AWWCC: 096.00

ARKANSAS WATER WELL CONSTRUCTION COMMISSION

RULES AND REGULATIONS

January 28, 2006

(Includes Proposed Changes to Rule 3.4)

SECTION 1 - SCOPE

1.1 APPLICATION. The rules and regulations hereby prescribed provide minimum standards for the construction or repair of water wells, and locations of water wells which are used or intended to be used to locate, acquire, divert or artificially recharge ground water within the boundaries of the State of Arkansas. After the effective date of the adoption of these rules and regulations, no water well as defined below shall be constructed or repaired contrary to the provisions of these regulations.

1.2 RULES APPLICABLE TO OLD WELLS. Wells constructed prior to the adoption of these rules and regulations may not meet the criteria established. When a well is to undergo rehabilitation, reconstruction, or repair, the work shall include those changes necessary to make the well conform to these rules and regulations. When wells or pumps are repaired, the well and pumping equipment will be brought into compliance with current regulations.

1.3 EXEMPTIONS. In some instances safe, potable water may be obtained from wells in certain geographical locations which are not in strict accordance with these rules and regulations. In this event permission, in writing, shall be obtained from the Commission prior to developing the well.

SECTION 2 - PROCEDURE

[RESERVED]

SECTION 3 - LICENSING AND BONDING

3.1 AUTHORIZED CONSTRUCTOR. Water wells subject to these rules and regulations shall be constructed only by persons having a valid license under Act 641 of 1969, enacted by the General Assembly of the State of Arkansas, unless exempt under provisions of that Act.

3.2 SUPERVISION. During the construction, alteration, or repair of a water well, or installation or repair of pumping equipment there must be, at the well site, a person who has obtained a registration certificate and has been certified in the type of construction engaged. The person shall supervise and shall remain informed and have knowledge of the status of the work being accomplished.

3.3 ENGINEERS AND GEOLOGISTS. Arkansas Registered Professional Engineers and Arkansas Registered Professional Geologists practicing geotechnical

engineering or geologic investigations may be declared exempt from certification, bonding, and testing requirements upon application for exemption from the Commission.

3.4 FEES. The following fees will be charged for licensing, registration, examination, rig permitting, and requests for construction reports. Once processed, all fees are non-refundable.

Contractor Licenses		
Drilling and Pump System License	$.~~200.00~~	280.00
Pump System License	~~50.00~~	70.00
Registration Certificates		
Driller Registration Certificate	~~70.00~~	100.00
Pump Installer Registration Certificate	~~70.00~~	100.00
Apprentice Certificate		70.00
Examination Fees		25.00
Rig permit	~~80.00~~	115.00
Official Copy Construction Report		10.00

3.4.1 EXAMINATION FEE. The Commission hereby establishes an application and examination fee of $25.00 for each Examination. All applicants for registration certificates shall pay said fees prior to completing the exam. Once processed, all applications, examinations, and licensing fees are non-refundable.

3.5 CATEGORIES FOR REGISTRATION CERTIFICATES.

3.5.1 DRILLER REGISTRATION.

3.5.1.1 CONSOLIDATED. Includes water well construction techniques for all water wells, other than monitoring wells, completed in rock formation or in formations which will not cave, including the overburden and soils overlying consolidated formations.

3.5.1.2 UNCONSOLIDATED. Includes water well construction techniques for all water wells, other than monitoring wells, completed in sand, clay, and gravel formations which are caving in nature.

3.5.1.3 MONITORING AND PIEZOMETER. Includes construction for the purpose of locating and sampling for Engineering or Geological data or sampling ground water.

3.5.1.4 HYDROFRACTURING. Includes pumping or injecting fluids, into a well, and does not include the use of explosives.

3.5.1.5 GEOTHERMAL. Includes construction of wells built for the purpose of geothermal energy exchange including earth-coupled and direct exchange systems.

3.5.2. PUMP INSTALLER REGISTRATION

3.5.2.1 TURBINE PUMPS. Includes equipment consisting of, or used in conjunction with, line shaft turbine pumps.

3.5.2.2 SUBMERSIBLE PUMPS. Includes equipment consisting of, or used in conjunction with, submersible pumps and motors.

3.5.2.3 JET PUMPS. Includes equipment used in conjunction with the jetting action of a venturi nozzle.

3.5.2.4 MONITORING/PURGING/SAMPLING. Includes pumps and other devices permanently installed to purge monitor wells, obtain samples from a monitoring well, or recover foreign substances from ground water.

3.5.2.5 POSITIVE DISPLACEMENT PUMPS AND OTHER DEVICES. Includes the installation of equipment and pumping devices not listed above, such as hand pumps, windmills, stroke pumps or sucker rod pumps and equipment.

3.5.2.6 PLUGGING – Registered pump installers who have demonstrated a knowledge of the applicable rules and possession of the required skills by passing a test on those subjects administered by the Commission are authorized to plug abandoned water wells

3.6 WATER WELL CONTRACTOR LICENSES.

3.6.1 GENERAL Any person who contracts for or is engaged in well construction or pump installation shall hold or be employed by a person holding an Arkansas Water Well Contractor License. The Water Well Contractor shall hold the proper license, certificates, and permits for the type of construction engaged, and shall meet continuing education requirements as set forth herein.

3.6.2 CATEGORIES.

3.6.2.1 DRILLING AND PUMP SYSTEMS. Includes contracting for all elements of water well construction, including drilling and pump installation.

3.6.2.2 PUMP SYSTEMS. Includes contracting for the installation and repair of pumps and related equipment and does not include excavating the well.

3.6.3 MASTER ELECTRICIANS. A Master Electrician holding a valid license may repair or install pressure switches, control boxes and other electrical components of the pumping equipment at the well head without holding licenses issued by the Commission. The Electrician shall adhere to these regulations for the installation and is not authorized to break the well seal, or alter, cut or drill into the casing. The person shall keep the Commission advised of his or her current mailing for revisions to the regulations.

3.6.4 MASTER PLUMBERS. A Master Plumber holding a valid Master Plumber License may repair or install pressure switches, pressure tanks, valves and pipes at the well head, without holding licenses issued by the Commission. The plumber shall adhere to these regulations for the installation and is not authorized to break the well seal, or alter, cut or drill into the casing. The person shall keep the Commission advised of his or her current mailing address for revisions to the regulations.

3.7. BONDING.

3.7.1 CONDITIONS OF BOND FOR RESIDENT AND NONRESIDENT CONTRACTOR. The Water Well Contractor as defined in Act 641, as amended, as principal and a surety company or corporation authorized to do business in the State of Arkansas as surety shall bind themselves and their successors and assigns jointly and severally to the Arkansas Water Well Construction Commission for the use and benefit of the public in the full penal sum of no less than ten thousand dollars ($10,000.00) for each licensing year; that said principal and any person employed by him shall well and duly comply with Act 641 of 1969, as amended, and all rules and regulations pertaining to said Act. Any one contract, as prescribed herein by section 2.4.7, between said principal and a person doing business with said principal exceeding ten thousand dollars ($10,000.00) or the amount of aforesaid bond if in excess of ten thousand dollars (10,000.00) shall require said principal to enter into a separate agreement and a bond equal to the amount of said contract as required in Subsection (c) of Section 11 of Act 641 of 1969, shall be provided unless otherwise exempted by the Commission.

3.7.2 RECOVERY OF DAMAGES. Any and all persons doing business with said principal or person in his employ, who have been damaged by reason of violation of any of the provisions set out in Act 641 of 1969, as amended, and all rules and regulations pertaining to said Act, may in their own name and without joining the Commission as a party, sue thereon and join in said action as one of the defendants the surety on said bond(s).

3.7.3 EXHAUSTION OF ADMINISTRATIVE REMEDIES. No action shall be taken against the principal and surety on said bond(s) until all reasonable administrative remedies have been exhausted by the Commission.

3.7.4 TERM OF BOND. Each bond shall be construed as a new bond in the sum aforesaid in section 3.7.1, for each year it remains in full force unless the bond is waived as set forth in Section 3.7.8.

3.7.5 TERMINATION OF BOND. The surety shall terminate each bond by giving not less than thirty (30) days written notice of the effective date of said termination to the Commission. Termination shall not relieve said surety or principal of any liability during which the bond was in force until a period of not less than five (5) years from the effective date of termination has expired.

3.7.6 BOND FORM. The Commission shall provide a contractor's bond form to each person applying for the contractor's license. Each contractor's license shall be issued only after the receipt of the original copy of the water well contractor's bond prescribed above, and said form is completed and notarized. The contractor's license may be renewed annually without receipt of a new contractor's bond form provided the Commission has proof that the original contractor's bond(s) remains in full force and effect.

3.7.7 THE AMOUNT OF THE CONTRACT. "THE AMOUNT OF THE CONTRACT" as used in section 3.7.1 shall be defined as the amount or cost of the construction of the well, including but not limited to the cost of drilling, casing, screens, grout, seals, etc., excluding the costs of systems employed, constructed or installed on the discharge side of the pressure tank or beyond the point of discharge from the pump if no

tank is employed, or to pivot systems, ditches, pumping stations, pump houses, buildings, air conditioning duct work, or items which the water well contractor may construct or install, but are not directly connected with the construction of the well or included under the Definition or Scope of a water well as prescribed in Subsection (E) of Section 3, and Section 4 of Act 641 of 1969, as amended, and these rules and regulations.

3.7.8 WAIVER. The Commission shall reserve the right to waive the requirement of obtaining a water well contractor's bond in the amount of ten thousand dollars ($10,000.00) in favor of a bond of a lesser amount to those contractors whose contracts for each one year period consistently amount to less than ten thousand dollars ($10,000.00) if the contractor has proof that he is unable to obtain a bond, or such bond would cause an undue hardship and if it is the recommendation of the Executive Secretary of the Commission that such a bond of lesser amount would be sufficient protection for any persons doing business with the Contractor.

3.7.9 CASH BOND. Persons who install pumping equipment or repair pumping equipment that have been granted a waiver for a $10,000 bond and are unable to post a $2,000 bond may post in lieu of a water well contractors bond an Escrow cash bond of no less than $500.00 per year until $10,000 is accrued. Persons authorized to post an escrow cash bond in lieu of posting bond shall also submit a statement of personal indemnification signed by the principal owner or Chief Executive Officer.

3.8 MAIL.

3.8.1 GENERAL. All persons licensed or certified by the Commission agree to keep the Commission advised of current address and must readily accept all mail sent to them from the Commission.

3.8.2 REGISTERED OR CERTIFIED MAIL. Registered or Certified Mail sent with proper postage and to the last known address that is returned unclaimed shall be considered adequate notification of notice served.

3.8.3 CHANGE OF ADDRESS. The Commission shall be notified of any change of address within 15 days of the change.

3.8.4 REFUSAL TO ACCEPT MAIL. Refusal to accept mail is considered a violation of these regulations and could result in disciplinary action.

3.9 CONTINUING EDUCATION. Beginning August 1, 2002, as a condition of annual license renewal, a contractor or one designee who is a partner, officer, or full-time employee and a registered driller or pump installer shall submit proof of 6 approved continuing education credits completed during the previous licensing year. For each additional designee, two (2) additional credits will be required per contractor per year. Credits exceeding the required number may be carried over into the next licensing year. The Commission may pre-approve continuing education programs and the number of credits to be given therefore. Programs submitted for pre-approval shall be considered by the Commission only upon submission, by the sponsor or attendee, of a written description, which must include the names and qualifications of the presenters, the time and location, the proposed number of credits, and the program's objectives. Programs

may be held within or without the state, and must be related to water wells or pump systems technology, science, or health, sound business practices, or compliance with the Commission's Rules and other governmental and industry requirements including worker health and safety. Program sponsors must provide written proof of attendance to attendees, and providers of pre-approved classes must provide a list of attendees to the Commission by July 31 of each year.

3.10 APPRENTICESHIP PROGRAM

3.10.1 GENERAL. A natural person obtaining the knowledge, skills, and abilities necessary to obtain a certificate of registration as a pump installer or water well driller under the personal supervision of a registered pump installer or registered water well driller may apply to the Commission for an apprenticeship certificate.

3.10.1.1 PERSONAL SUPERVISION. “Personal supervision” means that the supervisor is at the job site with the apprentice or within an hour’s traveling distance of the apprentice when ever the apprentice is working in well construction or pump installation. At any time when the supervisor is not physically present at the job site with the apprentice, the supervisor must be reachable by phone or radio contact.

3.10.1.2 IMPLEMENTATION OF PROGRAM. Until the Commission approves apprenticeship program rules and makes the program available to applicants for one year, persons applying to be certified as registered drillers and registered pump installers will not be required to complete one year of the apprenticeship program before applying for certification as a driller or pump installer.

3.10.1.2.1 Once the Commission determines that the apprenticeship program has been available for at least one year, any person applying to be registered as a certified water well driller or certified pump installer shall have

1. Completed at least one year of the apprenticeship program;

2. In the past ten (10) years, held a valid certificate of registration from the commission of the type and class for which the applicant is applying; or

3. A valid certificate from another state of a type and class substantially similar to the type and class for which the person is applying for a period of years that equals the minimum requirement for completion of the apprenticeship program.

3.10.2 REQUIREMENTS FOR APPRENTICESHIP CERTIFICATE. All applicants for apprenticeship certificates must submit the following:

1. Completed application form;

2. IRS W2 Wage and Tax Statement form or forms showing at least one year of experience while employed by a licensed water well contractor unless the applicant is applying for a geothermal apprenticeship certification to include only direct exchange wells for the purpose of emerging or developing technology, in which case no evidence of prior experience with a licensed water well contractor is required;

3. Notarized letter from a registered certificate holder stating:

a. that he or she holds a certificate of registration in the same area or a comparable area sought by the apprenticeship applicant and that he or she has held that certificate for at least five years,

b. that he or she has no record of construction violations in the specialty area unless waived by the Commission;

c. that he or she has no outstanding fines or fees owed to the Commission;

d. that he or she is willing to serve in a supervisory capacity during the apprenticeship,

e. the number of apprentices including the applicant that the supervisor currently supervises or anticipates supervising within a year of drafting the letter with the number not exceeding five, and

f. a description of training program;

4. Written statement from a contractor employing the supervisor whereby the contractor agrees to accept responsibility for the apprenticeship;

5. Copy of driver's license or other document illustrating that applicant is at least eighteen years old; and

6. Registration fee of seventy dollar ($70).

3.10.3 REGISTRATION FOR CONCURRENT APPRENTICESHIPS. An applicant may register for both a drilling apprenticeship and a pump installer's apprenticeship at the same time. Each registration will require separate registration fees.

3.10.4 TRANSFER OF SUPERVISORY AUTHORITY. A supervisor may agree to temporarily transfer supervising responsibility to a person holding a certificate of registration in the area sought by the apprentice and employed by the same contractor. The supervisor to whom responsibility is temporarily transferred must not already supervise more than five other apprenticeships and must meet the requirements of 3.10.2.

3.10.5 APPRENTICE RESPONSIBILITIES. An apprentice's certificate may be revoked for engaging in prohibited activities.

3.10.5.1 DRILLER APPRENTICE RESPONSIBILITIES. A driller apprentice shall:

1. represent his supervising driller during operations at the well site;

2. not perform, or offer to perform, any services associated with water well drilling except under the personal supervision of a certified driller; and

3. not perform, or offer to perform, any services associated with pump installation unless the apprentice holds a pump installer apprentice certificate or pump installer certificate of registration.

3.10.5.2 PUMP INSTALLER APPRENTICE RESPONSIBILITIES. A pump installer apprentice shall:

1. represent his supervising pump installer during operations at the well site;

2. not perform, or offer to perform, any services associated with pump installation except under the direct supervision of a certified pump installer; and

3. not perform, or offer to perform, any services associated with water well drilling unless the apprentice holds a driller apprentice certificate or driller certificate of registration.

3.10.6 LENGTH OF APPRENTICESHIP. A person must be apprenticed with the Commission for at least one year before that person is eligible to apply for certification as a water well driller or pump installer.

3.10.7 ELIGIBILITY TO APPLY FOR DRILLER AND PUMP INSTALLER CERTIFICATION.

3.10.7.1 SUPERVISOR RECOMMENDATION. After the apprentice has completed at least one year of apprenticeship, the apprentice’s supervisor may send the Commission a letter on the apprentice’s behalf stating that the apprentice is ready to sit for examination to obtain a certificate of registration as a water well driller or pump installer.

3.10.7.2 APPLICATION BY APPRENTICE. After the apprentice has completed three years of apprenticeship, the apprentice may submit IRS W2 Wage and Tax Statement forms demonstrating that he has spent three years in the employ of a licensed water well contractor and that he is ready to sit for the certificate of registration

examination. The Commission will then approve or disapprove the apprentice to take the examination.

3.10.7.2.1 INABILITY TO SECURE LETTER FROM CONTRACTOR. If after the apprentice has completed at least one year of apprenticeship but is unable due to extenuating circumstances to secure a letter from his supervisor recommending that he be qualified to sit for examination, the apprentice may petition the Commission to waive the requirement that he provide a letter from a supervisor prior to sitting for the examination.

3.10.8 RENEWAL OF APPRENTICESHIP CERTIFICATE. An apprentice's certificate shall be deemed expired on July 31 of each year. If the apprentice has knowingly violated Commission rules or owes fees assessed by the Commission, the Commission may choose to deny renewal. A certificate must be renewed prior to the certificate's expiration date by complying with all of the following requirements:

1. Submission of the renewal application form; and

2. Payment of a $70 renewal fee to the Commission.

3.10.9 CHANGE OF RESPONSIBLE SUPERVISOR OR CONTRACTOR. If a supervisor terminates supervision of an apprentice, the contractor employing the apprentice must send a written statement to the Commission stating the relationship has ended. In order to continue the apprenticeship, the apprentice must find another certificate holder to supervise him or her, and that new supervisor must send a notarized letter to the Commission that meets the requirements of Rule 3.10.2.

SECTION 4 - REPORTING

4.1 REPORTS. Within 90 days after a water well has been constructed or repaired, the constructor shall submit a report of construction to the Arkansas Water Well Construction Commission on such forms as are prescribed and furnished by the Commission. The date of construction and time of completion shall be the date and time the rig is removed or pulled off the bore hole or well. Reports must be legible, must supply all requested information applicable to the type of work done, and must contain the longitude and latitude of the well location.

4.1.2 TEST HOLES. When a water well contractor constructs a test hole for a well that may be developed into a water well, the contractor shall file a construction report within thirty (30) days after the date of construction regardless of the stage of completion of the water well.

4.2 REPORTING PUMP INSTALLATION OR REPAIR. Reports on Pump Installation shall be filed on pump installation or repair. A Water Well Contractor is required to file a water well systems report (AWD-7) within 90 days after the pumping equipment is installed. A report is not required for repair of pumps or replacement of

pumps or pumping equipment provided, the depth of the setting and efficiency are not affected, and original pump equipment set below ground level is replaced by the same product initially installed (see example 1 & 2).

EXAMPLE 1: A line shaft, is replaced by another line shaft, and the replacement has no obvious physical defects or is not of an inferior or superior quality than the first. No report required.

EXAMPLE 2: A plastic coupling, installed below ground level, is replaced by a galvanized coupling. A report is required.

4.3. DOMESTIC WELLS. Pumps installed in water wells used for domestic purposes are exempted from this requirement. The contractor is required to maintain adequate records at his place of business. Generally all warranty information should be maintained as well as depth of settings, size of wire, size of pipe, etc.

4.4 COPY TO BE PROVIDED TO CUSTOMER. A copy of the Construction Report shall be provided to the customer upon demand.

SECTION 5 - CONSTRUCTION

NOTE: Construction requirements vary according to type of formation, type of well, intended use. Please review the both the general requirements and Section 6, "SPECIAL WELL CONSTRUCTION TECHNIQUES" for the type of well you are working on.

5.1 LOCATION.

5.1.1 GENERAL. In establishing the location of a well the constructor shall give consideration to sources of contamination which exist on or adjacent to the premises where the well is to be located. As far as possible, the well shall be located on ground which is higher than sources of contamination and shall have ready access for repairs, maintenance, treatment and inspection.

5.1.2 RELATION TO SOURCES OF CONTAMINATION. Determination of minimum lateral distances to locate a well from potential sources of contamination involves evaluation of the character and location of the sources of contamination, types of geologic formations present, depth to the aquifer, effect on ground water movement by well pumping and possibilities of flooding of the site by surface waters. Based on practice and experience, accepted minimum lateral distances for some common sources of pollution with respect to a well have been established. The lack of specific distances for other possible sources of contamination such as streams, refuse disposal sites, excavations, waste treatment facilities, buried oil and gasoline storage tanks, improperly constructed wells and cisterns, etc. does not minimize their potential hazard. These must be evaluated in each particular situation and a distance arrived at based on the pertinent facts.

5.1.3 MINIMUM LATERAL DISTANCES. The following minimum lateral distances shall apply for common sources of contamination listed:

POTENTIAL SOURCES OF CONTAMINATION	MINIMUM LATERAL DISTANCES FOR CLAY AND LOAM SOILS.
Cess Pools	100 Feet
Leaching Pit	100 Feet
Pit Privy	100 Feet
Subsurface Seepage Tile	100 Feet
Manure Piles	100 Feet
Septic Tank	100 Feet
Sewers (Cast iron with water tight, leaded or mechanical joints)	50 Feet
Footing Drains (No connection to a sewer or a sump handling sewage)	10 Feet
Pump House Floor Drain (Cast iron with water tight joints and having free fall discharge to ground surface)	2 Feet

When the upper formations are more pervious, the lateral distances shall be increased (i.e., double the distance for highly pervious gravel formations).

5.1.4 FLOOD WATER. Locations subject to flooding should be avoided. If no reasonable alternate site exists, wells may be constructed in flood zones providing special protective construction is included.

5.1.5 VERTICAL CLOSED LOOP SYSTEMS/WELLS. Vertical closed loop systems and wells shall not be located closer than 50 feet to a septic tank, its field lines, or other water supply wells used for human consumption. This requirement may be waived. An approved waiver may be obtained by contacting the Commission Office by telephone or mail. Written approval must be obtained from the Commission prior to construction of the well.

5.1.6 OPEN LOOP SYSTEMS/WELLS. The location of open loop wells shall meet the same criteria as water wells used for domestic or human consumption.

5.1.7 VERTICAL CLOSED LOOP SYSTEMS/WELLS. Vertical closed loop systems/wells shall not be located closer than fifty (50) feet to a septic tank, its field lines, or other water supply wells used for human consumption. This requirement may be waived. An approved waiver may be obtained by contacting the Commission Office by telephone or mail. Written approval must be obtained from the Commission prior to construction of the well.

5.1.8 INDUSTRIAL AND IRRIGATION WELLS. No industrial or irrigation well shall be located nearer than one hundred (100) feet to any other well producing potable water. It is recommended that locations subject to flooding be avoided. If no reasonable alternate exists, wells should be constructed with the casing terminating two (2) feet above the maximum known flood water elevation.

5.1.9 RELATIONS TO BUILDINGS. With respect to building, the location of a well shall be as follows:

5.1.9.1 ADJACENT TO BUILDING. When a well must be located adjacent to a building, it shall be so located that the center line of the well extended vertically will clear any projection from the building by not less than ten (10) feet. The well shall also be located at least ten (10) feet away from any power lines.

5.1.9.2 INSIDE BUILDING. The casing top of a well and any other opening shall not terminate in the basement of any building, or in any pit, room or space which is below ground surface or connected to a basement, which is not properly drained or pumped. Where it is necessary to seal out seep water or rain water in small diameter wells that are underground, National Water Well Association approved pitless adapters, or an approved seal, shall be used.

5.2 DESIGN FACTORS. The design of each well shall include consideration of the following:

5.2.1 NATURAL PROTECTION. Location of the well shall include utilization of every natural protection available to promote sanitary conditions.

5.2.2 UNDESIRABLE GEOLOGICAL FORMATIONS. The exclusions of water bearing formations which are or may become contaminated formations which have undesirable characteristics.

5.2.3 DURABILITY. The use of construction methods and materials which will result in a durable well producing safe water, without excessive sediment and sand, or harmful bacteria.

5.3 MATERIALS AND TECHNICAL REQUIREMENTS.

5.3.1 CONSTRUCTION WATER. Water used in the drilling process should be obtained from a source which will not result in contamination of the well. It is required that an appropriate amount of chlorine solution be added to the construction water in order to protect the well from contamination. Please refer to the tables in Section 9 to determine the proper amount of chlorine to use.

5.3.2 PLUMBNESS AND ALIGNMENT. Each drilled well shall be tested for plumbness and alignment and the bore of the hole shall be sufficiently plumb and straight to receive the casing without binding. The casing shall be sufficiently plumb and straight that it will not interfere with installation and operation of the pump.

5.3.3 YIELD. Each well shall be tested for yield and draw down by pump, bailer, or air.

5.4 CASING. The casing shall be installed where the purpose of casing is to seal off surface, near surface, or deeper contaminants or where the purpose is to retain the wall of the well in addition to repelling outside contaminants. In selection of casing pipe, consideration shall be given to the strain to which the pipe will be subjected during construction and the corrosiveness of the water with which it comes in contact. Used or reject pipe is not acceptable.

5.4.2 TEMPORARY (OUTER) CASING. Casing intended for construction purposes only shall be of weight and design as necessary to be watertight and permit installation without distortion or rupture to the specified depth.

5.4.3 GROUTING GUIDES. Protective casing that is to be grouted in the drill hole should have sufficient guides welded to the casing to permit the unobstructed flow and disposition of the thickness of grout specified.

5.4.4 SCREENS. Screen openings shall provide the maximum amount of open area consistent with the strength of screen and the grading of the water bearing formation or gravel pack. The opening shall permit maximum transmitting ability without clogging or jamming.

5.4.5 JOINTS. All casing pipe joints shall be watertight welded construction or threaded couplings.

5.4.6 UPPER TERMINAL. The Casing, well curb or riser pipe shall be terminated at a height above ground surface consistent with the proposed plans for a pump house and

pump installation but not less than eight (8) inches above ground surface or twenty-four (24) inches above maximum high water level where flooding occurs.

5.4.7 STEEL CASING FOR DOMESTIC, INDIVIDUAL, AND STOCK WELLS. Casing for domestic, individual and stock wells of steel construction shall be as follows: Eleven (11) pound, minimum, black steel pipe may be used in consolidated formations. ASA Galvanized Standard Weight Schedule 40 pipe, one (1) inch I.D. to four (4) inches I.D. pipe size and weight are covered in Table 1. 4.090 inch I. D. galvanized pipe, 9-1/2 pound (schedule 30) may be used on a statewide basis with the following provision that any failure of this weight pipe within a five year period be replaced by the contractor at no cost to the landowner.

5.4.8 PVC CASING. Effective January 1, 1989, PVC plastic casing may be used provided the PVC pipe is manufactured as water well casing and is permanently marked as well casing. The casing shall be made to ASTM F480. The Contractor shall be responsible to assure that the PVC wall thickness shall be sufficient to withstand both the formation and hydrostatic pressures imposed on the casing during its installation and development. PVC casing shall be used only when construction practices will allow the bore hole to remain open during casing installation and the casing can be lowered freely without driving.

5.4.9 FIBERGLASS CASING. Fiberglass reinforced plastic well casing, tested in accordance with ASTM D1180 (American Society Testing Materials), may be used where judged desirable by the contractor and approved by the customer, in consolidated and unconsolidated formations. Each coupling shall form a watertight seal. Pipe having a minimum bursting pressure of 660 PSI may be used.

5.4.10 CASING OF INDUSTRIAL AND IRRIGATION WELLS.

5.4.10.1 GENERAL. All casing, including steel shall be strong enough to resist the forces imposed during installation and other forces that can be expected after installation. It shall be the contractor's responsibility to see that all casing used in industrial and irrigation wells will not collapse. Any material used in construction of industrial and irrigation wells that collapses or breaks within five years shall be renewed with a material strong enough to withstand the stress or pressure without charge to the customer.

5.4.10.2 PVC CASING. PVC 160 PSI NSF or stronger material classification may be used in construction of industrial and irrigation wells, where judged desirable by the contractor and approved by the customer in unconsolidated formations. All pipe shall be permanently marked under a method suitable to the National Sanitation Foundation. Plastic pipe must be made of new, not reclaimed material.

5.4.10.3 JOINTS. The joints of all casing shall be watertight and plumb and in alignment. All casing shall be installed so as to seal off water bearing formations that contain undesirable water (such as saline) and prevent water from the surface entering the fresh water aquifer so as not to contaminate them. Each joint of PVC pipe shall have a minimum of four (4) screws or rivets in the coupling.

5.4.11 CASING IN CONSOLIDATED FORMATIONS. Metal or plastic casing shall extend a minimum of one (1) foot into solid bedrock or slate in a cement or Bentonite seal at least one (1) inch thick from rock upward for five (5) feet. In wells where consolidated formations, such as bedrock or slate, occur as a definable unit, the casing shall be set into the consolidated formation and sealed below all crevices that would normally release water of inferior quality into the well. Plastic casing may be used to case through overburden in consolidated formations, providing the casing meets the requirements for the depth being cased.

5.4.11.1 ROCK BELOW CREVICED FORMATION. The diameter of the drill hole through the creviced formation shall be a minimum of two (2) inches greater than the diameter of the casing. If an outer casing is left in place in the earth mantle, the annular opening around that casing shall be sealed as outlined in Section 5.4.11. All wells constructed in consolidated formations shall be cased a minimum of ten (10) feet from ground surface or one (1) foot minimum into the consolidated formation.[1] All casing left permanently installed in consolidated formations shall be grouted with the appropriate materials, as outlined in Section 5.5, from the bottom of the casing upward five (5) feet. Where a desirable water bearing formation underlies a crevice or undesirable water bearing formation, the overlaying formation should be completely grout sealed and watertight. Drilling construction should extend into the desired formation.

[1]Ten feet from ground surface or one foot minimum in to the consolidated formation means that wells must be cased at least ten feet. Wells will never have less than 5 feet of cement or Bentonite grout in the annulus. Wells must also be cased at least one foot into consolidated formations. Minimum of one foot into consolidated rock means that many times even thought the formation is consolidated, ground water, at a particular depth would be undesirable and additional casing and grout to a depth greater than one foot into consolidated formation is required.

5.4.12 CASING IN UNCONSOLIDATED FORMATIONS. Unconsolidated formations such as sand and gravel may extend to or near the ground surface. Generally, however, they lie below the ground surface at varying depths and are covered by an over burden of earth. The kind, nature and depth of the over burden are factors in determining how a well shall be constructed. Wells constructed in unconsolidated formations shall have a permanent casing installed, in which the casing or screen shall extend the complete length of the drill hole. A minimum of the upper ten (10) feet shall be filled with grout after the casing is in place.

5.4.12.1 GRAVEL WALL CONSTRUCTION. When an oversized drill hole is constructed to permit the placement of a gravel wall around the well screen or perforated casing, the annular opening between the casing and the drill hole shall be sealed in the top twenty (20) feet with concrete, cement, or Bentonite grout. If a permanent outer casing is installed, it shall extend to a depth of at least twenty (20) feet depending on the formations present, the annular opening between the drill hole and the outer casing shall be sealed as provided for in Section 5.4.12. The annular opening between inner and outer casings shall be filled with concrete, cement, or Bentonite grout in the upper twenty (20) feet.

5.5 GROUTING.

5.5.1 SAND AND CEMENT GROUT. This mixture should consist of cement, sand and water, in the proportion of one bag of cement (94 pounds) and an equal volume of dry sand to not more than six (6) gallons of clean water.

5.5.2 NEAT CEMENT GROUT. This mixture should consist of one bag of cement (94 pounds) to not more than six (6) gallons of clean water. Additives up to 6% by weight to increase fluidity may be used.

5.5.3 CONCRETE. This mixture should consist of cement, sand, aggregate (gravel), and water in the proportion of one bag of cement (94 pounds) and an equal amount of dry sand and aggregate and clean water. Concrete can be used in the top ten (10) feet of the annular space around the casing of the large diameter wells when the annular space is larger than two (2) inches from the outside of the casing wall to the face of the bore hole. Aggregate shall be no larger than 1/5 of the dimension between the outside casing and the face of the bore hole. All concrete shall be placed to prevent voids.

5.5.4 BENTONITE GROUT. Bentonite or sealing clay grout is a manufactured clay product that expands in contact with moisture to form a seal that prevents the movement of water and may be used in consolidated and unconsolidated formations. It is the responsibility of the contractor to make the viscosity of the Bentonite thick enough to seal out all contaminates.

5.5.5 GROUTING OF METAL-CASED WELLS. Metal casing shall be encased in a cement seal at least two (2) inches thick from ground level to a distance of at least ten (10) feet below established ground surface.

5.5.6. GROUTING OF CURBED WELLS. Curbed wells shall be concreted at lease six (6) inches thick poured monolithically from the upper terminal to a distance of at lease ten feet below established ground surface.

5.6 WELL SEALS OR CAPS.

5.6.1 GENERAL. Well seals or caps installed on wells shall be securely capped. The seal may provide ventilation but shall be sufficiently tight and secure so as to prohibit foreign objects, insects and other creatures from entering the well. The well seal shall be secure so as to prohibit entrance to the well from unauthorized persons without tools or excessive physical exertion.

5.6.2 TIMING. The well seal or cap shall be installed immediately upon completion of the well and prior to departure of the driller and or contractor or his drilling equipment from the well site. An effort should be made by the driller or contractor to insure that the well seal or cap provided/installed is compatible to the type of pump and pipe to be installed.

5.6.3 SEALS OR CAPS WHEN PUMP INSTALLED. Well seals or caps shall be installed on all water wells after pump installation, and shall be securely capped. The seal MAY provide ventilation but be sufficiently tight and secure to prohibit foreign

objects, contamination, insects and other pests from entering the well. The well seal shall be secure to prohibit entrance to the well from unauthorized persons without tools or excessive physical exertion. All wells in consolidated areas will be vented with insect proof vents. If the well is located inside a building it shall be vented to the outside.

5.6.4 PITLESS ADAPTERS. Pitless adapter shall be installed in a manner that excludes entrance of water or other materials into the well.

5.6.5 TEST HOLES. The contractor shall insure that the well/hole is capped to prevent injury or pollution. If the test well is abandoned then the well shall be plugged as outlined in Section 5.8.

5.7 DISINFECTION.

5.7.1 GENERAL. Every new well, or existing water supply system that has been disrupted for service or repair, should be disinfected before it is returned to use. Water in the well and storage tank should be treated with a strong chlorine solution to destroy disease organisms. All pipe lines and fixtures in the distribution system should be rinsed and flushed with chlorinated water. All wells, excluding irrigation, will be disinfected.

5.7.2 TIMING. If the constructor of the well is also responsible for preparing the well for the pump installation and making the pump installations, disinfection may be postponed until his work is completed. In the event the constructor does not have this responsibility, it is required before capping the well that an appropriate amount of chlorine solution be introduced into the well.

5.7.3 DISINFECTION AND PUMP INSTALLATION. At the time of new pump installation or reinstallation of an existing pump, the water system shall be chlorinated to a minimum concentration of 50 ppm for a minimum of 24 hours. Each well shall be disinfected by tablets and/or liquid.

5.7.4 WATER. Water, which has made contact with pipe or equipment used in chemigation, shall not be allowed to back siphon or be used to backwash the well.

5.7.5 EMERGENCIES. If an emergency situation exists the water system may be used, provided, the system is not for human consumption, and the system is disinfected as soon as the situation permits. Refer to the tables in Section 9 for guidance on administering chlorine.

5.8 PLUGGING OR ABANDONMENT OF WELLS.

5.8.1 DRY HOLES. If no water is encountered and the landowner does not wish to abandon the well in the event that he might plan further development of the well at a later date, the contractor shall complete the well according to the rules and regulations, including casing, sealing, and capping the well. A letter from the landowner, stating his intentions of future development of the well, shall be sent to the Commission along with the well completion report.

5.8.2 SEALING OUT SOURCES OF CONTAMINATION. If an unconsolidated formation is more than ten (10) feet below ground surface, it is the contractor's responsibility to seal out any and all contamination, such as surface water or seepage, by placing the grout to the necessary depth.

5.8.3 PLUGGING IN CONSOLIDATED FORMATIONS. All abandoned wells in consolidated formation will be filled from bottom to within 2 feet of top with cement.

5.8.4 PLUGGING IN UNCONSOLIDATED FORMATIONS. All wells in unconsolidated formations will be filled with sand or natural material to 12 feet of ground surface, from 12 feet to 2 feet with Bentonite or cement.

5.9 FRACTURING.

5.9.1 GENERAL: Fracturing includes the use of explosives, acid, or pumping fluids (hydrofracturing) into a water well. A Driller registered in category 4 shall supervise hydrofracturing. A driller registered in category 1-3 may use explosives or acid without being registered in category 4. Wells which do not meet the requirements of these construction regulations shall not be fractured.

5.9.2 WATER. Water used in fracturing must be free of contamination and chlorinated to 50 milligrams per liter chlorine prior to injection.

5.9.3 RELATION TO SOURCES OF CONTAMINATION. Water wells located closer than 100 ft. to any potential source of contamination shall not be fractured.

5.9.4 PROCESS. The following action must take place when hydrofracturing a water well:

1. Analysis of the well site and well to determine the location of other wells and potential sources of contamination in the immediate vicinity. Determine if the well needs repair and if so bring up to standards. Determine the effect on geological formations and ground water.
2. Conduct a test and estimate well yield.
3. Advise owner of hazards and potential liability of fracturing.
4. Disinfect well to be fractured to 50 milligrams per liter chlorine.
5. Fracture well.
6. Reinstall pump equipment.
7. Disinfect well and pump equipment.
8. Pump well to recover no less than the amount of water injected.
9. Conduct test and estimate well yield.

10. Complete a construction report. On the report, in the space provided for description of formation, indicate the depth and PSI (or amount of explosive) of each zone fractured.

* The above steps are not meant to be all inclusive. The contractor remains responsible and liable for damages to the well or wells in the immediate vicinity resulting from hydrofracturing, even though the Contractor may have complied with these regulations.

5.9.5 CONSOLIDATED FORMATIONS. Fracturing PSI shall not be excessive.

SECTION 6 - SPECIAL WELL CONSTRUCTION TECHNIQUES

6.1 ARTESIAN WELLS. In known artesian territories, initial drilling operations shall extend into but not through the formation confining the water. The casing shall be installed and the annular opening between the drill hole and casing sealed with cement or Bentonite grout and allowed to set. The hole shall then be extended into artesian formation. Flow control from the well shall be provided by valved pipe connections, watertight pump connections, or receiving reservoirs set at an altitude corresponding to the artesian head.

6.2 DRIVEN, DUG, OR BORED WELLS. Wells in this classification are dug, bored or driven, unless the type or purpose of the well applies to all methods of well construction (test holes, heat pump wells etc.).

6.2.1 DRIVEN WELLS. On all driven wells there shall be an outer casing grouted from ground surface to a minimum ten (10) feet depth. Plastic or steel casing that will accommodate the outside diameter of the pipe being driven shall be placed in a hole that has a minimum diameter of four (4) inches larger than the surface casing. This should give a minimum of two (2) inches thickness of grout.

6.2.2DUG OR BORED WELLS. Every dug or bored well shall have a continuous watertight lining of steel casing or concrete pipe extending from above ground surface to a depth of at least ten (10) feet below the ground surface. When more than one formation bearing suitable water exists, the lower formation should be used. The lining in the producing zone shall readily admit water and shall be structurally sound to withstand external pressures.

6.2.3 ANNULAR OPENINGS. The open space between the excavation and the installed lining shall be sealed with grout. If the first ten (10) feet of the casing is jointed, such as concrete, and would allow surface water to seep into cracks of casing, the grout will continue from the ten (10) foot seal to ground level.

6.2.4 UPPER TERMINAL. The watertight lining shall extend at least eight (8) inches above finished ground surface. A cover slab at least two and one half (2 1/2) inches thick, adequately reinforced and having a diameter sufficient to overlap the lining by two (2) inches shall be provided. The top of the slab shall be sloped to drain to all sides and a watertight joint made where the slab rests on the well lining using cement mortar or a mastic compound. A manhole, if installed, shall consist of a metal curb cast in the slab

and extending four (4) inches above the slab. The manhole shall have a watertight covering having sides to overhang the curb at least two (2) inches. Adequate sized pipe (plastic pipe may be used) shall be cast in place in the slab, extending at least eight (8) inches above the slab, to accommodate the type of pump or pump piping proposed for the well. If the well contractor does not install the pump, a cap (seal) will be placed on top of the pipe. The owner or licensed driller may cut off the cap and must leave a minimum of two (2) inches above the slab.

6.3 INDUSTRIAL AND IRRIGATION WELLS. This section applies to wells constructed for purposes other than human consumption.

6.3.1 OUTER CASING SEAL FOR GRAVEL WALL INDUSTRIAL AND IRRIGATION WELLS. Industrial or irrigation wells shall be sealed with a concrete slab or grouted or both.

6.3.1.1 SLABS. Slabs must be of reinforced concrete and at least four (4) inches thick and have a diameter sufficient to overlap the drill hole by two (2) feet. The top of the slab shall be sloped to drain to all sides.

6.3.1.2 GROUT. Grout must be composed of sodium montmorillonite clay, also known as Bentonite, cement, or a sodium montmorillonite (Bentonite)-cement mixture and shall fill the annular opening between the casing and the drill hole in the upper five (5) feet.

6.3.1.3 TIMING. If noted on the Report of Water Well Construction, a slab may be placed on non-grouted wells within one year of the date of construction to allow for settling.

6.3.1.4 GRAVEL REFILL PIPES. Gravel refill pipes may be installed if they terminate above the concrete slab surface and are provided with watertight caps.

6.3.2 PUBLIC NOTICE. Each new industrial or irrigation well and each existing industrial or irrigation well when brought under the rules and regulations of the Act shall have a weatherproof sign attached in a conspicuous location stating that "THIS WATER IS NOT FOR DRINKING PURPOSES" or a suitable decal of weatherproof material.

6.3.3 CASING, SCREEN, AND ALL MATERIAL FOR INDUSTRIAL AND IRRIGATION WELLS OF STEEL CONSTRUCTION OVER FOUR INCHES I. D. The minimum wall thickness shall be seven gauge or .1875. All material used shall not allow sand or sediment to enter a well. Where there is an acid condition screen material may be stainless steel, plastic, bronze, or other material suitable for the water and ground formations in which the well has been completed.

6.3.4 GRAVEL REFILL PIPES. Gravel refill pipes may be installed if they terminate above ground surface and are provided with water tight caps.

6.3.5 ARTIFICIAL PACK. Wells designed for placement of an artificial pack shall be provided with an adequate screen having openings sized on the basis of the grain size of the gravel. The well shall be developed to insure free entry of water without sediment.

6.4 GEOTHERMAL (HEAT PUMP) WELLS. Heat pump wells are designed for two major types of Heat pump Systems.

6.4.1 CLOSED LOOP OR EARTH COIL. Fluid is circulated in a continuous unbroken pipe beneath the surface of the earth or under ponds, swimming pools, lakes or in a medium where the system can obtain a sufficient cooling or heat exchange. Normally no fluid is gained or lost. Depths of installation vary and is dependent upon the type and size of closed loop system, the land area available, soils/formation, climate, and seasonal variation in ground temperature, etc. There are three types of closed loop heat pump well systems:

6.4.1.1 HORIZONTAL SYSTEM. A closed loop system where pipes are installed horizontally under the earth's surface or under ponds, swimming pools, lakes, etc.

6.4.1.2 VERTICAL SYSTEM. A closed loop system where pipes are vertically installed beneath the surface of the earth.

6.4.1.3 COMBINATION HORIZONTAL AND VERTICAL. A system that has pipes installed beneath the earth's surface horizontally and vertically.

6.4.1.4. DIRECT EXCHANGE (DX) WELLS. A small diameter bore hole constructed for the purpose of sinking or sourcing thermal energy between the direct exchange loop and the earth.

6.4.1.4.1 ADDITIONAL CONSTRUCTION STANDARDS FOR DIRECT EXCHANGE (DX) WELLS.

1. A DX well shall comply with Commission Rules 5.1 and 5.2

2. The DX well does not have to be completely vertical.

3. The DX well casing is a metal tube with the bottom capped, running from the bottom of the bore hole to within 1 foot of the top of the bore hole. A thermal fluid can be used to fill the DX Well Casing to within 2 feet of the top of the DX Well casing. A water tight sealing material will be used to seal the top of the DX Well Casing. The material can be silicone, latex, or other material suitable for the seal. The DX Well Casing shall comply with Rule 5.5.5.

4. DX Well Casing will be required if the pH of the material around the DX Loop can not be corrected to a pH of 8.5 or greater with the use of back fill or grout.

5. If the DX well Casing material is steel, then no cathodic protection is required. (The DX Loop is Copper, which is more noble than steel; therefore, the steel acts as cathodic protection.) The joints will be threaded or welded.

6. If the DX Well Casing material is Copper then cathodic protection is required. The Joint will be welded using Arkansas Heating, Ventilation, Air Conditioning, and Refrigeration (HVACR) standards for joining Refrigeration copper.

7. The DX Loop can be constructed of Type L copper tubing (ACR) Any joint must comply with HVACR standards for joining Refrigeration Copper. The copper tubing's length and diameter is sized for proper refrigerant flow.

6.4.2 OPEN LOOP OR WATER SOURCE. Water is obtained from a source (water well, lake, river, etc.) and circulated, usually one time, for the purpose cooling or heat exchange. Water quality, quantity and disposal are primary concerns with open loop systems. There are three types/categories of open loop well systems:

6.4.2.1 GENERAL. Open loop wells shall be constructed in the same manner and conform to rules for wells used for domestic purposes. This shall pertain to the supply well and return well.

6.4.2.2 SINGLE WELL OPEN SYSTEM. Water is obtained from a well, circulated and returned to the same well.

6.4.2.3 DUAL WELL OPEN SYSTEM. Water is obtained from a supply well, circulated, and injected/dumped into a return well. These wells may be designed to switch roles and the return well becomes the supply well, the supply well the return well.

6.4.2.4 SINGLE WELL/WASTE OPEN SYSTEM. Water is obtained from a well, circulated, and dumped/wasted into some other medium (land surface, lake, pond, ditch, sewer, etc.).

6.4.3 VERTICAL CLOSED LOOP SYSTEMS/WELLS. The Contractor is responsible and shall insure that water quantity and quality are not adversely effected.

6.4.3.1 GROUTING. Closed loop wells constructed in consolidated formations shall be back filled with grout (prescribed in Section 5.5) the entire length of the bore hole. Wells constructed in unconsolidated formations may be back filled with cuttings, sand, or native material, provided the material does not adversely affect the quality of the ground water. The upper ten (10) feet (minimum requirement) of wells constructed in unconsolidated formations shall be grouted (prescribed in Section 5.5). A well meeting requirements for a domestic water well is not required to be back filled as outlined in this Section.

6.4.3.2 HORIZONTAL EXCAVATION. The top of the bore hole may terminate at the bottom of the excavation for installation of horizontal pipes. The horizontal excavation is not required to be back filled with grout. The grout shall be placed at least 10 feet below the bottom of the excavation in unconsolidated formations.

6.4.4 APPROVED FLUIDS. The fluid or liquid used for circulation must be an approved fluid. Fluids which are highly combustible, corrosive or toxic will not be used. A list of approved fluids will be maintained by the Commission. Ethylene Glycol is not an approved fluid. Approved fluids include but are not limited to: water, salt water, calcium chloride, food quality propylene glycol.

6.4.5 JOINTS AND FITTINGS. All joints and fittings installed and buried shall be heat, socket or butt fused. Glue or clamps shall not be used below ground level unless:

(1) the joint or connection serves as a service outlet,

(2) and, the joint or connection is not covered with earth.

6.4.6 CIRCULATING PIPES. The circulating pipes shall be made of approved materials. Approved circulating pipe are approved gas rated materials such as polyethylene and polybutylene. Polyvinyl chloride (PVC) material is not acceptable for circulating pipes for closed loop systems, below ground level. Polyethylene pipe meeting or exceeding PPI PE 3408, ASTM D 3350, cell classification 355434C, SDR-11 is approved. Polybutylene pipe meeting or exceeding ASTM D 3309, rated at 160 PSI at 73 degrees Fahrenheit and also 100 PSI at 180 degrees Fahrenheit is approved.

6.4.7 PRESSURE TESTING. Pipes shall be pressure tested at 150% of maximum working pressure for 15 minutes prior to installation and shall not leak.

6.5 MONITORING AND PIEZOMETER WELLS. This section applies to monitoring well construction. Monitoring wells are exempted from the construction requirements established in Sections 4 through 16 of these rules and regulations. Design and Construction Techniques published by the Environmental Protection Agency in RCRA GROUND-WATER MONITORING TECHNICAL ENFORCEMENT GUIDANCE DOCUMENT (TEGD) shall be used as a guide in the location, construction, and design of monitoring wells. The latest publication of this document may be obtained by contacting;

Arkansas Water Well Construction Commission

101 East Capitol Avenue, Suite 350

Little Rock, Arkansas 72201

phone (501) 682-1025

Ask for the RCRA book on monitor wells - cost $22.00.

6.6 TEST AND SAMPLE WELLS. Water Wells constructed for the purpose of locating, or sampling ground water or other scientific purposes shall be constructed in a manner which shall not contaminate ground water or provide a conduit to further contaminate ground water.

6.7 PUBLIC AND SEMI-PUBLIC WELLS. Wells for public and semi-public water systems shall be located, designed, and constructed in accordance with the respective regulations of the Arkansas Department of Health (ADH) and shall have written approval from the ADH prior to the start of construction. If uncertain that a well is public or semi-public, the well contractor shall obtain a written determination from the ADH prior to construction.

SECTION 7 - PUMP INSTALLATION

7.1 GENERAL. Installation shall be in accordance with the manufacturer's recommendation and these regulations. All pump installations shall be designed and installed so as to prevent contamination of the well.

7.2 LICENSING AND REGISTRATION. Pump installation shall be by a licensed Water Well Contractor and registered pump installer.

7.3 EFFICIENCY. Pump capacity shall be consistent with intended use and yield characteristics of the well. The pumping capacity of the pump installed in a well shall be consistent with the intended use of the ground water and with the yield characteristics of the well.

7.4 LOCATION OF PRESSURE TANKS AND SWITCHES. Pressure tanks and switches shall be located above ground or in a pit or basement that is adequately drained. A pressure tank may be buried provided, the tank is designed for installation below ground. Tanks designed for use inside the bore of a water well must be designed for that purpose and approved by the Commission.

7.5 VENTING OF GASSES. Toxic or flammable gases shall be vented from a well to the outside above roof level or a point where they will not produce a hazard.

7.6 UPPER TERMINAL. Pump Installers shall leave no less than eight inches of casing above normal ground level.

7.7 TEMPORARY SEAL. If the pump equipment is not installed at the time drilling is completed, all openings to the well must be closed to prevent pollution or vandalism. After installation, all open spaces must be sealed off to prevent contamination of the ground water.

7.8 DROP PIPE, WIRE, ETC. All drop pipe, wire, pumps and other pumping equipment shall be clean and installed to permit removal and repair of all equipment. If equipment or tools are lost in the well and not recovered a statement describing the item or items lost shall be attached to the installation report, or, maintained in the contractor's records, when no report is required.

7.9 WELL TANKS. Well tanks installed shall be adequate to meet the needs of the water system.

7.10 PLUMBNESS. All pumps shall be installed in a plumb manner so as not to interfere with proper operation or efficiency, and not cause excessive wear on pumping equipment.

7.11 PREVENTION FROM CONTAMINATION. Pumping Equipment shall be installed in such a manner to discourage the entrance of contamination into the ground water. Discharge pipes shall include devices which will discourage the entrance of animals.

7.12 CHECK VALVES. Pumping Equipment installed, which may be used in conjunction with chemigation shall employ at least one check valve or other back siphoning device between the well head and point of entrance of the foreign substances.

7.13 SUBMERSIBLE PUMP INSTALLATION.

7.13.1 CHECK VALVES. Submersible Pumps shall have no less than 2 check valves installed. One check valve must be installed above ground. Submersible Pumps used for irrigation are excluded from this requirement (16.5).

7.13.2 WIRE. Wire shall be secured to the drop pipe in a manner which will support the weight of the wire and keep the wire close to the pipe.

7.13.3 TORQUE ARRESTERS AND CABLE GUARDS. Torque arresters and cable guards shall be used on all submersible installations. Torque arresters are not required for pump installation using steel pipe or schedule 80 PVC.

7.13.4 CLAMPS. All clamps used shall be all stainless steel.

7.14 JET PUMP INSTALLATION.

7.14.1 CHECK VALVES. Jet Pumps shall have a check valve installed on the discharge side of the pressure tank.

7.14.2 APPROVED DROP PIPE. Polyethylene plastic pipe and fittings shall be a minimum of SDR-7 PE-2306, with a pressure rating of 160 PSI and is approved for use as the drop pipe in jet pump installations.

7.14.3 CLAMPS. All clamps used shall be all stainless steel.

7.15 TURBINE PUMPS.

7.15.1 STEEL COLUMN PIPE FOR LINE SHAFT TURBINE PUMPS. Steel Column Pipe for Line Shaft Turbine Pumps. Column pipe for irrigation wells shall be of .188 steel wall thickness. Flange or threaded steel column pipe shall be used on turbine pump installation. Plastic Column Pipe for turbine pump installation may be used provided the pipe meets or exceeds (Specifications).

7.16 PRESSURE SYSTEMS.

7.16.1 RELIEF VALVE. All pressure systems will have a pressure relief valve installed between the well seal and pressure switch.

7.17 POWER AND CONTROL WIRING. Licensees and registrants may run power and control wiring from a disconnect box to water well equipment without obtaining an electrician's license. Licensees and registrants may not alter the existing electrical service to any building or structure. (See Act 493 of 1999) All wiring must meet the requirements of the National Electrical Code 1999 edition, of the National Fire Protection Association, or any updates or new editions of the National Electrical Code adopted by the Board of Electrical Examiners after notice and public hearing.

SECTION 8 - DEFINITIONS

For the purpose of these rules and regulations, the following definitions shall apply:

8.1 COMMISSION means the Arkansas Water Well Construction Commission as created by Section 5 of Act 641 of 1969, as amended.

8.2 WATER WELL means any excavation that is drilled, redrilled, cored, bored, washed, driven, dug, jetted or otherwise artificially constructed for the purpose of locating, acquiring, diverting or artificially recharging ground water; to include excavations made for the purpose of exchanging the geothermal energy found in the earth as herein defined as heat pump wells: but such terms do not include an excavation made for the purpose of obtaining or for prospecting for oil, natural gas, minerals, or products of mining or quarrying, or for inserting media to repressure oil or natural gas, or other products. (Subsection E, Section 3, of Act 641 of 1969).

8.3.1 HEAT PUMP WELLS means any excavation that is drilled, redrilled, cored, bored, washed, driven, dug, jetted or otherwise artificially constructed for the purpose of obtaining or exchanging geothermal energy for use with ground water source air conditioning or heat pump systems. The excavation may have pipes installed inside the excavation to circulate or discharge various fluids for the above said use and purpose and the well may or may not be back filled after excavation. (Subsection H, Section 3, of Act 641 of 1969).

8.4 WELL CONSTRUCTION means the act of setting up the rig for and engaging in the excavation of a water well, the modification of the borehole, and the setting or removal of casing, up to the point of installing or repairing pump equipment, and plugging abandoned water wells.

8.5 AQUIFER means a water bearing formation that transmits water in sufficient quantity to supply a well.

8.6 ESTABLISHED GROUND SURFACE means the elevation of the ground surface at the site of the well.

8.7 NON-PUMPING (STATIC) WATER LEVEL means the elevation of the water surface in a well when no water is being pumped.

8.8 ANNULAR SPACE means the opening between a well hole excavation and the well casing or curb, or between a casing pipe and a liner pipe.

8.9 WELL SEAL means an arrangement or device used to cap a well or to establish closure of the junction of a well pump or piping with the well casing at the upper terminal of the well.

8.10 UNCONSOLIDATED FORMATION means a geological formation above bedrock such as sand or gravel which is caving in nature.

8.11 CONSOLIDATED FORMATION means a geological formation which is firm such as rock, slate or clay that will not cave.

8.12 OWNER means the persons who own the property on which the well is being constructed.

8.13 RIG means the machinery used in the construction or repair of water wells. As used in this definition the word "machinery" shall not be construed to include vehicles or any other equipment used in the transportation, or as the foundation, or any other component part, of the apparatus specifically designed and used in the construction or repair of water wells.

8.14 CHEMIGATION means any activity or method which adds a foreign substance; such as fertilizers, herbicides, fungicides, pesticides, and other substances or chemicals, to a water system through mechanical or manual means.

8.15 BACKWASH means the surging effect or reversal of water flow in a well.

8.16 PRESSURE SYSTEM means a system that includes a switch or other cut off device that operates off of the water pressure, generated by the same system.

8.17 EXCESSIVE SEDIMENT - Excessive sediment is sediment which is excessive for the purpose or intended use of the well.

Guidelines established by the National Water Well Association, the U.S. Environmental Protection Agency, and the Arkansas Water Well Construction Commission are as follows:

1. 1 mg/liter - water to be used directly in contact with, or in the processing of, food and beverages.

2. 5 mg/liter - water for homes, institutions, municipalities, and industries.

3. 10 mg/liter - water for sprinkler irrigation systems, industrial evaporative cooling systems, and any other use where a moderate amount of sediment is not especially harmful.

4. 15 mg/liter - water for flood-type irrigation.

8.18 SEDIMENT - All particles or material which is not suspended in standing water after 24 hours. Natural occurring minerals and elements such as iron, sodium, silica, lignite, manganese, etc. may also be used to calculate sediment provided the minerals are not suspended after 24 hours.

8.19 UNDESIRABLE GEOLOGICAL FORMATIONS are formations that produce water which have characteristics that are not conducive to the use or purpose for which the well is to be used. The characteristics of each Geological Formation vary greatly depending upon the location and depth of each formation. Formations with undesirable characteristics are considered undesirable relative to other formations at the same location which can produce water for the intended use, which are known to have the desired quality.

8.20 GROUND WATER - Water occurring in the ground.

8.21 SURFACE WATER - Water located above the ground.

8.22 HARMFUL BACTERIA - The presence of coliform bacteria constitutes the presence of harmful bacteria.

8.23 SATURATED ZONE - The subsurface zone in which all openings are full of water.

8.24 CONTAMINATION - The degradation of natural water quality as a result of man's activities. There is no implication of any specific limits, since the degree of permissible contamination depends upon the intended end use, or uses, of the water.

8.25 MONITORING WELLS - Wells constructed for the purpose of locating and sampling for Engineering or Geological data.

8.26 STATIC WATER LEVEL - The level water naturally reaches in a well, at atmospheric pressure.

8.27 WELL YIELD - The volume of water discharged from the well after construction expressed in gallons per minute (gpm) or gallons per hour (gph). Well yield is an estimate of the total volume of water the well is capable of producing at the time of construction.

8.28 ABANDONED WATER WELL means a well whose use has been permanently discontinued. Any well shall be deemed abandoned which is in such a state of disrepair that continued use for the purpose of obtaining ground water is impractical.

8.29 STANDARD DIMENSION RATIO (SDR) - Outside diameter in inches divided by the wall thickness in inches.

8.30 MASTER PLUMBER - A person currently holding a valid master plumbers license pursuant to Arkansas Code Ann. 17-31-101 et. seq.

8.31 MASTER ELECTRICIAN - A person currently holding a valid master electricians license pursuant to Arkansas Code Ann. 17-25-101 et. seq. and 20-31-101 et. seq.

8.32 WATER WELL CONTRACTOR – means any person (including a partnership or corporation) who engages in the business of well construction or pump installation or repair, exclusive of surveying or other acts preparatory to the construction of a water well.

8.33 WATER WELL DRILLER – means any natural person, whether or not connected with a firm, partnership, corporation, or other public or private association, who engages for compensation in well construction.

8.34 PUMP INSTALLER – means any natural person, whether or not connected with a firm, partnership, corporation, or public or private association, who engages for compensation in pump installation or repair.

8.35 PUBLIC WELL-means any well supplying water to a public water system as defined and regulated by the Arkansas Department of Health. In general, this means a well serving or anticipated to serve 15 or more connections or an average of at least 24 individuals 60 or more days in a year.

8.36 SEMI-PUBLIC WELL-means any well supplying water to a semi-public water system as defined and regulated by the Arkansas Department of Health. In general, this means a well supply made available to the public for drinking or used in connection with the manufacturing, processing, or handling of ice, food, or drink.

8.37 APPRENTICE-means a natural person who under the supervision of a registered Water Well Pump Installer or registered Water Well Driller is obtaining the knowledge, skills, and abilities necessary to obtain a Certificate of Registration as a Water Well Pump Installer or Water Well Driller.

8.38 APPRENTICE PROGRAM-means a program developed by the Commission pursuant to § 17-50-312 to develop certain minimum knowledge, skills or abilities in those natural persons desiring registration as Pump Installers or Water Well Drillers.

8.39 DIRECT EXCHANGE WELL-means a small diameter bore hole constructed for the purpose of sinking or sourcing thermal energy between the direct exchange loop and the earth.

8.40 DIRECT EXCHANGE LOOP-means a continuous unbroken pipe beneath the surface of the earth that circulates refrigerant for the purpose of sinking or sourcing thermal energy between the direct exchange loop and the earth.

8.41 THERMAL FLUID-means a fluid used to transfer thermal energy. The thermal fluid must be biodegradable and non-toxic in soil or water.

SECTION 9 - TABLES

SIZE	EXTERNAL	INTERNAL	THICKNESS	WEIGHT PLAIN END	(LBS./FT.) THREADED AND COUPLED
1.00	1.315	1.049	.133	1.68	1.70
1.25	1.660	1.049	.140	2.27	2.30
1.50	1.900	1.610	.145	2.72	2.75
2.00	2.375	2.061	.154	3.65	3.75
2.50	2.875	2.469	.203	5.79	5.90
3.00	3.500	3.068	.216	7.58	7.70
3.50	4.000	3.548	.226	9.11	9.25
4.00	4.500	4.026	.237	10.70	11.00
5.00	5.563	5.047	.258	14.62	15.00

Table 2. Chlorine Compound Required to Produce a 50-mg / l Solution in 100 ft (30.5 m) of Water-Filled Casing*

Casing Diameter		Volume 100ft. (30.5 m)		65% HTH, Perchloron, etc. (dry weight)		25% Chloride of Lime (dry weight)H		5.25% Purex, Chlorox, etc.(sodium hypochlorite) (liquid measure)	
in	**mm**	**gal**	**m^3**	**oz**	**g**	**oz**	**g**	**oz**	**l**
2	51	16.3	0.06	0.2	5.7	0.5	14.2	2	0.06
4	102	65.3	0.25	0.7	19.8	2	56.7	9	0.3
6	152	147	0.56	2	56.7	4	113	20	0.6
8	203	261	.99	3	85.1	7	198	34	1.0
10	254	408	1.5	4	113	11	312	56	1.7
12	305	588	2.2	6	170	16	454	80	2.4
16	406	1,045	4.0	11	312	28	794	128	3.8
20	508	1,632	6.2	17	482	43	1,219	214	6.4
24	610	2,350	8.9	24	680	63	1,786	298	8.7

Note: Liquid sodium hypochlorite in a 12-percent solution is often sold for use in water and wastewater treatment plants, and as a commercial bleach or for use in swimming pools. Utilizing a solution of this nature would call for a liquid (chemical) measure equal to one-half the volumes presented in column 5.

*EPA recommends a minimum concentration of 100 mg/ l available chlorine. To obtain this concentration, double the amounts indicated.

Where a dry chemical is used, it should be mixed with water to form a chlorine solution before putting it into the well.

Table 3 How to Sanitize a Water System to 400 ppm using Autotrol's Well Sanitizer Pellets. Autotrol's pellets contain 70% calcium hypochlorite and 30% inert material.

Well Diameter-Inches	For each 100 feet of water depth use*		
	Weight of Pellets lbs. - oz.	Cups of Pellets	Number of Pellets
2	0 - 1.5	1 / 4	40
3	0 - 3.0	2 / 5	80
4	0 - 6.0	3 / 4	140
5	0 - 8.0	1	200
6	0 - 12.0	1 - 1/2	300
8	1 - 5.0	2 - 1/2	500
10	2 - 0	4	800
12	3 - 0	6	- - -
24	12 - 0	24	- - -
36	26 - 0	- - -	- - -

* To produce a 400 PPM chlorine dosage

Note: Pellets Weight = 1.14 gram each, 25 pellets/oz., 400 pellets/lb.

1 cup of pellets = 1/2 lb., or 8 oz., or 200 pellets

Autotrol Corporation's Well Sanitizer chlorinating pellets can be used for well, storage tank, or cistern sanitization. The amount of pellets used will depend on the amount of water in the system to be sanitized. To produce a 400 ppm chlorine concentration, to

sanitize a water system, use one-half (1/2) pound chlorination pellets for each 100 gallons of water in the system (1/2 lb/100 gal = 8 oz/100 gal = 200 pellets/100 gal = 1 cup pellets/100 gal). Table 3 shows how many pellets to use per 100 feet of water in various diameter wells.

Drilled Wells

1. Remove the cap or seal from the casing and measure the depth of the water in the well, then refer to the Table to determine how many chlorine pellets should be used. In some instances removing the seal to measure the water can be a difficult task, and it is easier to estimate well and water depth from well log or other records.

2. Remove well cap and determine if there is an unobstructed path from the top of the well to the water level. If it is not possible to remove the well cap, remove vent or sanitization access plug.

3. Drop one pellet into the well and listen to hear if it hits the water. If the pellet hits the water, drop one-half (1/2) the number of pellets determined to be needed into the well. These will sink to the bottom and sanitize the lower part of the well.

4. Mix the remaining pellets in a few gallons of water in a CLEAN plastic container and pour the solution into the well.

5. In order to mix the chlorine thoroughly throughout the entire water system, it is necessary to recirculate the water in the well. This can be accomplished by connecting a hose to an outside silcock that is located after the pressure tank. Use hose to run water back down the well (this also rinses upper portion of well). After about 15 minutes of recirculation the water, a strong chlorine odor should be apparent. Turn off hose.

6. Bypass water softener and filters and open each water outlet in the water system until chlorine is present in water. This procedure assures that all the water in the system is chlorinated.

7. Allow the chlorinated water to stand in the system for at least six (6) hours, and preferably overnight. After this, open an outside faucet and flush system until water runs chlorine free. Repeat flush operation on each faucet in system.

Note:

A. Chlorine may break loose iron deposits, slime and organic material. This material will make the water run colored. The material broken loose may plug pump screens. DO NOT CONTINUE TO RUN PUMP IF WATER DOESN'T FLOW.

B. The high level of chlorine required to sanitize a water system is corrosive to most metals and chlorine solution must not be allowed to remain in water system more than 36 hours before being completely flushed from system.

8. After system has been completely flushed, perform a bacterial analysis on the water following all applicable procedures.

Large Diameter Bored Wells

Calculate the volume of water in well by determining the total cubic inches or cubic feet of water in the well. Each 231 cubic inches of water is equal to one gallon. Each cubic foot of water is 7.5 gallons of water. Use 1/2 pound of chlorine pellets for each 100 gallons of water in well. Dissolve pellets in clean, plastic pail and add to well. Pour two cups of pellets directly into well. Connect a garden hose to a faucet in water system and run water from hose back down well. When strong chlorine odor is present in hose water, wash down sides of well with chlorinated water. Proceed with steps Nos. 6, 7 and 8 of instructions for Drilled Wells.

Springs and Cisterns

Mix about 1/2 cup of pellets in 5 gallons of water use this to scrub the walls of the spring box or holding tank. With a constant flow of fresh water from the spring there is probably no way of detaining the chlorine solution in the reservoir for more than a few minutes. However, the chlorinated water should flow through the pipeline to disinfect the distribution system. Cisterns can be disinfected in the same way but a source of clean water will be needed to flush the dirty waste out of the system.

Note: This product is intended to sanitize a water supply system that has been temporarily contaminated, and is not intended to solve a recurring contamination problem.

NOTE: These regulations are the minimum requirements for water wells constructed in Arkansas.

< For additional information pertaining to Public or Semi-Public Water Systems contact the Arkansas Department of Health, 661-2000.

< For information regarding water use reporting, water rights, and ground water diversions contact the Arkansas Natural Resources Commission, 682-1611.

< For information on having your well water sampled contact your local county sanitarian, county health unit.

< For additional information on water well construction or if you believe you have a complaint contact the Arkansas Water Well Construction Commission.

< For Underground Storage Tank information contact the U.S.T. Division at Arkansas Department of Pollution Control and Ecology, 562-7444.