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**IDAPA 37
TITLE 03
Chapter 09**

37.03.09 - WELL CONSTRUCTION STANDARDS RULES

000. LEGAL AUTHORITY (Rule 0).

The Idaho Water Resource Board adopts these rules under the authority provided by Section 42-238(4), Idaho Code. (7-1-93)

001. TITLE AND SCOPE (Rule 1).

01. Title. (7-1-93)

02. Scope. The Department of Water Resources has statutory responsibility for administering the appropriation and allotment of the ground water resources of the state and to protect the resource against waste and contamination. The 1987 Idaho Legislature enacted amendments to the existing statutes which requires amendment of the rules of well construction standards. These rules are applicable to all water wells, monitoring wells, low temperature geothermal wells, injection wells and other artificial openings and excavations in the ground which are more than eighteen (18) feet in vertical depth below land surface as described in these rules. Many holes drilled into the ground do not constitute a well. Any time that such a hole is constructed the intent of these rules shall be observed. If waste or contamination is attributable to this type of hole, the hole shall be abandoned as determined by the Director. (7-1-93)

002. WRITTEN INTERPRETATION (Rule 2)

003. ADMINISTRATIVE APPEALS (Rule 3).

004. -- 009. (RESERVED).

010. DEFINITIONS (Rule 10).

Unless the context otherwise requires, the following definitions govern these rules. (7-1-93)

01. Abandoned Well. Any well which has been filled or plugged so that it is rendered unproductive and will prevent contamination of the ground water. A properly abandoned well will not produce water nor serve as a channel for movement of water from the well or between water-bearing zones. (7-1-93)

02. Annular Space. The space between two concentric cylindrical objects, one of which surrounds the other, such as the space between the walls of a drilled hole (well bore) and a casing or between a temporary surface casing and a permanent casing. (7-1-93)

03. Aquifer. Any geologic formation that will yield water to a well in sufficient quantities to make the production of water from this formation feasible for beneficial use. (7-1-93)

04. Area of Drilling Concern. An area designated by the Director in accordance with Section 42-238(7), Idaho Code. (7-1-93)

05. Artesian Water. Any water that is confined in an aquifer under pressure so that the water will rise in the well casing or drilled hole above the elevation where it was first encountered. This term includes water of flowing wells and water under pressure in wells that do not flow. (7-1-93)

06. Artificial Gravel Pack. The placement of gravel or other permeable material in the annular space around a perforated well casing or well screen. A gravel pack is frequently used to prevent the movement of finer material into the well casing and to increase the ability of the well to yield water. (7-1-93)

07. Board. The Idaho Water Resource Board. (7-1-93)

08. Bore Diameter. The diameter of the hole in the formation made by the drill bit or reamer. (7-1-93)

09. Bottom Hole Temperature of an Existing or Proposed Well. The temperature of the ground water encountered in the bottom of a well. (7-1-93)
10. Casing. The conduit to maintain the well opening and to prevent waste and contamination of the ground water as required by these standards, or as otherwise used in the construction of a well. It does not include well screens or liners used in the construction of a well. (7-1-93)
11. Cathodic Protection Well. Any artificial excavation in excess of eighteen (18) feet in vertical depth constructed for the purpose of protecting certain metallic equipment in contact with the ground. Commonly referred to as cathodic protection. (7-1-93)
12. Cement Grout. A mixture of water and cement in the ratio of not more than six (6) gallons of water to a ninety-four (94) pound sack of portland cement which is fluid enough to be pumped through a small-diameter pipe. To obtain a better flowing mixture, three (3) to five (5) pounds of bentonite may be added per sack of cement and the water increased to not more than six and one-half (6.5) gallons per sack of cement. Other cement grout or neat cement mixes may be used. These mixes shall be mixed and installed in accordance with the American Petroleum Institute Standards - API Class A through H. As found in API RP10B "Recommended Practice for Testing Oil Well Cements and Cement Additives", current edition or other approved standards. (7-1-93)
13. Conductor Pipe. The first and largest diameter string of casing to be installed in a low temperature geothermal resource well. This casing extends from land surface to a depth great enough to keep surface waters from entering and loose earth from falling in the hole prior to setting surface casing. (7-1-93)
14. Consolidated Formations. Naturally-occurring geologic formations that have been lithified (turned to stone). The term is sometimes used interchangeably with the word "bedrock" and includes rocks such as basalt, rhyolite, sandstone, limestone and shale. Commonly, these formations will stand at the edges of a bore hole without caving. (7-1-93)
15. Contamination. The introduction into the natural ground water of any physical, chemical, biological or radioactive material which may: (7-1-93)
- a. Cause a violation of State Drinking Water Standards; or (7-1-93)
 - b. Adversely affect the health of the public; or (7-1-93)
 - c. Adversely affect a designated and protected use of the State's ground water. Contamination includes the introduction of heated water or cooled water into the ground water if the alteration of ground water temperature renders the ground water less suitable for beneficial use. (7-1-93)
16. Department. The Idaho Department of Water Resources. (7-1-93)
17. Director. The Director of the Idaho Department of Water Resources or his duly authorized representatives. (7-1-93)
18. Hydraulic Fracturing. A process whereby water or other fluid is pumped under high pressure into a well to fracture and clean-out the reservoir rock surrounding the well bore thus increasing the flow into the well. (7-1-93)
19. Injection Well. Any excavation or artificial opening into the ground which meets the following three criteria: (7-1-93)
- a. It is a bored, drilled or dug hole, or is a driven mine shaft or driven well point; and (7-1-93)
 - b. It is deeper than its largest straight-line surface dimension; and (7-1-93)
 - c. It is used for or intended to be used for subsurface placement of fluids. (7-1-93)

20. Intermediate String or Casing. The casing installed within a low temperature geothermal resource well to seal out brackish water, caving zones, etc., below the bottom of the surface casing. Such strings may either be lapped into the surface casing or extend to land surface. (7-1-93)
21. Mineralized Water. Any naturally-occurring ground water that has an unusually high amount of chemical constituents dissolved within the water. Water with above five thousand (5000) ppm total dissolved solids is considered mineralized. (7-1-93)
22. Modify. A change in the construction of an existing well which deepens the well, increases the dimensions of the well or which causes or may cause the well to not meet the minimum well construction standards as determined by the Director. (7-1-93)
23. Monitoring Well. Any well more than eighteen (18) feet in vertical depth constructed to evaluate, observe or determine the quality, quantity, temperature, pressure or other characteristics of the ground water or aquifer. (7-1-93)
24. Pitless Adaptor or Pitless Unit. An assembly of parts designed for attachment to a well casing which allows buried pump discharge from the well and allows access to the interior of the well casing for installation or removal of the pump or pump appurtenances, while preventing contaminants from entering the well. (7-1-93)
25. Production String. The casing or tubing through which a low temperature geothermal resource is produced. This string extends from the producing zone to land surface. (7-1-93)
26. Puddling Clay. A mixture of bentonite, other expansive clays, fine-grained material and water, in a ratio of not less than seven (7) pounds of bentonite or expansive clay per gallon of water. Puddling clay must be composed of not less than fifty (50%) percent expansive clay with the maximum size of the remaining portion not exceeding that of coarse sand. (7-1-93)
27. Seal or Seal Material. The impermeable material, such as cement grout, bentonite grout, or puddling clay, placed in the annular space between the borehole wall and the permanent casing, to prevent the downhole movement of water or the vertical movement and mixing of artesian waters. Seals may not be installed dry unless in granular form and above the water table. (7-1-93)
28. Surface Casing. The first string of casing in a low temperature geothermal resource well which is run after the conductor pipe to anchor blow out prevention equipment and to seal out all existing cold ground water zones. (7-1-93)
29. Unconsolidated Formation. A naturally-occurring earth formation that has not been lithified. Alluvium, soil, sand, gravel, clay, and overburden are some of the terms used to describe this type of formation. (7-1-93)
30. Well. An artificial excavation or opening in the ground more than eighteen (18) feet in vertical depth below land surface by which ground water of any temperature is sought or obtained. Well also means any injection well more than eighteen (18) feet in vertical depth below land surface and any test well, monitoring well, cathodic protection well, observation well or exploratory well more than eighteen (18) feet in vertical depth below land surface that is constructed to evaluate the ground water resource or to evaluate contamination of the resource. Well does not mean a hole drilled for mineral exploration, oil and gas exploration (for which a permit has been issued pursuant to Section 47-320, Idaho Code) for dam or building foundation dewatering, for foundation geotechnical evaluations, for the installation of standpipes or piezometers installed near dams, buildings or other construction sites for the sole purpose of measuring uplift forces caused by water or for the purpose of collecting soil samples above the water table. (7-1-93)
31. Well Driller or Driller. Any person who excavates or opens a well or wells for compensation or otherwise upon any land of the well driller or upon other land. Well driller does not include those persons who construct a well on their own property for their own use without the aid of any power driven mechanical equipment. (7-1-93)

32. Well Drilling or Drilling. The act of constructing a new well or deepening or modifying an existing well by any percussion, rotary, boring, digging, jetting or auguring method. (7-1-93)

33. Well Owner. The owner of the land on which the well is located unless a deed, covenant, contract, easement, or other documentation acceptable to the director is provided to demonstrate that the well is owned by another. (7-1-93)

34. Well Rig. Any power driven percussion, rotary, boring, digging, jetting or auguring machine used in the construction of a well. (7-1-93)

011. -- 024. (RESERVED).

025. CONSTRUCTION OF COLD WATER WELLS (Rule 25).

01. General. (7-1-93)

a. All wells shall be constructed in a manner that will guard against waste and contamination of the ground water resources of the state of Idaho. The adopted standards are minimum standards which must be adhered to in the construction of all wells. The Director shall, when necessary to protect the ground water resource, require that specific wells be constructed in compliance with such additional standards as determined necessary. All wells constructed for domestic water shall, in addition to meeting these standards, meet all of the siting and distance requirements set forth by the appropriate District Health Department and Idaho Department of Health and Welfare rules. The well driller and the property owner are charged with the responsibility of taking whatever steps might be necessary in any unique situation to guard against waste and contamination of the ground water resources. It will be necessary in some cases to construct wells with significant additional controls beyond the minimum standards to accomplish these goals. (7-1-93)

b. If, in any given unique case, it appears that the ground water resources can be protected against waste and contamination without complying with the minimum well construction standards, a written request for a waiver may be submitted to the Department. If the Director determines that the waiver can be granted, the well can be constructed with some variance from the minimum standards. In order to prevent unnecessary delay the Director may grant a waiver, upon oral request, provided that the oral request is followed by a written request as specified above. (7-1-93)

c. The standards specified in Rule 025 apply to all wells with a bottom hole temperature of eighty-five (85) Degrees F or less. These standards also apply to injection wells and monitoring wells except as conditioned by any permits issued by the Department. Injection wells shall also comply with the IDAPA 37, TITLE 03, Chapter 03, "Rules for the Construction and Use of Injection Wells." (7-1-93)

02. Casing. (7-1-93)

a. Casing shall be installed in every well. For water wells and injection wells the casing shall extend at least twelve (12) inches above land surface and finished grade and to a minimum depth of eighteen (18) feet below land surface or as required by Rule 025.03 below. Open well pits with the casing below finished grade are not allowed without written approval by the Director. Upon completion of drilling and prior to removal of well drilling equipment from a water well site, the top of the casing shall be completely covered with a one fourth inch (1/4") thick solid, new or like-new steel plate welded in place, a threaded cap, or a watertight sanitary seal cover cap. In every instance where well casing is installed in a well, it shall be of steel in new, or like-new condition, and be free of pits and breaks. When casing lengths are joined together, they shall be joined by welded joints or screw-couple joints which shall be water tight or by other means as approved by the Director. If welded, the weld shall be at least as thick as the wall thickness of the well casing and fully penetrating. The specifications below under "Nominal Wall thickness" will be enforced, allowing a twelve and one half (12.5%) percent manufacturing tolerance. All permanent steel casing required to be installed in a well shall meet the minimum specifications listed in Table 1 shown below: (7-1-93)

Permanent Steel Casing Minimum Specifications			
Nominal Size (inches)	Outside Diameter (inches)	Nominal Wall Thickness (inches)	Weight Per Ft. (lbs.)
1 1/2	1.900	.145	2.72
2	2.375	.154	3.65
2 1/2	2.875	.203	5.79
3	3.500	.216	7.58
3 1/2	4.000	.226	9.11
4	4.500	.237	10.79
5	5.500	.244	13.70
6 or greater		.250	

(7-1-93)

b. Plastic Well Casing may be used for monitoring wells. The use of plastic well casing for water wells shall be considered on a case-by-case basis upon the submittal of a waiver request. Plastic casing may be used as a liner inside the required casing without a waiver or written approval. The specifications of any plastic casing to be used shall meet or exceed ASTM Standard F-480.

(7-1-93)

03. Sealing of Casing.

(7-1-93)

a. Well casings shall be sealed to prevent the possible downward movement of contaminated surface waters in the annular space around the well casing. The seal shall also prevent the upward movement of artesian waters within the annular space around the well casing that could result in the waste of ground water. The sealing is also to prevent the movement of ground water either upward or downward from zones that have been cased out of the well due to quality or other reasons. The seal material shall consist of cement grout, puddling clay or bentonite grout. The use of well cuttings alone is not an approved seal.

(7-1-93)

b. One of the following methods shall be used in placing surface seals:

(7-1-93)

i. An open free standing hole, two (2) inches greater in diameter than the outside diameter of the permanent casing shall be drilled, or temporary surface casing at least two pipe sizes larger than the permanent casing (six (6) inch permanent casing requires eight (8) inch temporary casing) shall be installed to a minimum depth of eighteen (18) feet below land surface, or to such additional depth as hereafter required (Figure 1.1a in APPENDIX A, located at the end of this chapter). If an open hole is drilled and permanent casing installed, the annular space between the wall and permanent casing shall be filled with puddling clay or bentonite grout during drilling. If the well is drilled open, the annular space must be filled with seal material and maintained full during installation of the permanent casing. If a temporary casing has been installed, upon completion of the drilling, the annular space shall be filled with seal material and kept full while withdrawing the temporary casing.

(7-1-93)

ii. A temporary casing a minimum of six (6) inches in diameter greater than the permanent casing and a minimum of five (5) feet in length shall be installed. The temporary casing shall extend not less than one (1) foot above ground surface and not less than three (3) feet below ground surface. The annular space shall be kept full of seal material in a slurry condition at all times during drilling. Upon completion of drilling, the temporary casing shall be removed (Figure 1.1b in APPENDIX A, located at the end of this chapter).

(7-1-93)

c. In wells where the above described methods of sealing wells do not apply, special sealing procedures can be approved by the Director upon written request by the well driller.

(7-1-93)

d. Consolidated formations. When a water well is drilled into and acquires water from an aquifer that is overlain by consolidated formations which are above the water table, unperforated casing shall be installed so that it extends into the consolidated formation or to a depth of eighteen (18) feet, whichever is greater. If necessary to complete the well, a smaller diameter casing, liner, or well screen may be installed below the unperforated casing.

(7-1-93)

e. Unconsolidated formations without significant clay beds. When a water well is drilled and acquires water from an aquifer which is overlain with unconsolidated formations, such as sand and gravel without significant beds of clay, an unperforated well casing shall extend to at least five (5) feet below the water table. If the water table is within eighteen (18) feet of land surface, unperforated well casing shall extend to at least eighteen (18) feet.

(7-1-93)

f. Clay beds in unconsolidated formations. When a well is drilled to develop water from an aquifer that is overlain by unconsolidated deposits such as sand and gravel, and there are significant interbeds of clay above the water table, the well casing may be terminated in a clay bed which will prevent the downward or upward movement of water. Unperforated casing shall extend to and be driven into the clay stratum overlying the water-bearing zone. A minimum of eighteen (18) feet of casing shall be installed below land surface. A single casing may extend from land surface to the water-bearing zone, or a smaller diameter casing, perforated liner, or well screen may be installed below the seal depth.

(7-1-93)

04. Artesian Water. When artesian water is encountered in the well, unperforated well casing shall extend into the confining stratum overlying the artesian zone. The casing shall be sealed into the confining stratum to prevent surface and subsurface leakage from the artesian zone. If the well flows at land surface, it shall be equipped with a control valve so that the flow can be completely stopped. If leaks occur around the well casing or adjacent to the well, the well shall be completed with seals, packers, casing or grout that will eliminate the leakage. The well driller shall not move his well drilling rig from the site until this has been accomplished. Some mixing of water may be required to develop an adequate water well; however, the mixing shall be restricted to water zones of similar pressure, temperature and quality. The Director may grant a waiver for good cause. The driller shall take precautions to case and seal out zones which may lead to waste or contamination.

(7-1-93)

05. Artificial Gravel Pack Wells. If a well is to be artificially gravel packed, the casing shall be sealed using one of the two following methods:

(7-1-93)

a. Access pipes used to inject gravel must be installed in the annular space prior to sealing the space with cement grout or puddling clay. Care should be taken to insure that the seal is water tight around the injection pipe. The pipe must be equipped with a water-tight cap or plug. The surface seal must extend a minimum of eighteen (18) feet below land surface. (See Figure 2.2a, APPENDIX B, (located at the end of this chapter).

(7-1-93)

b. If a permanent surface or outer casing or liner is installed in the construction of a gravel packed well, a temporary surface casing at least two inches larger than the permanent casing shall be installed to a minimum depth of eighteen (18) feet below land surface. Upon completion of the drilling, the annular space shall be filled with cement grout or puddling clay and the temporary casing withdrawn. The space between the permanent outer casing and the liner or inner casing shall be covered with a water-tight seal. This seal shall be of metal welded to both casings in a manner that prevents the movement of surface water into this space and hence into the gravel-packed zone. An access pipe for injecting gravel may be permanently installed. The seal must remain water tight and the pipe equipped with a water-tight cap or plug. (See Figure 2.2b, APPENDIX B, located at the end of this chapter).

(7-1-93)

06. Driven Wells. For all driven wells a well bore having a diameter of at least three (3) inches larger than the outside diameter of the casing shall extend at least three (3) feet below the land surface as outlined in sealing procedure Rule 025.03. The annular space around the drive pipe shall be filled with seal material and maintained in a slurry condition at all times during driving of the casing.

(7-1-93)

07. Dug Wells. All dug wells greater than eighteen (18) feet in depth shall be constructed with a water tight surface curbing extending to a depth of at least eighteen (18) feet. The surface curbing and/or surface casing required shall be of concrete, concrete tile, or steel. Concrete pipe, if used, must meet or exceed ASTM C67-72T Class III specification. Cast in place concrete if used shall, at a minimum, be six (6) inches thick; however, the driller shall determine the wall thickness necessary to withstand external pressures which might cause the casing to collapse.

Steel casing must, at a minimum, meet the specifications in Rule 025.01 and Table 1 of these standards. If precast concrete tile or steel casing is used for the surface casing, the well diameter to the bottom of the surface casing shall be two (2) inches greater than the outside diameter of the tile or steel. The annular space shall be filled with cement grout or puddling clay to a depth of at least eighteen (18) feet below the land surface. In a buried slab type well, the slab shall be at least eighteen (18) feet below the land surface. The slab shall be steel reinforced concrete at least four (4) inches in thickness. The seal between the casing and the slab shall be water tight. The well bore shall be backfilled with puddling clay or cement grout to the land surface. (See Figure 3, APPENDIX A, (located at the end of this chapter.) (7-1-93)

08. Injection Wells. In addition to meeting the requirements of these standards, the construction of all injection wells over eighteen (18) feet in vertical depth shall comply with the requirements of the injection well permit and the injection well rules. Drillers shall obtain from the Director a certified copy of the permit authorizing construction or modification of an injection well before beginning work. (7-1-93)

09. Cathodic Protection Wells. All cathodic protection wells shall be constructed in compliance with these rules. (7-1-93)

10. Monitoring Wells. All monitoring wells shall be constructed and maintained in a manner that will prevent waste or contamination and as otherwise required by these rules. When a monitoring well is no longer useful or needed, the owner or operator of the well shall abandon the well in accordance with Rule 025.12. (7-1-93)

11. Access Port or Pressure Gage. Upon completion of a well and before removal of the well rig from the site, the well shall be equipped with an access port that will allow for measurement of the depth to water or an approved pressure gage fitting that will allow access for measurement of shut-in pressure of an artesian flowing well. All pressure gage fittings shall include control valves such that the pressure gage can be removed. Approved access ports are illustrated in Figure 4, APPENDIX D, (located at the end of this chapter) together with approved locations for pressure gage fittings. Air lines are not a satisfactory substitution for an access port. Nonflowing domestic and stock water wells that are to be equipped with a sanitary seal with a built-in access port are exempt from this requirement. (7-1-93)

12. Abandoning of Wells. (7-1-93)

a. The well owner is charged with maintaining and abandoning a well in a manner that will prevent waste and/or contamination of the ground water. Permanently abandoned wells may have the casing removed or left in place and shall be filled with bentonite grout, cement grout, concrete, or puddling clay or other material as required to stop the upward or downward movement of water. If the well is artesian, cement grout, concrete or a packer approved by the Director shall be placed across the confining stratum overlying the artesian zone so as to prevent subsurface leakage from the artesian zone. The remainder of the well shall be filled with cement grout, concrete, or other approved material. (7-1-93)

b. The Director may require the abandonment of a well in compliance with the provisions of Rule 025.12.a. if the condition of the well does not meet minimum well construction standards or if there is no valid water right or other authorization acceptable to the Director for use of the well. (7-1-93)

13. Completion of a Well. The Director shall consider that every well is completed when the well drilling equipment has been removed, unless written notice has been given to the Director by the well driller that he intends to return and do additional work on the well within a specified period of time. Upon completion of the well, the well shall meet all of the required standards. (7-1-93)

14. Pitless Adapters. The requirement of using seal material in the top eighteen (18) feet of the annular space around the well casing, as set forth in previous sections of these standards, may be altered when a pitless adaptor is installed; the well driller may, at his discretion, stop the well seal at a maximum of six (6) feet (seal from six (6) feet to eighteen (18) feet) below land surface. When a pitless adaptor is used, the adaptor should be of the type approved by the National Sanitation Foundation (NSF) testing laboratory or the approval code adopted by the Pitless Adaptor Division of the Water Systems Council. The pitless adaptor, including the cap or cover, casing extension, and other attachments, must be so designed and constructed to be water tight and to prevent contamination of the potable water supply from external sources. The well owner or person installing the pitless adaptor shall then seal the

excavation surrounding the pitless adaptor using bentonite grout or other suitable material. (7-1-93)

15. Dry Hole Wells. Dry hole wells shall be backfilled with cement grout, concrete or other approved material. (7-1-93)

16. Explosives. Explosives used in well construction shall never be detonated inside the required well casing. Approved explosive casing perforators may be exempted by the Director. (7-1-93)

17. Hydraulic Fracturing. Hydraulic fracturing shall be performed only by well drillers licensed in Idaho. The pressure shall be transmitted through a drill string and shall not be transmitted to the well casing. The driller shall provide a report to the Director of the fracturing work which shall include well location, fracturing depth, fracturing pressures and other data as requested by the Department. (7-1-93)

18. Drilling Fluids or Drilling Additives. Drilling fluids or drilling additives shall not contain drilling fluids or drilling additives a concentration of any substance in excess of drinking water standards as set forth in the current IDAPA 16, TITLE 01, Chapter 08, "Rules for Public Drinking Water Systems." The driller shall be responsible for using drilling fluids and additives in accordance with the manufacturer's specifications. Specific products may be approved by the Director on a case-by-case basis. (7-1-93)

19. Disinfection and Contamination. (7-1-93)

a. No casing, pipe, pumps, artificial gravel packs, drilling tools or other items shall be placed in a well which will cause contamination. Disinfection with a five hundred (500) parts per million chlorine solution (1 gallon of chlorine bleach per one hundred (100) gallons clean water) is recommended for all items placed in the well. (7-1-93)

026. -- 029. (RESERVED).

030. CONSTRUCTION OF LOW TEMPERATURE GEOTHERMAL RESOURCE WELLS AND BONDING (Rule 30).

01. General. Drillers constructing low temperature geothermal resource wells (bottom hole temperature more than eighty-five (85) Degrees F and less than two hundred twelve (212) Degrees F) shall be qualified under the Well Driller Licensing Rules. All low temperature geothermal resource wells shall be constructed in such a manner that the resource will be protected from waste due to lost artesian pressure and temperature. The owner or well driller is required to provide bottom hole temperature data, but the Director may make the final determination of bottom hole temperature, based upon information available to him. (7-1-93)

a. All standards and guidelines for construction and abandonment of cold water wells shall apply to low temperature geothermal resource wells except as modified by Rule 030.03, 030.04, and 030.06. (7-1-93)

b. A drilling prospectus shall be submitted to and approved by the Director prior to the construction, modification, deepening or abandonment of any low temperature geothermal resource well. The well owner and the well driller are responsible for the prospectus and subsequent well construction. (7-1-93)

02. Well Owner Bonding. The owner of any low temperature geothermal resource well shall file a surety bond or cash bond as required by Section 42-233, Idaho Code, with the Director in an amount not less than five thousand dollars (\$5,000) nor more than twenty thousand dollars (\$20,000) payable to the Director prior to constructing, modifying or deepening the well after July 1, 1987. The bond amount shall be determined by the Director within the following guidelines. The bond shall be kept in force for one year following completion of the well or until released in writing by the Director, whichever occurs first. (7-1-93)

a. Any well less than three-hundred (300) feet deep with a bottom hole temperature of less than one hundred twenty (120) Degrees F and a shut-in pressure of less than ten (10) pounds per square inch gage (psig) at land surface shall maintain a bond of five thousand dollars (\$5,000). (7-1-93)

b. The owner of any well three hundred (300) feet to one thousand (1,000) feet deep with a bottom

hole temperature of less than one hundred fifty (150) Degrees F and a shut-in pressure of less than fifty (50) psig at land surface shall maintain a bond of ten thousand dollars (\$10,000). (7-1-93)

c. The owner of any low temperature geothermal resource well not covered by Rules 030.02.a. and 030.02.b. shall maintain a bond of twenty thousand dollars (\$20,000). (7-1-93)

d. The Director may decrease or increase the bonds required if it is shown to his satisfaction that well construction or other conditions merit an increase or decrease. (7-1-93)

e. The bond requirements of Section 42-233, Idaho Code, are applicable to wells authorized by water right permits or licenses having a priority date earlier than July 1, 1987, if the well authorized by the permit or license was not constructed prior to July 1, 1987 or if an existing well constructed within the terms of the permit or license is modified, deepened or enlarged on or after July 1, 1987. (7-1-93)

03. Casing. Low temperature geothermal resource wells shall be protected from cooling by preventing intermingling with cold water aquifers and from loss of pressure by preventing flow into zones of lower pressure. (7-1-93)

a. Casing which meets or exceeds the minimum specifications for permanent steel casing of Rule 035.02 shall be installed in every well. The Director may require a more rigid standard for collapse and burst strength as depths or pressures may dictate. Every low temperature geothermal resource well which flows at land surface shall have a minimum of forty (40) feet of conductor pipe set and cemented its entire length. (7-1-93)

b. Casing shall be installed from twelve (12) inches above land surface into the overlying confining strata of the thermal aquifer. The casing schedule may consist of several different casing strings (i.e. conductor pipe, surface casing, intermediate casing, production pipe) which may all extend to land surface or may be overlapped and sealed or packed to prevent fluid migration out of the casing at any depth. (7-1-93)

i. Low temperature geothermal resource wells less than one thousand (1,000) feet deep and which encounter a shut-in pressure of less than fifty (50) psig at land surface shall have two strings of casing set and cemented to land surface. Conductor pipe shall be a minimum of forty (40) feet in length or ten percent (10%) of the total depth of the well whichever is greater. Surface casing shall extend into the confining stratum overlying the aquifer. (7-1-93)

ii. Low temperature geothermal resource wells one thousand (1,000) feet or more in depth or which will likely encounter a shut-in pressure of fifty (50) psig or more at land surface require prior approval of the drilling plan by the Director and shall have three strings of casing cemented their total length to land surface. Conductor pipe shall be a minimum length of forty (40) feet. Surface casing shall be a minimum of two hundred (200) feet in length or ten percent (10%) of the total depth of the well, whichever is greater. Intermediate casing shall extend into the confining stratum overlying the aquifer. (7-1-93)

c. Rule 030.13.b. may be waived if it can be demonstrated to the Director through the lithology, electrical logs, geophysical logs, injectivity tests or other data that formations encountered below the last casing string set, will neither accept nor yield fluids at anticipated pressure to the borehole. (7-1-93)

d. A nominal bore hole size of two (2) inches in diameter larger than the Outside Diameter (O.D.) of the casing or casing coupler (whichever is larger) shall be drilled. All casing designations shall be by O.D. and wall thickness and shall be shown to meet a given specification of the American Petroleum Institute, the American Society for Testing and Materials, the American Water Works Association or the American National Standards Institute. The last string of casing set during drilling operations shall, at the Director's option, be flanged and capable of mounting a valve or blow out prevention equipment to control flows at the surface before drilling resumes. (7-1-93)

04. Sealing of Casing. All casing shall be sealed its entire length with cement or a cement grout mixture unless waived by the Director. The seal material shall be placed from the bottom of the casing to land surface either through the casing or tubing or by use of a tremie pipe. The cement or cement grout shall be undisturbed for a minimum of twenty-four (24) hours or as needed to allow adequate curing. (7-1-93)

a. A caliper log may be run for determining the volume of cement to be placed with an additional twenty-five (25%) percent on site ready for mixing. If a caliper log is not run, an additional one hundred (100%) percent of the calculated volume of cement shall be on site ready for placement. (7-1-93)

b. If there is no return of cement or cement grout at the surface after circulating all of the cement mixture on site, the Department will determine whether remedial work should be done to insure no migration of fluids around the well bore. (7-1-93)

c. The use of additives such as bentonite, accelerators, retarders, lost circulation material shall follow manufacturer's specifications. (7-1-93)

05. Blow Out Prevention Equipment. The Director may require the installation of gate valves or annular blow out prevention equipment to prevent the uncontrolled blow out of drilling mud and geothermal fluid. (7-1-93)

06. Repair of Wells. (7-1-93)

a. The well driller shall submit a drilling prospectus to the Director for review and approval prior to the repair or modification of a low temperature geothermal resource well. (7-1-93)

07. Abandoning of Wells. Proper abandonment of any low temperature geothermal resource well requires the following: (7-1-93)

a. All cement plugs shall be pumped into the hole through drill pipe or tubing. (7-1-93)

(See Figure 5, APPENDIX E, (located at the end of this chapter).

b. All open annuli shall be completely filled with cement. (7-1-93)

c. A cement plug at least one hundred (100) feet in vertical depth shall be placed straddling (fifty (50) feet above and fifty (50) feet below) the zone where the casing or well bore meets the upper boundary of each ground water aquifer. (7-1-93)

d. A minimum of one hundred (100) feet of cement shall be placed straddling each drive shoe or guide shoe on all casing including the bottom of the conductor pipe. (7-1-93)

e. A surface plug of either cement grout or concrete shall be placed from at least fifty (50) feet below the top of the casing to the top of the casing. (7-1-93)

f. A cement plug shall extend at least fifty (50) feet above and 50 feet below the top of any liner installed in the well. The Director may waive this rule upon a showing of good cause. (7-1-93)

g. Other abandonment procedures may be approved by the Director if the owner or operator can demonstrate that the low temperature geothermal resource, ground waters, and other natural resources will be protected. (7-1-93)

h. Approval for abandonment of any low temperature geothermal well must be in writing by the Director prior to the beginning of any abandonment procedures. (7-1-93)

031. -- 034. (RESERVED).

035. HEALTH STANDARDS (Rule 35).

01. Public Supply. All wells that are constructed for public supply of domestic water shall, in addition to meeting these standards, meet all of the requirements set forth by the Idaho Department of Health and Welfare Rules, IDAPA 16, TITLE 01, Chapter 08, "Rules For Public Drinking Water Systems." (7-1-93)

02. Special Standards For Construction of Wells When Mineralized or Contaminated Water is Encountered. Any time in the construction of a well that mineralized or contaminated water is encountered, the well driller shall take the appropriate steps necessary to prevent the poor quality waters from entering the well or moving up or down the annular space around the well casing. The method employed to case out this water shall be determined by the well driller, provided the minimum standards are met. Special precautions must be taken in the case of gravel-packed wells to prevent water of inferior quality from moving vertically in the gravel packed portions of the well. (7-1-93)

03. Distances from Contaminate Sources. All water wells constructed for domestic use shall comply with minimum distances from septic tanks, drain fields, drainfield replacement area and other siting requirements of the Idaho Department of Health and Welfare and the appropriate District Health Department. (7-1-93)

04. Well Maintenance. The well owner shall be responsible for properly maintaining the well. All wells shall be capped, covered and sealed such that debris cannot enter the well, persons or animals cannot fall into the well, and water cannot enter the well around the outside of the casing. (7-1-93)

036. -- 039. (RESERVED).

040. AREAS OF DRILLING CONCERN (Rule 40).

01. General. (7-1-93)

a. The Director may designate an "area of drilling concern" to protect public health, or to prevent waste and contamination of ground and/or surface water because of factors such as aquifer pressure, vertical depth to the aquifer, warm or hot ground water, or contaminated ground or surface waters. (7-1-93)

b. The designation of an area of drilling concern does not supersede or preclude designation of part or all of an area as a Critical Ground Water Area (Section 42-233a, Idaho Code), Ground Water Management Area (Section 42-233b, Idaho Code), or Geothermal Resource Area (Sections 42-4002 and 42-4003, Idaho Code). (7-1-93)

c. The designation of an area of drilling concern can include certain aquifers or portions thereof while excluding others. The area of drilling concern may include low temperature geothermal resources while not including the shallower cold ground water systems. (7-1-93)

02. Bond Requirement. (7-1-93)

a. The minimum bond to be filed by the well driller with the Director for the construction or modification of any well in an area of drilling concern shall be ten thousand dollars (\$10,000) unless it can be shown to the satisfaction of the Director that a smaller bond is sufficient. (7-1-93)

b. The Director may determine on a case-by-case basis if a larger bond is required based on the estimated cost to repair, complete or properly abandon a well. (7-1-93)

03. Additional Requirements. (7-1-93)

a. A driller shall demonstrate to the satisfaction of the Director that he has the experience and knowledge to adequately construct or abandon a well which encounters warm water or pressurized aquifers. (7-1-93)

b. A driller shall demonstrate to the satisfaction of the Director that he has, or has immediate access to, specialized equipment or resources needed to adequately construct or abandon a well. (7-1-93)

041. -- 044. (RESERVED).

045. DRILLING PERMIT REQUIREMENTS (Rule 45).

01. General Provisions. (7-1-93)

a. The owner of a well to be constructed, drilled, deepened or enlarged on or after July 1, 1987 shall obtain a drilling permit from the Director prior to construction or drilling of the well. (7-1-93)

b. The owner of a well under construction prior to July 1, 1987, for which the drilling equipment is at the site and construction is ongoing, shall not be required to obtain a drilling permit, provided that construction of the well was complete by August 1, 1987. The Director may extend the date for good cause. (7-1-93)

c. The Director may issue a drilling permit to the owner of a proposed well, to the driller employed to construct the well, or to the owner's representative. (7-1-93)

d. Drilling permits will not be issued for construction of a well which requires another separate approval from the department, such as a water right permit, transfer, amendment or injection well permit, until the other separate approval has been given by the department. The Director may grant a waiver if he determines that the public interest will be served by an expedited approval. (7-1-93)

e. The Director may give verbal approval to a well driller for the construction of certain wells such as single family domestic wells and stockwater wells which do not require other separate approvals from the department, provided the driller files the drilling permit and appropriate fee with the Director within thirty (30) days of the verbal approval. (7-1-93)

f. The Director may give verbal approval to a well driller for the construction of a well for which other permitting requirements have been met, provided the driller files the drilling permit and appropriate fee with the Director within thirty (30) days of the verbal approval. (7-1-93)

g. The Director will not give a verbal approval for well construction or drilling in a designated area of drilling concern. (7-1-93)

h. Failure of the driller to submit a completed drilling permit and fee within the thirty (30) day period after receiving verbal approval to construct a well is cause for the Director to seek the penalties provided by statute and by these rules. (7-1-93)

i. After the effective date of these rules, a well driller shall not construct, drill or modify any well until a drilling permit has been issued or verbal approval is given. (7-1-93)

02. Effect of a Permit. (7-1-93)

a. A drilling permit authorizes the construction, drilling or modification of a well in compliance with the conditions of approval on the permit. (7-1-93)

b. A drilling permit does not constitute a water right permit, injection well permit or other authorization which may be required from the department prior to actual well construction and does not authorize use of water from the well or discharge of fluids into the well. (7-1-93)

c. A drilling permit may not be assigned from one owner to another. (7-1-93)

d. A drilling permit authorizes the construction of one (1) well (except group monitoring well drilling permits) unless other holes started under terms of the permit are properly abandoned and the department is advised of the abandonment. (7-1-93)

03. Exclusions. (7-1-93)

a. Geotechnical borings for the purpose of mineral exploration or for the design of foundations for structures or for the design of dams and embankments are not subject to the drilling permit requirement but shall be constructed and abandoned in accordance with minimum well construction standards. (7-1-93)

b. The Director may require abandonment of wells constructed pursuant to Rule 045.03.a. if the wells are determined to cause waste or contamination of the ground water. (7-1-93)

c. Wells constructed pursuant to Rule 045.03.a. shall be abandoned in compliance with adopted rules when use of the wells cease. (7-1-93)

04. Fees. (7-1-93)

a. A drilling permit fee is not required for a well constructed and completed prior to July 1, 1987, provided the well is not deepened or the dimensions of the well are not increased on or after July 1, 1987. (7-1-93)

b. The drilling permit fee for construction of a well for a single family domestic use, stockwater use, class V(c) heat pump injection associated with a single family domestic use or monitoring use or for any use with a rate of diversion of four one hundredths (0.04) cubic feet per second or less and for the storage of four (4) acre-feet per year or less shall be ten (\$10) dollars. (See IDAPA 37, TITLE 03, Chapter 03, "Rules for Construction and Use of Injection Wells" for the description of class V(c) injection wells). (7-1-93)

c. The Director may issue a blanket drilling permit for site specific monitoring programs prepared by a licensed engineer or licensed geologist as provided in Section 42-235, Idaho Code, upon submittal of a fifty dollar (\$50) fee. (7-1-93)

d. The drilling permit fee for well uses which are not included in Rules 045.04.b. and 04.c. shall be one hundred dollars (\$100). (7-1-93)

e. The difference between the drilling permit fee required by Rules 045.04.b. through 04.d., as applicable, shall be paid when an existing well constructed on or after July 1, 1987, for which the lower drilling permit fee was paid, is authorized by the Department for a use which would require the larger drilling permit fee. This rule applies even though the existing well is not deepened or the dimensions of the well are not increased. (7-1-93)

f. A drilling permit fee will not be required for a new or additional use from an existing well constructed on or after July 1, 1987, when the drilling permit fee for the new or additional use is the same amount which was previously paid for construction of the well in connection with the existing use. (7-1-93)

046. -- 049. (RESERVED).

050. PENALTIES (Rule 50).

A person owning or controlling a well that allows waste or contamination of the state's ground water resources or causes a well not to meet the construction standards provided in these rules, is subject to the civil penalties as provided by statute. A driller who violates the foregoing provisions of these minimum well construction standards rules is subject to the penalty provisions specified in 42-238 and 42-238b, Idaho Code. (7-1-93)

051. -- 999. (RESERVED).

APPENDIX A

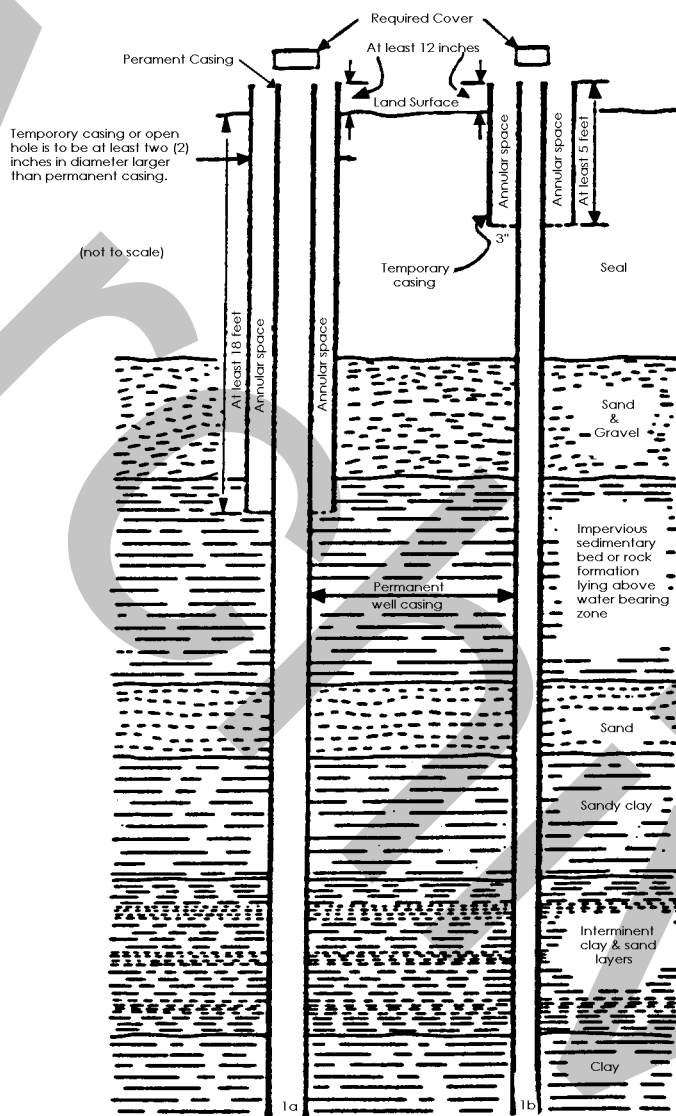


FIGURE 1. Construction of drilled wells (sealing of casing)

Diagram illustrating two methods of well construction:

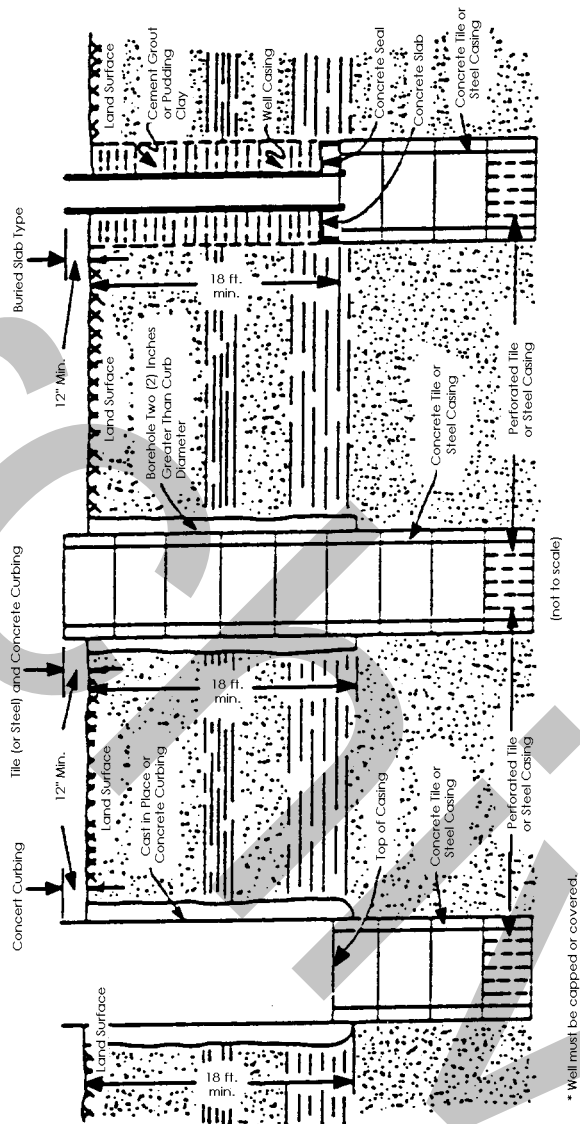
- 2a Construction Without Surface Casing:** Shows a well casing installed directly into the ground. The casing is surrounded by a gravel pack. A packer is installed between the seal and gravel pack. The casing is sealed with a Steel Seal Cap. The required cover is at least 12 inches. The casing is surrounded by a layer of Cement Grout or Pudding Clay. The casing is surrounded by a layer of Clay. The casing is surrounded by a layer of Sand and Gravel. The casing is surrounded by a layer of Clay.
- 2b Construction With Surface Casing:** Shows a well casing installed inside a surface casing. The surface casing is surrounded by a gravel pack. The well casing is surrounded by a gravel pack. A packer is installed between the seal and gravel pack. The casing is sealed with a Steel Seal Cap. The required cover is at least 12 inches. The casing is surrounded by a layer of Cement Grout or Pudding Clay. The casing is surrounded by a layer of Clay. The casing is surrounded by a layer of Sand and Gravel. The casing is surrounded by a layer of Clay.

Labels in the diagram include: Land surface, Top soil, Clay, Sand and Gravel, Clay, Well Casing, Gravel Pack, Packer should be installed between seal and gravel pack, At Least 18 Feet, At Least 12 inches, Steel Seal Cap, Fill pipes may be installed, Cement Grout or Pudding Clay, Surface casing, Top soil, Clay, Sand and Gravel, Clay, (not to scale), 2a Construction Without Surface Casing, 2b Construction With Surface Casing.

FIGURE 2. Construction of Gravel Packed Wells

APPENDIX C

FIGURE 3. Construction of dug wells



APPENDIX D

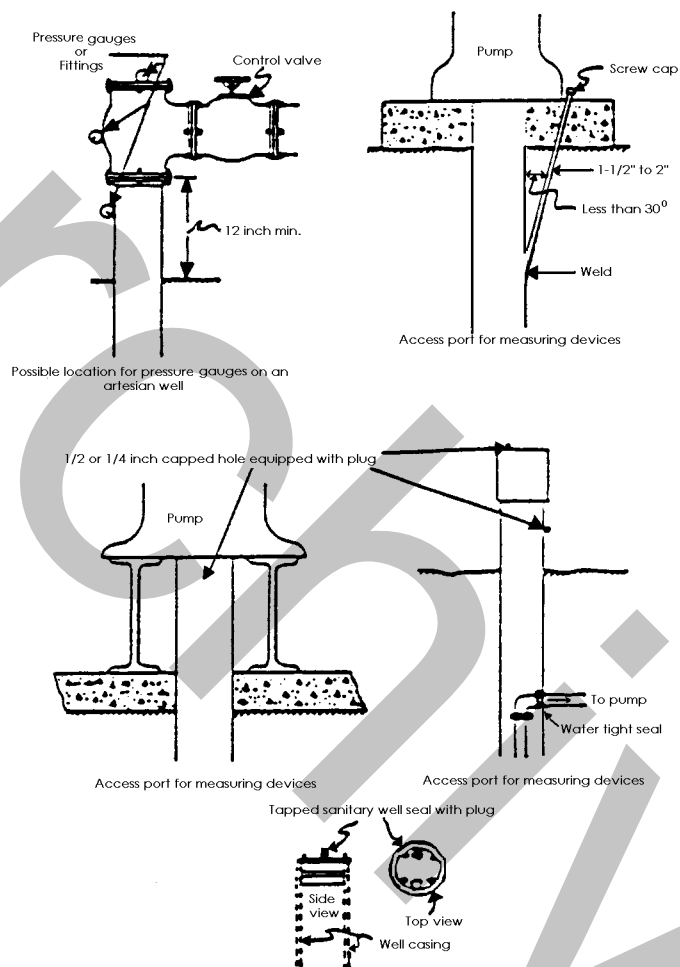


FIGURE 4. Methods of installing access ports and pressure gauges

APPENDIX E

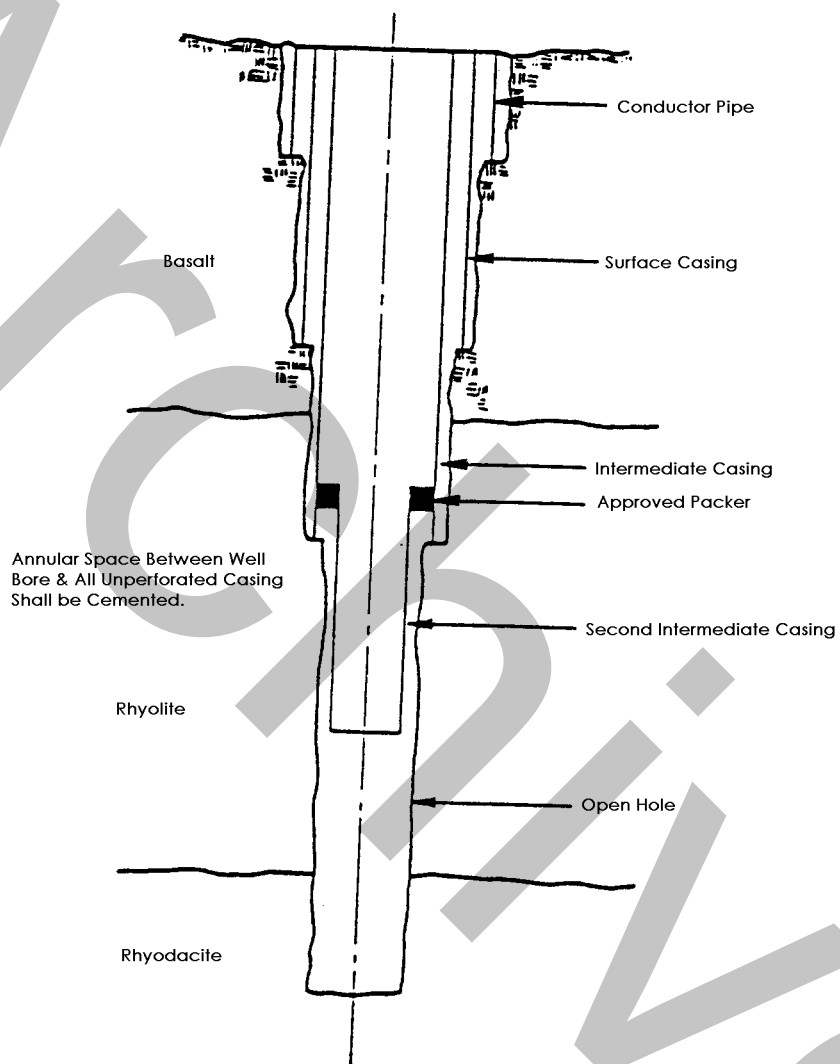


FIGURE 5. Typical Construction Features of a Low Temperature Geothermal Resource Well.