as closely as possible.

5. Pipe sizes that are ten (10) inches in diameter or larger shall be Schedule 20 pipe as a minimum.

TABLE B

MINIMUM DIMENSIONS AND WEIGHTS FOR WATER WELL CASING

Diameters in inches		Minimum Wall Thickness in Inches	Weight in Pounds per foot
External	Internal	in Inches	Plain Ends Only
3.500	3.250	0.125	4.51
4.000	3.732	0.134	5.53
4.500	4.216	0.142	6.61

(Rule 0400-45-09-.10, continued)

5.500	5.192	0.154	8.79
6.000	5.672	0.164	10.22
6.625	6.255	0.185	12.72
8.625	8.249	0.188	16.90

(c) Thermoplastic well casing may be installed in wells constructed to obtain water from unconsolidated aquifers (such as saturated gravel, sand or overburden) provided:

1. The casing is new;

2. The casting meets or exceeds the requirements of ASTM Standard F-480-88 and bears the NSF (National Sanitation Foundation) seal in each section of casing;

3. The Standard Dimension Ratio (SDR) shall not exceed 26;

4. The casing is installed after the borehole has been drilled to the final depth of the finished well, and no additional drilling takes place after the casing has been installed; and

5. Joints shall be solvent cemented with a quick-setting cement, or threaded and coupled.

(d) In areas where the water is obtained from overburden above the consolidated rock surface, the casing shall be set at or just above the consolidated rock. A screen may be attached to the bottom of the casing or the lowermost few feet of the casing may be slotted or perforated to allow water to enter the well provided the top of the screen or the topmost perforation in the casing is at least 20 feet below land surface. The completed well shall be finished so that extraneous material such as sediment cannot enter the well.

(e) Water well casing shall extend a minimum of six inches above the finished land surface unless, site conditions dictate that the well head will be better protected below ground surface and the upper terminus is constructed in the following manner:

1. The casing is terminated just below ground surface in a watertight manhole cover.

2. The manhole cover lid and skirt shall be all cast steel or aluminum construction.

3. The manhole cover shall have a sufficient diameter to use a well cap below the manhole lid.

4. The manhole shall be secured by a concrete pad two inches thick and no less than 24 inches in diameter.

5. The manhole cover shall be equipped with a positive drain to an area where water cannot enter from flooding or where excessive runoff could back up through the drain to the well head. The drain may be located in the basement area of a house.

6. The manhole cover shall be clearly marked on the cover as a “water well”.

7. Construction techniques for casings cut off below ground level shall conform to the drawing in figure 1.

(Rule 0400-45-09-.10, continued)

BELOW GROUND SURFACE WELL HEAD CONSTRUCTION

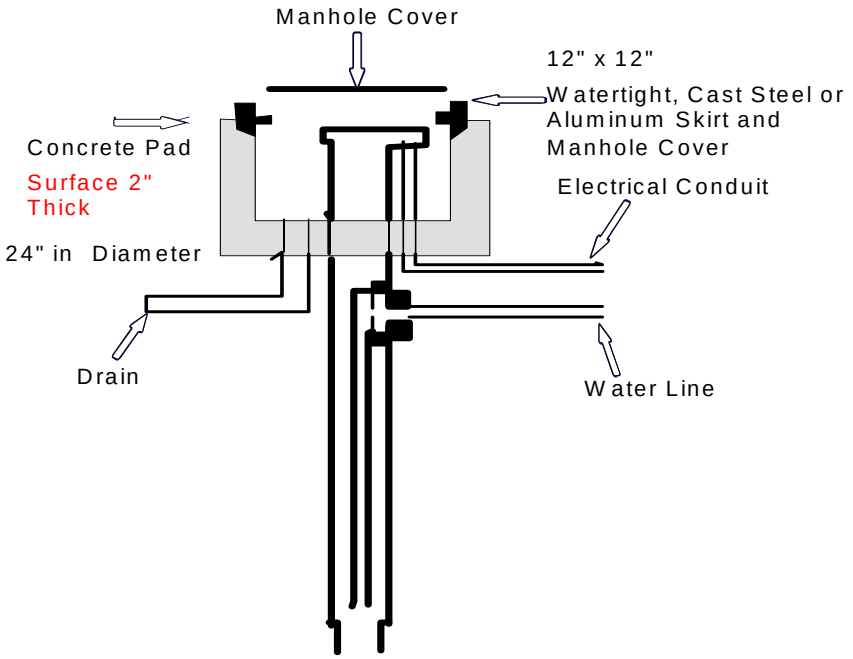

Figure 1

(f) The upper terminus of the well head shall be capped with a watertight well seal or cap specifically designed for capping the well.

(6) Backfilling and Grouting

(a) The grout material used in the backfilling or grouting of a water well shall consist of a mixture of Portland Class A cement or quick setting cement in a ratio of not over six (6.0) gallons of water per ninety-four (94) pound sack of cement, or a high solids mixing bentonite grout with a minimum of 20% solids and a weight of no less than nine and two tenths (9.2) pounds per gallon as measured by a standard mud balance. The use of bentonite, in chip or tablet form, ranging in size from one-quarter inch (1/4) to three-quarters of an inch (3/4) will be allowed as an alternate seal to slurry grouting. The bentonite shall be mixed and applied in accordance with the manufacturer's recommendations. The use of low solids bentonite drilling clay designed for use as a drilling fluid to form a filter cake on the side walls of the borehole and to increase viscosity of water) is prohibited for use as a grout or sealing material except as an additive. Only bentonite grout, bentonite tablets, or bentonite chips approved by the National Sanitation Foundation (NSF) or American National Standards Institute (ANSI) certified parties as meeting NSF product standard 60 or 61 shall be approved by the Department as appropriate grouting or sealing material.

(b) For wells completed with either steel or plastic well casing, the annular space between the casing and borehole wall of the well from a depth of three (3) feet to ten (10) feet below land surface shall be backfilled with an impervious material of either cement grout or bentonite as defined in subparagraph (a) of this paragraph. The remaining annular space between the casing and borehole wall shall be backfilled with an impervious material or combination of materials such as cement, bentonite, sand,

(Rule 0400-45-09-.10, continued)

puddled clay or well cuttings. However, the department recommends that the remaining annular space between the casing and the borehole wall of the well to the bottom of the watertight casing, be filled with the same grout or sealing material used from three to ten feet.

(c) Placement of the backfill material shall be done in such a way that there are no bridges or gaps in the annulus. The top of the backfill material shall remain level with the land surface surrounding the well.

(d) If bentonite is used for backfill, it shall be placed in accordance with the manufacturer's recommendations. For example, the product "Holeplug" from Baroid requires the annular space in a well to be one and one half inches (1-1/2") in clearance or more when "Holeplug" three fourths inch (3/4") is used. The annular space must be a minimum of three fourths inch (3/4") in clearance in the event that "Holeplug" three eighths inch (3/8") bentonite is used.

(e) If cement based grout or bentonite based grout is used for backfill, it shall be placed around the casing by one of the following methods:

1. Pressure

The annular space between the casing and the borehole wall shall be a minimum of one and five-tenths (1.5) inches, and grout shall be pumped or forced under pressure through the bottom of the casing until it fills the annular space around the casing and overflows at the surface; or

2. Pumping

The annular space between the casing and formation shall be a minimum of one and five tenths (1.5) inches and grout shall be pumped into place through a pipe or hose extended to the bottom of the annular space which can be raised as the grout is applied, but the grout pipe or hose shall remain submerged in grout during the entire application; or

3. Other

The annular space between the casing and the borehole wall shall be a minimum of two (2) inches and the annular space shall be completely filled with grout by any method that will insure complete filling of the space, provided the annular area does not contain water or other fluid. If the annular area contains water or other fluid, it shall be evacuated of fluid or the grout shall be placed by the pumping or pressure method.

(7) Well Screens

(a) Any water well finished in an unconsolidated rock formation shall be equipped with a screen or perforated pipe that will adequately prevent the entrance of soil or formation material into the well after the well has been developed and completed by the well contractor.

(b) The well screen shall:

1. Be of steel, stainless steel, plastic or other Department approved material and shall be of a strength to satisfactorily withstand chemical and physical forces applied to it during and after installation;

(Rule 0400-45-09-.10, continued)

2. Be of a design to permit optimum development of the aquifer with minimum head loss consistent with the intended use of the well;

3. Have openings designed to prevent clogging and shall be free of rough edges, irregularities or other defects that may accelerate or contribute to corrosion or clogging; and

4. Be provided with such fittings as are necessary to seal the top of the screen to the watertight casing and to close the bottom. If the screen is installed through the casing, a packer, seal or other approved design shall be used to prevent the entry of ground water into the well through any openings other than the screen.

(c) Multi-screened wells shall not connect aquifers or zones which have differences in:

1. Water quality to the extent that intermixing of the waters would result in deterioration of the water quality in any aquifer or zone.

2. Static water levels that would result in depletion of water from any aquifer or zone, or significant loss of head in any aquifer or zone.

(8) Gravel-Packed Wells

(a) In constructing a gravel-packed well:

1. The gravel shall be composed of quartz, granite, or similar rock material and shall be clean, rounded, uniform, water-washed and free from clay, silt, or other deleterious material.

2. The gravel shall be placed in the annular space around the screens and casing by any method that will insure accurate placement and avoid bridging or segregation.

3. The gravel pack shall have a minimum thickness of at least one-inch and shall be placed a minimum of nineteen feet below land surface.

4. The gravel shall be disinfected using water with a free chlorine residual of at least 50 parts per million (ppm).

(b) The gravel pack shall not connect aquifers or zones which have differences:

1. In water quality that would result in deterioration of the water quality in any aquifer or zone.

2. In static water levels that would result in depletion of water from any aquifer or significant loss of head in any aquifer or zone.

(9) Large Diameter Wells

(a) Large-diameter bored or augered wells may be cased with concrete pipe provided such wells are constructed as follows:

1. The bore hole shall have a minimum diameter of six (6) inches larger than the outside diameter of the casing.

(Rule 0400-45-09-.10, continued)

2. The annular space around the casing shall be filled with grout to a depth at least five feet below the static water level or twenty (20) feet below land surface, whichever is greater. The grout shall be placed in accordance with the requirements of subparagraph (6)(d) of Rule 0400-45-09-.10.

3. The annular space around the casing below the grout shall be completely filled with sand or gravel that has been disinfected with water containing a free-chlorine residual of at least 50 parts per million (ppm).

4. The sand or gravel material shall be composed of quartz, granite, or similar rock material and shall be clean, rounded, uniform, water-washed and free from clay, silt, or other deleterious material.

(b) The wellhead shall be completed in the same manner as required for other water-supply wells.

(10) Well Development. Prior to completion of a well for water supply, the driller shall take all steps necessary to:

(a) Remove any mud, drill cuttings, or other foreign matter from the well that would render the well useless for its intended purpose;

(b) Correct any damage to the aquifer that might have occurred during drilling; and

(c) Disinfect the well.

(d) Fracturing as an aid in water well development:

1. Fracturing includes the use of explosives, acid or pumping fluids or air into water well in an attempt to increase the yield of the well. General water well disinfection procedure with chlorine is not considered fracturing. A licensed driller shall supervise fracturing and submit a rework report for each site.

2. Water used in fracturing must be obtained from a public water supply, water well or protected springbox and chlorinated a minimum of two (2) parts per million chlorine residual prior to injection.

3. Wells located closer than fifty (50) feet from known sources of pollution shall not be fractured. Known sources of pollution include but are not limited to septic tanks field lines and sewers.

4. All packers set in a zone to be fractured by fluid or air must be placed at depths greater than fifty feet below land surface or a depth greater than twenty feet below the bottom of water tight casing, or whichever is greater in depth from land surface.

5. The driller shall submit a report of driller within sixty (60) days upon completion of fracturing the well reworking the well, and denote in the comments section the zone fractured, water used and amount of pressure induced on each zone.

(11) Wellhead Completion

(a) The top of the casing shall be cut off smooth and level, be free from dents and cracks, and shall terminate at least six (6) inches above the land surface. All wells shall be capped with an approved well cap.

(Rule 0400-45-09-.10, continued)

(b) Underground installations leading from the well shall employ a pitless adapter which does not require welding at the casing. Pitless units or adapters shall comply with the Water Systems Council's Pitless Adapter Division (PAD) PAS-1 (6th Ed., March 1987) and shall bear the PAD symbol of certification or shall otherwise have been approved by the Department.

(c) Pitless units or adapters shall be constructed and installed so as to prevent the entrance of contaminants into the well or potable water supply, conduct water from the well, protect the water from freezing, and provide access to water system parts within the well.

(d) Surface drainage shall be diverted away from the well head so that water is not allowed to stand around the casing.

Authority: *T.C.A. §§ 69-10-101 et seq. and 4-5-201 et seq.* ***Administrative History:*** *Original rule filed October 16, 2012; effective January 14, 2013. Rule renumbered from 1200-04-09. Amendment filed June 19, 2015; effective September 17, 2015.*

0400-45-09-.11 INSTALLATION OF PUMPS, FILTERS, AND WATER TREATMENT UNITS.

Primary responsibility for compliance with the provisions set forth herein for the installation of water well pumps, filters and water treatment units rests with the installer of these devices.

(1) The capacity of the pump shall be consistent with the intended use and yield characteristics of the well.

(2) The pump and related equipment for the well shall be conveniently located to permit easy access and removal for repair and maintenance.

(3) The base plate of a pump placed directly over the well shall be designed to form a watertight seal with the well casing or pump foundation.

(4) In installations where the pump is not located directly over the well, the annular space between the casing and pump intake or discharge piping shall be closed with a watertight seal designed specifically for this purpose.

(5) The well shall be properly vented at the wellhead to allow for pressure changes within the well. The vent shall be screened to prevent entry of insects.

(6) Any suction line installed underground between the well and pump shall be surrounded by six (6) inches of impervious material such as cement, or encased in a larger pipe that is sealed at each end.

(7) All conduits, valves and other plumbing fixtures used to convey water from a water-supply well to any building or other outlet shall be installed in accordance with manufacturer's requirements.

(8) All pressure tanks shall be installed above ground unless the tank is specifically designated by the manufacturer for below ground burial.

(9) The electrical wiring and equipment used in connection with the installation of a water well pump shall:

(a) Meet underwriters specifications;

(Rule 0400-45-09-.11, continued)

(b) Be installed in accordance with the National Electrical Code or local codes and ordinances if the latter are more restrictive;

(c) Be equipped with a fused or circuit breaker disconnect switch.

(d) Be served by an entirely separate circuit from other equipment.

(10) Water filters and water treatment units shall be installed and serviced to accommodate water quality problems as determined by physical, chemical or bacteriological evaluation or field test; and the function of the equipment shall achieve the results specified by the manufacturer. In servicing and installing treatment units the sanitation of the water supply shall be protected.

Authority: *T.C.A. §§ 69-10-101 et seq. and 4-5-201 et seq.* ***Administrative History:*** *Original rule filed October 16, 2012; effective January 14, 2013. Rule renumbered from 1200-04-09.*

0400-45-09-.12 DISINFECTION OF WATER SUPPLY WELLS.

(1) All water wells shall be disinfected upon completion of construction, reworking, pump installation or repairs as follows:

(a) A chlorine solution shall be placed in the well in sufficient dosage to produce a chlorine residual of at least one hundred (100) parts per million (ppm) in the water standing in the well (see Tables C and D for the correct amount). A chlorine solution may be prepared by dissolving dry hypochlorite granules (trade names include HTH, Chlor-Tabs, etc.) in water or by liquid bleach (trade names include Clorox, Purex, etc). (CAUTION: When working with chlorine, persons should be in a well ventilated place. The powder or strong liquid should not come in contact with skin or clothing. Solutions are best handled in wood, plastic or crockery containers because metals are corroded by strong chlorine solutions).

(Rule 0400-45-09-.12, continued)

TABLE C

QUANTITY OF DISINFECTANT REQUIRED TO PRODUCE A FREE CHLORINE RESIDUAL OF 100 PARTS PER MILLION (PPM) IN DRILLED WELLS.

Feet of Water	Liquid Bleach (Clorox, Purex, etc.) (5.25 % Chlorine)			Dry Granules (HTH, Clor-Tabs, etc.) (70% Chlorine)			Feet of Water
	Well Diameter			Well Diameter			
	4-inch	6-inch	8-inch	4-inch	6-inch	8-inch	
10	1/4 cup	1/2 cup	1 cup	1 tab.	2 tabs.	1/2 oz.	10
20	1/2 cup	1 cup	1 pt.	2 tabs.	4 tabs.	1 oz.	20
30	3/4 cup	1 1/2 cups	1 1/2 pts.	3 tabs.	1 oz.	1 1/2 oz.	30
40	1 cup	1 pt.	1 3/4 pts.	4 tabs.	1 1/4 ozs.	2 ozs.	40
50	1 1/4 cups	1 1/4 pts.	1 qt.	5 tabs.	1 1/2 ozs	2 1/2 ozs	50
60	1 1/3 cups	1 1/2 pts.	1 1/4 qts.	6 tabs.	1 3/4 ozs.	3 ozs.	60
70	1 1/2 cups	1 3/4 pts.	1 1/2 qts.	1 oz.	2 ozs.	3 1/2 ozs.	70
80	1 3/4 cups	1 qt.	1 3/4 qts.	1 oz.	2 1/4 ozs.	4 ozs.	80
90	1 pt.	1 1/4 qts.	2 qts.	1 1/4 ozs.	2 1/2 oz.	4 1/2 ozs.	90
100	1 1/4 pt.	1 1/4 qts.	2 1/4 qts.	1 1/4 ozs.	3 ozs	5 ozs.	100
120	1 1/3 pts.	1 1/2 qts.	2 1/2 qts.	1 1/2 ozs.	3 1/2 ozs.	6 ozs.	120
140	1 1/2 pts.	1 3/4 qts.	3 qts.	1 3/4 ozs.	4 ozs.	7 ozs.	140
160	1 3/4 pts.	2 qts.	3 1/2 qts.	2 ozs.	4 1/2 ozs.	1/2 lbs.	160
180	1 qt.	2 1/4 qts.	1 gal.	2 1/4 ozs.	5 ozs.	2/3 lbs.	180
200	1 1/4 qts.	2 1/2 qts.	1 1/4 gal.	2 1/2 ozs.	6 ozs.	3/4 lbs.	200
250	1 1/2 qts.	3 qts.	1 1/2 gals.	3 1/4 ozs.	1/2 lb.	1 lbs.	250
300	2 qts.	1 gal.	1 3/4 gals.	5 ozs.	2/3 lb.	1 lbs.	300
400	2 1/2 qts.	1 1/4 gal.	2 1/4 gals.	6 1/4 ozs.	3/4 lbs.	1 1/2 lbs.	400
500	2 3/4 qts.	1 1/2 gal.	2 3/4 gals.		1 lbs.	2 lbs.	500

Measures:
2 cups = 1 pint (pt)
2 pints = 1 quart (qt)
4 quarts = 1 gallon (gal)
7 tablets = 1 ounce (oz)
8 ounces = 1/2 pound (lb)
16 ounces = 1 pound (lb)

Equations for calculating amount of disinfectant required to chlorinate drilled wells with diameters larger than 8 inches:

Pints of liquid bleach = $D^2 h \div 10$

Ounces of dry granules = $D^2 h \div 9$

where: D = Diameter of well in feet
h = height of water above bottom of well in feet.

(Rule 0400-45-09-.12, continued)

TABLE D

QUANTITY OF DISINFECTANT NEEDED TO PRODUCE A FREE CHLORINE RESIDUAL OF 100 PARTS PER MILLION (PPM) IN DUG OR BORED WELLS

Feet of Water	Liquid Bleach (5.25% Chlorine) Well Diameter in feet				Dry granules (70% chlorine) Well Diameter in feet			
	2 ½	3	4	5	2 1/2	3	4	5
1	1 1/4 cups	1 pt	1 Qt	1 1/4 qts	5 tabs	1 oz	2 ozs	3 ozs
2	1 1/4 qts	1 qt	1 1/2 qts	2 1/2 qts	1 1/2 ozs	2 ozs	4 ozs	6 ozs
3	1 qt	1 1/2 qts	2 1/4 qts	3 1/2 qts	2 1/4 ozs	3 ozs	6 ozs	9 ozs
4	1 1/4 qts	2 qts	3 qts	5 qts	3 ozs	4 ozs	1/2 lb	3/4 lb
5	1 1/2 qts	2 1/4 qts	4 qts	1 1/2 gals	4 ozs	5 ozs	3/4 lb	1 lb
10	3 qts	1 1/4 gals	2 gals	3 gals	7 ozs	1/2 lb	1 1/2 lbs	2 lbs
15	1 gal	1 3/4 gals	3 gals	4 1/2 gals	3/4 lb	1 lb	2 lb	3 lbs
20	1 1/2 gals	2 1/4 gals	4 gals	6 gals	1 lb	1 1/2 lbs	2 1/2 lbs	3 1/2 lbs

Equations for calculating amounts of chlorine needed to disinfect dug or bored wells.

Pints of liquid bleach = D^2h) 10

Ounces of dry granules = D^2h) 9

where: D = diameter of well in feet
h = height of water above bottom of well in feet.

(b) Place the required amount of liquid bleach or dry granules in the well by one of the following methods:

1. Dry granules or tablets may be dropped in the top of the well and allowed to settle to the bottom; or

2. Liquid bleach may be mixed with water and poured in the top of the well and allowed to settle to the bottom.

(c) Agitate the water in the well to insure thorough dispersion of the chlorine throughout the entire length of the well.

(d) The well casing, pump column and any other equipment above the water level in the well, shall be thoroughly rinsed with the chlorine solution as a part of the disinfecting process.

(Rule 0400-45-09-.12, continued)

(e) The chlorine treated water shall stand in the well for a period not less than twelve (12) hours. The well shall, thereafter, be pumped until the odor of the chlorine is no longer detectable.

Authority: *T.C.A. §§ 69-10-101 et seq. and 4-5-201 et seq.* ***Administrative History:*** *Original rule filed October 16, 2012; effective January 14, 2013. Rule renumbered from 1200-04-09.*

0400-45-09-.13 REPAIR OF WATER WELLS.

(1) All materials used in the replacement or repair of any water well shall meet the requirements for a new installation.

(2) Plastic pipe approved by the National Sanitation Foundation (NSF) and rated at 160 psi (SDR = 26) may be used for liner casing. The liner casing shall be installed with centering guides to insure proper centering in the well and the annular space around the liner casing shall be completely sealed at both ends to repel the inflow of extraneous material from the lined interval.

(3) Repairs to wells completed with the top of the well casing terminating below ground shall include extending the well casing above land surface in accordance with subparagraph (5)(a) of Rule 0400-45-09-.10.

Authority: *T.C.A. §§ 69-10-101 et seq. and 4-5-201 et seq.* ***Administrative History:*** *Original rule filed October 16, 2012; effective January 14, 2013. Rule renumbered from 1200-04-09.*

0400-45-09-.14 WELL REGISTRATION - IDENTIFICATION.

(1) Each water well constructed or reconstructed shall be equipped before the drill rig leaves the site with an identification tag or decal bearing a registration number. The tag and registration number shall be supplied by the Department.

(2) The identification tag or decal shall be securely attached to the well casing or other appurtenance where it is readily visible.

(3) The identification tag or decal shall not be removed from the well unless otherwise approved by the Department.

(4) The registration number shall be recorded on the well completion report to be submitted by the driller to the Department.

Authority: *T.C.A. §§ 69-10-101 et seq. and 4-5-201 et seq.* ***Administrative History:*** *Original rule filed October 16, 2012; effective January 14, 2013. Rule renumbered from 1200-04-09.*

0400-45-09-.15 DATA AND RECORDS REQUIRED.

(1) A “Report of Well Driller” (well completion report) shall be submitted to the Department on a form provided or approved by the Department within sixty (60) days after completion of the drilling, construction, reconstruction or closure of each water well.

(2) The report shall be true and accurate. The report shall include as a minimum the following accurate information about the well. Footage shall be accurate to the nearest foot of measurement:

(a) Name and address of the person for whom the well was drilled;

(Rule 0400-45-09-.15, continued)

(b) The location of the well as denoted by county, street address and road name;

(c) The location of the well as denoted by the latitude and longitudinal coordinates of the well in degrees, minutes and seconds. The accuracy of the coordinates must be to the nearest second of the location;

(d) Proposed use of the well;

(e) The date completed for each well;

(f) The "log" of the well;

(g) The depth, diameter and general specifications for the well including;

1. Casing lengths used, type, diameter, wall thickness or SDR rating;

2. Liners used, location, type, diameter, wall thickness or SDR rating;

3. Bottom depth of casing, and depth of screen or slotted pipe;

4. Type backfill material used and location of backfill, and location of packers;

5. Static water level, depth to bedrock, (if encountered) for bedrock wells only;

6. Water bearing zones encountered in excess of one gallon per minute for bedrock wells only;

7. General water quality.

(h) Licensed driller's name and Tennessee license number;

(i) The well driller tag number and Notice of Intent Number;

(j) Information on well head completion, i.e. well cap, well disinfection, information supplied by the homeowner to the driller or confirmation by the driller that the septic tank and field lines are located fifty (50) feet or greater from the water well.

(3) The original report shall be signed by the licensee and submitted to the Director. The licensed driller shall maintain a copy of each report and fee payment submitted for five (5) years.

Authority: *T.C.A. §§ 69-10-101 et seq. and 4-5-201 et seq.* ***Administrative History:*** *Original rule filed October 16, 2012; effective January 14, 2013. Rule renumbered from 1200-04-09. Amendment filed June 19, 2015; effective September 17, 2015.*

0400-45-09-.16 WELL ABANDONMENT.

(1) The driller or person holding a license for well closure shall backfill and close any newly drilled water well not intended for use in which casing has not been installed or from which casing has been removed, within fifteen (15) days after the drill rig leaves the site. The driller shall take all steps necessary to maintain safety around the site until the closure process is completed. Prior to closing any such well, the driller shall:

(a) Remove all equipment or material that may obstruct access to the bottom of the well;

(Rule 0400-45-09-.16, continued)

(b) Check the entire depth of the well for obstructions that may interfere with sealing operations and remove them, and

(c) Thoroughly chlorinate the well prior to sealing by the addition of sufficient quantities of liquid bleach or dry hypochlorite granules to produce a free chlorine residual of twenty-five (25) parts per million (ppm).

(2) Except as provided in paragraphs (3), (4), (5) and (6) of this rule water well plugging and closure shall be accomplished by a licensed driller by the following methods:

(a) For uncased water wells, a cement grout or bentonite as defined in subparagraph (c) of this paragraph or other grout material approved by the Department shall be placed in the well bore from two feet below land surface to a minimum of twenty-five (25) feet below land surface. Native soil may be used to backfill the borehole from land surface to two feet below land surface or the driller may use cement or bentonite to land surface. The well bore twenty-five (25) feet below land surface shall be filled with either bentonite, cement grout, clean crushed stone one half inch in diameter or less, well cuttings, puddled clay, sand or combined mixture of any of these listed materials. Backfill shall remain level with land surface.

(b) For water wells with a minimum of nineteen feet of casing installed, a surface plug consisting of either cement grout or bentonite as defined in subparagraph (c) of this paragraph shall be placed in the well bore from land surface to a minimum of five (5) feet below land surface. An additional seal of cement grout or bentonite as defined in subparagraph (c) of this paragraph shall also be placed in the well bore for a minimum length of ten (10) feet. The top of this ten (10) foot seal shall either be located within twenty (20) feet below the bottom of the casing or at the top of the well screen or perforated pipe. The remaining well bore or casing shall be backfilled with either bentonite, cement grout, clean crushed stone one half inch in diameter or less, well cuttings, puddled clay, sand, or combined mixture of any of these listed materials. Surface casing may be terminated two (2) feet below land surface and native soil may be placed in the well bore from two feet to land surface provided that the upper surface plug of cement or bentonite grout is placed in the borehole from two to seven feet below land surface. Backfill shall remain level with land surface.

(c) The grout material used in the plugging and abandonment of a water well shall consist of a grout material approved by the Department or a mixture consisting of Portland Class A cement or quick setting cement in a ratio of not over six (6.0) gallons of water per ninety-four (94) pound sack of cement, or a high solids bentonite grout with a minimum of 20% solids and a weight of no less than nine and two tenths (9.2) pounds per gallon as measured by a standard mud balance. The use of bentonite, in chip or tablet form, ranging in size from one-quarter inch (1/4") to three-quarters (3/4) of an inch will be allowed as an alternate seal to slurry grouting. The bentonite shall be mixed and applied in accordance with the manufacturer's recommendations. The use of low solids bentonite drilling clay (designed for use as a drilling fluid to form a filter cake on the side walls of the borehole and to increase viscosity of water) is prohibited for use as a grout or sealing material except as an additive. If bentonite is used as a sealing material only bentonite grout, bentonite tablets, or bentonite chips, approved by the National Sanitation Foundation (NSF) or American National Standards Institute (ANSI) certified parties as meeting NSF product standard 60 or 61 shall be approved by the Department as appropriate grouting or sealing material.

(d) Placement of the backfill material shall be done in such a way that there are no bridges or gaps in the well bore. The top of the backfill material shall remain level with land surface.

(Rule 0400-45-09-.16, continued)

(3) Wells extending into more than one aquifer shall be filled and sealed in such a way that exchange of water from one aquifer to another is prevented.

(4) The sealing of flowing wells shall be accomplished only after the wells have been treated to reduce the flow to zero. This may be accomplished by introducing high specific gravity fluids which are approved for use in potable water systems into the bottom of the well bore and continuing until the flow ceases.

(5) The driller or a person holding a license for well closure may submit a written petition for an alternative method of well abandonment. Any alternate method of filling and sealing a well shall be submitted to the Director for review and written approval prior to sealing a well by such method. In an emergency or in exceptional instances, the Department will respond to a verbal request provided the applicant submits a written application within ten (10) days of the verbal application.

(6) Hand dug water wells greater than twelve inch in diameter without steel or plastic casing and less than sixty (60) feet in depth may be abandoned by a landowner, or the following individuals licensed in Tennessee: licensed engineers, licensed professional geologists, licensed building contractors, licensed pump installers, county environmentalists, or environmental specialists for the state of Tennessee. They must all follow the construction standards for the closure of a hand dug well. The landowner should contact the Division of Water Resources or a licensed driller prior to closing a hand dug well for additional technical assistance. The person, other than the landowner closing the hand dug well is responsible for submitting the well closure report for the hand dug well. A landowner who does the well closure is not required by law to complete a well closure report: however it is recommended that the landowner submit a letter to the Division of Water Resources similar to information submitted on a well closure report. The information serves as a public record of the landowners' compliance with state well construction standards and will be important information for land appraisals and property transfer arrangements. No matter who does the job, the landowner is ultimately responsible for the closure of a hand dug well.

(7) Hand dug water wells may be closed by using the following procedures:

(a) Thoroughly chlorinate the well prior to sealing by the addition of sufficient quantities of liquid bleach or dry hypochlorite granules to produce a free chlorine residual of twenty-five (25) parts per million within the entire well.

(b) Cement grout or bentonite as defined in subparagraph (2)(c) of this rule must be used from five feet to two feet below land surface to place a barrier for the well. The remaining annular space from two feet to land surface may be filled with native soil or cement. Backfill must remain level with land surface.

(c) Construction debris, trash or wood are prohibitive materials and must never be used during the well closure process.

(d) Native soil material, gravel less than one inch or less in diameter, cement or bentonite may be used as well closure material from five feet below land surface to the total depth of the well.

(8) All well closure reports shall include a diagram showing the location and distance in feet of the closed well from one specific landmark and septic system or sewer systems on the property.

(9) Well Abandonment-Existing Wells with Obstructions

(Rule 0400-45-09-.16, continued)

(a) Existing wells required to be closed for which no well construction report is on file and/or those that are partially filled or obstructed with soil, rock, construction debris or other materials must be cleaned out inside the well down to a minimum depth of twenty-five (25) feet below land surface to allow for proper sealing of the upper terminus of the well.

1. If the well does not open up and remains filled below twenty-five (25) feet, the well shall be backfilled and sealed from twenty-five (25) feet to land surface with a cement grout or bentonite as defined in subparagraph (2)(c) of this rule.

2. If the well opens up below twenty-five (25) feet while cleaning, the well shall be backfilled from its lowermost open depth to twenty-five (25) feet below land surface with either cement grout, bentonite, clean crushed stone one-half (½) inch diameter or less, well cuttings, puddled clay, sand or a combined mixture of any of these materials. Cement grout or bentonite as defined in subparagraph (2)(c) of this rule shall be used to backfill the well from twenty-five (25) feet to land surface.

(b) If the grading or elevation changes are expected at the site, native soil or crushed rock can be used to backfill the well from land surface to two (2) feet below land surface.

(c) The driller will be required to file a well closure report with the Department within sixty (60) days of the completion of the well abandonment.

Authority: *T.C.A. §§ 69-10-101 et seq. and 4-5-201 et seq.* ***Administrative History:*** *Original rule filed October 16, 2012; effective January 14, 2013. Rule renumbered from 1200-04-09. Amendment filed June 19, 2015; effective September 17, 2015.*

0400-45-09-.17 GEOTHERMAL WELL CONSTRUCTION STANDARDS FOR CLOSED LOOP GEOTHERMAL BOREHOLES.

(1) Location of Closed Loop Geothermal Boreholes

(a) The construction of a closed loop geothermal borehole is prohibited at other than a safe distance from any potential source of contamination. The minimum safe distances shall apply for the sources listed below:

Source of structure	Minimum Distances
Sewer Line	10 feet
Septic Tanks	25 feet
Springs	100 feet
Septic Drain Fields	25 feet
Water Wells	100 feet
House to septic tank connection	10 feet
House to sewer line connection	10 feet

(2) Source of Drilling Water for Closed Loop Geothermal Boreholes

(a) All water used in drilling and construction of a closed loop geothermal borehole shall be from a public water supply, water well or protected spring box.

(b) Water used in the drilling or construction process shall be treated with enough chlorine product to retain a free chlorine residual of at least two (2) parts per million unless the

(Rule 0400-45-09-.17, continued)

water is obtained on site from a direct connection to a public supply equipped with a proper cross connection protection device.

(c) Drilling fluids and additives shall be materials specified by the manufacturer for use in either water or geothermal well drilling or construction and approved by the Department.

(d) During the course of drilling a closed loop geothermal borehole with air rotary equipment, a minimum of one gallon per minute (1) of water must be injected or added into the air stream unless the drill rig is equipped and uses a dust cyclone to control dust. The amount of water injected shall be sufficient to control dust and to keep the borehole cleaned out.

(e) Petroleum based products or byproducts spilled or leaked from a drill rig in any quantity greater than one (1) quart shall be removed from the drilling area before the drill rig is removed from the borehole being constructed.

(3) Grouting for Closed Loop Geothermal Boreholes

(a) The entire borehole surrounding the closed loop shall be filled with a grout material approved by the Department. A cover from land surface to five (5) feet below land surface comprised of native soil material may be used in closed loop geothermal boreholes.

(b) Grout in closed loop geothermal boreholes is to be composed of cement, a bentonite cement mixture, high solids sodium bentonite or other grout material approved by the Department. Thermal grout, Thermal Grout Lite and Mix 111 Grout are three specific type grouts approved by the board for the grouting and closure of closed loop geothermal boreholes.

1. Cement grout shall be composed of Class A, Type I Portland Cement mixed with not more than six (6) gallons of clean water per bag (one cubic foot or 94 pounds) of cement with a density of 15 to 16 pounds per gallon, or to manufacturer's specifications.

2. Bentonite-cement grout shall be composed of powdered bentonite (less than 5% by weight) mixed at not more that 8 gallons of water to the bag, with a density of 14 to 15 pounds per gallon, or to manufacturer's specifications.

3. High solids sodium bentonite grout shall have minimum of 20% solids and be mixed per manufacturer's specifications with water and/or other required additives.

(c) All grouting shall be accomplished using forced injection to emplace the grout. When emplacing the grouting material, the tremie pipe shall be lowered to the bottom of the zone to be grouted. The tremie pipe shall be kept full continuously from start to finish of the grouting procedure, with the discharge end of the tremie pipe being continuously submerged in the grout until the zone to be grouted is completely filled.

(d) The driller shall take all steps necessary to maintain safety around the borehole until the closed loop is installed and grouted in the borehole. Each ungrouted borehole or loop shall have a protective cover, or sand bag placed over the open borehole. The closed loop u-bend or dropline pipe shall be placed into the borehole to its proper depth and grouted in place within five (5) days of drilling each borehole unless the u-bend dropline pipe has been installed to its maximum depth with a dedicated tremie pipeline.

(Rule 0400-45-09-.17, continued)

Each u-bend dropline pipe opening shall be taped or crimped or covered at land surface after installation of the loop. All Closed Loop Geothermal Boreholes shall be grouted in-place within fifteen (15) days of being drilled.

(e) When high solids bentonite grouts are used, a cover at the land surface at least the width of the borehole made of suitable materials, as approved by the Department, such as native soils, gravel, sand or thermoplastic material sufficient to support the weight of normal foot traffic shall be used as a covering for each borehole.

(f) Boreholes that encounter caves or large fractures below thirty (30) feet from land surface that prohibit the use of standard grouting procedures shall use one of the following materials to fill these intervals up to a maximum of thirty (30) feet in each well;

1. Chipped or granular bentonite;

2. Clean washed gravel ½ inch diameter or less;

3. Clean washed coarse sand; and

4. Liner casing shall consist of steel casing if the casing is permanently installed in the borehole

(g) All drilled boreholes must be drilled to a minimum of four (4) inches in diameter or larger to allow for installation of the loop and tremi pipe unless prior approval has been granted by the Department. Well depths shall not exceed five hundred (500) feet unless prior approval has been granted by the Department.

(h) Geothermal systems consisting of five (5) boreholes or greater shall not be located within well head protection areas unless prior approval has been granted by the Department in writing. The driller must contact the Department to determine if a site is located within a well head protection area designated by the Department. The Director may set any conditions deemed necessary to protect the well head protection area,

(i) A licensed geothermal driller or loop installer may request a variance from the Director to convert an existing water well into a closed loop geothermal well. A geothermal report is required within sixty (60) days upon completion of conversion if approved by the Department. There is no Notice of Intent or fee required for this conversion. The Director may approve or disapprove any request for conversion and set additional conditions as deemed necessary by the Director to protect the ground water resource.

(j) A licensed geothermal well driller may request a variance from the Department to convert a geothermal borehole at a geothermal system to a water well. A Notice of Intent fee and specific water well driller report for the converted well is required within sixty (60) days upon completion of converson if approved by the Department. The Department may approve or disapprove any request for conversion and set additional conditions as deemed necessary by the Department to protect the ground water resource.

(4) Reporting of Closed Loop Geothermal Boreholes

(a) A “Report of Well Driller” for a closed loop geothermal borehole system shall be submitted by the driller to the Department within sixty (60) days after the drilling or closure of the last closed loop borehole in the system at the site. A Report of Well Driller shall also be submitted for a closed loop geothermal test borehole if drilled on the site to determine geology or heat transfer characteristics within sixty (60) days after

(Rule 0400-45-09-.17, continued)

drilling the borehole. See also paragraph (14) of this rule for Notice of Intent requirements for drilling.

(b) The report shall be true and accurate. Borehole footage shall be accurate to the nearest foot of measurement. The report shall include as a minimum the following accurate information about the system:

1. Name and address of the person for whom the closed loop geothermal boreholes were drilled;

2. The location of the system as denoted by county, street address and road name;

3. The location of the system as denoted by latitude and longitudinal coordinates of the center of the system, a diagram of the closed loop geothermal boreholes, and identification of other wells on the property and the location of the septic tank, field lines or sewer lines on the property. The accuracy of the coordinates must be to the nearest second of the location;

4. The date the last closed loop geothermal borehole was drilled at the system site and additional information as required by the Department;

5. The licensed driller's name and contractor identification number, general specifications of the closed loop geothermal borehole such as depth, diameter, backfill and closed loop information;

6. Reserved;

7. For systems with ten or less closed loop boreholes, the driller is required to provide a master plat to both the owner and Division of Water Resources of the location of each borehole. The plat shall include related distances from major buildings, septic tanks and field lines and sewer lines and be submitted with the Report of Well Driller within sixty (60) days upon completion of drilling of the last borehole on a given project. Site plans drawn up by a licensed engineer may be used if the driller is unable to provide a master plat;

8. For systems with eleven or more boreholes. The driller is required to provide a master plat to the owner of the property. The plat shall include related distances from major buildings, septic tanks and field lines and sewer lines. The driller shall also submit a Report of Well Driller to the Division of Water Resources within sixty (60) days upon completion of drilling of the last borehole on a given project. Site plans drawn up by a licensed engineer may be used if the driller is unable to provide a master plat.

(5) A geothermal driller license or closed loop installer license is required to install a closed loop dropline or u-bend loop in a closed loop geothermal borehole. In a closed-loop geothermal borehole, the material used to make up the heat-exchange loop that is placed in the ground or into a body of water must be composed of high-density polyethylene or other material approved by the Department. All closed loop material placed in the borehole must be installed and grouted within fifteen (15) days upon completion of drilling of each borehole. Each loop will be pressure tested to 100 pounds per square inch (psi) and maintain constant pressure for twenty (20) minutes before grouting and placement of loop into service. The entire system shall be free of leaks or pressure loss.

(a) High Density Polyethylene Pipe. This pipe must be manufactured in accordance with dimensional specifications of ASTM D-2513 or ASTM F-714 and must have a minimum

(Rule 0400-45-09-.17, continued)

cell classification of PE345434C up to PE345464C when tested under ASTM D-3350 to be acceptable for use in closed-loop heat pump systems. No other pipe shall be used for closed loop installation unless approved by the Department.

(6) Connecting Closed-Loop Pipe. The pipe must be thermally fused according to the pipe manufacturer's specifications and must not leak after assembly. No other connection method shall be used unless approved by the Department.

(7) Heat Transfer Fluid. The fluid used inside the closed-loop assembly must be composed of:

(a) Heat transfer fluids:

1. Pure glycerin solution-glycerin must be ninety-six and one-half (96.5%) United States pharmacopoeia grade;

2. Food grade propylene glycol;

3. Dipotassium phosphate;

4. Water;

5. Methanol

6. Ethanol; or

7. Other fluids as may be approved in advance by the Division.

(b) It is the responsibility of the closed loop installer, driller, primary geothermal heat pump installer and owner to become familiar with the safe and proper use of these fluids and to take necessary precautions to ensure ground water protection.

(8) Boreholes with closed loop u-bend material in the borehole shall have all heat transfer fluid removed from the closed loop before borehole abandonment. This fluid shall be disposed in accordance with manufacturers specifications. The closed loop u-bend material shall either be completely removed from the borehole before closure and the borehole closed in accordance with subparagraph (10)(a) of this rule or the loop shall be pumped full of cement grout or bentonite or other material approved by the Department. The driller shall denote on the geothermal well abandonment report how much grout or bentonite was used in sealing the closed loop or u-bend material. The upper portion of the borehole to five feet below land surface may be filled with compacted earth or same material to fill the closed loop.

(9) The driller or person holding a license for well closure shall backfill and abandon any drilled closed loop borehole in accordance with subparagraph (10)(a) of this rule not intended for use within 15 days after the drill rig leaves the property. The driller shall take all steps necessary to maintain safety around the site until the closure process is completed. Prior to closing any such borehole the driller shall:

(a) Check the entire depth of the borehole for obstructions that may interfere with sealing operations and remove them, and

(b) Thoroughly chlorinate the borehole prior to sealing by the addition of sufficient quantities of liquid bleach or dry hypochlorite granules to produce a free chlorine residual of 25 parts per million (ppm).

(Rule 0400-45-09-.17, continued)

(10) Closed loop borehole plugging and abandonment shall be accomplished by a licensed driller by the following methods:

(a) For closed loop boreholes without thermal transfer pipe, or closed loops installed, a cement grout or bentonite or other approved sealing material approved by the Department shall be placed in the borehole from two (2) feet below land surface to a minimum of twenty-five (25) feet below land surface. Native soil may be used to backfill the borehole from land surface to two feet below land surface or the driller may use cement or bentonite to land surface. The borehole twenty-five (25) feet below land surface shall be filled with either bentonite, cement grout, clean crushed stone one half inch in diameter or less, well cuttings, puddled clay, sand or combined mixture of any of these listed materials. Backfill shall remain level with land surface.

(b) The grout material used in the plugging and abandonment of a closed loop borehole shall consist of a mixture of Portland Class A cement or quick setting cement in a ratio of not over six (6.0) gallons of water per ninety-four (94) pound sack of cement, or a high solids bentonite grout with a minimum of 20% solids and a weight of no less than nine and two tenths (9.2) pounds per gallon as measured by a standard mud balance or other type grout material approved by the Department. The use of bentonite, in chip or tablet form, ranging in size from one-quarter (1/4") inch to three-quarters (3/4) of an inch will be allowed as an alternate seal to slurry grouting. The bentonite shall be mixed and applied in accordance with the manufacturer's recommendations. The use of low solids bentonite drilling clay (designed for use as a drilling fluid to form a filter cake on the side walls of the borehole and to increase viscosity of water) is prohibited for use as a grout or sealing material except as an additive. If bentonite is used as a sealing material, only bentonite grout, bentonite tablets, or bentonite chips, approved by the National Sanitation Foundation (NSF) or American National Standards Institute (ANSI) certified parties as meeting NSF product standard 60 or 61 shall be approved by the Department as appropriate grouting or sealing material.

(c) Placement of the backfill material shall be done in such a way that there are no bridges or gaps in the borehole. The top of the backfill material shall remain level with land surface.

(11) Boreholes extending into more than one aquifer shall be filled and sealed in such a way that exchange of water from one aquifer to another is prevented.

(12) The driller or person holding a license for well closure may submit a written petition for an alternative method of borehole abandonment. Any alternate method of filling and sealing a well shall be submitted to the Director for review and written approval prior to sealing a borehole by such method. In an emergency or in exceptional instances, the Department will respond to a verbal request provided the applicant submits a written application within ten (10) days of the verbal application.

(13) Every licensed driller or person holding a license for well closure, within sixty (60) days of abandonment of a closed loop borehole, shall submit a report of the abandonment of the borehole to the Department. The well abandonment report shall be made on a form provided by the Department or a reasonable facsimile approved by the Department. The report shall include the same information as required on the completion report and shall include specific information on how the borehole was closed and the placement and type of backfill placed in the borehole. The abandonment report shall be signed by the licensed driller or person holding a license for well closure.

(14) Notice of Intent required to drill geothermal closed loop well system.

(Rule 0400-45-09-.17, continued)

(a) A Notice of Intent to drill a closed loop geothermal borehole system must be submitted by the property owner or the licensed well driller to the Director in the manner prescribed by the Department, prior to commencement of drilling a water well or a closed loop geothermal borehole system in Tennessee. The licensed driller is required to have sufficient documentation that a Notice of Intent was submitted to the Division of Water Resources before beginning operations at a drill site. Sufficient documentation for a Notice of Intent being filed may include one of the following:

1. Fee receipt of the Notice of Intent.

2. Confirmation number of the Notice of Intent or other approved format approved by the Director and issued by the Department.

(b) The Notice of Intent fee or copy of the receipt for a Notice of Intent fee shall accompany the submission of the driller's report. No well or borehole shall be drilled unless the driller has documentation that a Notice of Intent has been filed. All well reports shall be submitted with documentation of the Notice of Intent fee being paid. Documentation of the fee being paid shall consist of the receipt originating from a Notice of Intent or money collected and enclosed with the original driller's report by the driller for the Notice of Intent. A Notice of Intent and fee is not required for well closure, deepening or reworking any closed loop geothermal borehole. The amount of the Notice of Intent fee shall be reviewed by the Department at least every five (5) years and shall currently be scheduled as follows:

1.	Geothermal well system (closed loop), ten boreholes or less	$ 75
2.	Geothermal well system (closed loop) eleven to fifty boreholes	$150
3.	Geothermal well system (closed loop) fifty-one boreholes or greater	$500
4.	Closed Loop test hole for thermal conductivity and geology	$ 75

(c) The requirement to furnish the Department a Notice of Intent fee payment shall not apply to closed loop geothermal boreholes drilled in any local jurisdiction which is authorized, by private act or pursuant to the provisions of an adopted "home rule" charter, to regulate the location and construction of these wells and which has established a fee for the inspection of both geothermal and water wells approved by the Commissioner.

(d) A Notice of Intent fee shall not apply to any property owner who within the past five years has filed a Notice of Intent and paid the fee for the same property. The property owner or driller must identify on the new Notice of Intent submitted for the property the identification number from the first Notice of Intent fee submitted.

(e) Checks returned for insufficient funds will be charged an established check processing fee and the Division will seek payment from the individual responsible for writing the check.

(f) A Notice of Intent shall expire one hundred and eighty days from the original date filed by the well driller or homeowner.

(g) When strict compliance with these standards is impractical, the driller or installer shall make application to the Department for approval of an alternative standard prior to the work being done. The Department may grant the request for an alternative standard if it determines the proposed standards offer an equivalent or higher level of protection to

(Rule 0400-45-09-.17, continued)

the environment. In an emergency or in exceptional instances, the Department will respond to a verbal request provided the applicant submits a written application within ten (10) ten days of the verbal application.

Authority: *T.C.A. §§ 69-10-101 et seq. and 4-5-201 et seq.* ***Administrative History:*** *Original rule filed October 16, 2012; effective January 14, 2013. Rule renumbered from 1200-04-09. Amendments filed June 19, 2015; effective September 17, 2015.*

0400-45-09-.18 MONITOR WELL CONSTRUCTION STANDARDS.

(1) Construction standards for monitor wells are not promulgated under this statute. Construction standards for monitor wells are regulated by the state agency requiring the monitor well to be placed into service. The Well Act only requires an individual to be licensed as a monitor well driller.

(2) Monitor well reports and Notice of Intent fees for monitor wells are not required to be submitted to the Division of Water Resources.

(3) Installer licenses are not required to install pumps or water treatment devices on monitor wells.

(4) Monitor wells are required to be constructed by licensed monitor well drillers.

(5) Monitor wells may be closed by a licensed water well driller, geothermal driller, monitor well driller or a person holding a license for well closure. Well closure standards for monitor wells are regulated by the agency requiring the monitor well to be placed into service and not the Division of Water Resources.

Authority: *T.C.A. §§ 69-10-101 et seq. and 4-5-201 et seq.* ***Administrative History:*** *Original rule filed October 16, 2012; effective January 14, 2013. Rule renumbered from 1200-04-09.*