

Water Used Must be Potable

690-210-040 All water used in the construction, alteration, repair or abandonment of a well shall be potable.

Organic Materials

690-210-050 Organic materials which foster or promote undesired organic growth or have the potential to degrade water quality shall not be employed in the construction of a [water] well. This includes but is not limited to brans, hulls, grains, starches and proteins.

Explosives

690-210-060(1) If explosives are used in the construction of a well, their use must be reported on the well report form (well log). Information which shall be included is the type and amount of explosive used.

(2) In no case shall explosives other than commercially developed gun perforators be detonated inside the well casing or liner pipe without written permission from the Director. The request shall include the type of explosive to be used, how they will be placed, and where they are to be placed. In no case shall an explosive charge be dropped down a well or used to sever installed well casing or liner pipe.

Injection Wells

690-210-070 No well subject to these rules shall be used for the injection of surface or ground waters, or chemically or thermally altered waters, unless the injection installation, well design, and receiving formations are approved by the Water Resources Department. For additional regulations on the use of wells for injection purposes, contact the Oregon Department of Environmental Quality.

Commingling of Waters

690-210-080 In no case shall a well be constructed to allow commingling or leakage of ground water within an individual well by gravity flow or artesian pressure from different ground water a[c]quifers associated with different geological units. However, ground water entering from different depths in the same geological unit may be combined provided the waters are similar as to potentiometric head, temperature and mineral content.

Perched Ground Water

690-210-090 Wells drawing water from perched zones must be constructed to prevent the waste of this type of ground water.

Mineralized or Contaminated Ground Water

690-210-100 All formations which yield contaminated or mineralized water shall be adequately cased and sealed off so as to prevent contamination of the overlying or underlying water-bearing zones.

Unattended Wells

690-210-110 All wells when unattended during construction shall be covered to protect public health and safety.

Additional Standards for Artesian Wells

690-210-120(1) Wells penetrating into an artesian aquifer shall have an upper drillhole four (4) inches greater in diameter than the nominal diameter of the permanent well casing. Watertight unperforated casing shall extend and be sealed at least five (5) feet into the confining formation immediately overlying the artesian water-bearing zone. In all cases, a minimum of 18 feet of casing and casing seal will be required. If cement grout is placed by a suitable pump from the bottom of the casing (Methods A, B, and D, in Appendix 2 and Figure 2), the diameter of the upper drillhole shall be at least two (2) inches larger than the nominal diameter of the casing. To complete the well, a smaller diameter casing, a perforated liner, or a well screen may be installed.

(2) When artesian pressures are encountered in the absence of a confining formation, casing and casing seal requirements shall be determined by the Director upon written application. In the alternative, the person constructing the well may construct the well in conformance with the minimum standards for artesian wells with a confining formation, set forth in section (1) of this rule.

(3) If a well flows at land surface, the well shall be equipped with a watertight mechanical cap, threaded or welded, and a control valve, so that all flow of water from the well can be completely stopped.

(4) All flowing artesian wells shall be equipped with a pressure gauge placed on a deadend line. A petcock valve shall be placed between the gauge and well casing. (See Figure 10, 1986.)

(5) All flowing artesian wells shall be tested for artesian shut-in pressure in pounds per square inch and rate of flow in

cubic feet per second, or gallons per minute, under free discharge conditions. This data shall be reported on the well report.

Sealing of Wells in Unconsolidated Formations Without Significant Clay Beds

690-210-130(1) Wells drilled into unconsolidated water-bearing strata overlain by unconsolidated materials, such as sand, silt, or sand and gravel, without significant clay beds, shall have a watertight, unperforated well casing extending at least five (5) feet below the top of the water table. If the water table is thirteen (13) feet or less below land surface, a watertight, nonperforated, permanent well casing shall extend to a minimum depth of eighteen (18) feet. An upper oversize drillhole, four (4) inches greater in diameter than the nominal diameter of the casing, shall be constructed to a minimum depth of eighteen (18) feet. To prevent caving, a temporary surface casing, at least eighteen (18) feet in length, shall be used throughout the construction of the annular seal space.

(2) The annular space between the permanent well casing and the temporary surface casing or drillhole wall shall be completely filled and sealed from a depth of at least eighteen (18) feet to land surface with grout in accordance with rules 690-210-300 through 690-210-360 after the permanent well casing is set into its final position. The temporary surface casing shall be removed as the annular space is filled with grout. (See Figure 3, 1986.)

Sealing of Wells in Unconsolidated Formations With Significant Clay Beds

690-210-140 Wells drilled into water-bearing strata overlain by unconsolidated deposits of clay, or sand and gravel in which significant interbeds of clay are present, shall have a watertight, nonperforated, permanent well casing extending at least five (5) feet into a clay or other impermeable stratum overlying the water-bearing zone. In all cases, an upper oversize drillhole, at least four (4) inches greater in diameter than the nominal diameter of the permanent well casing shall be constructed to this same depth. In the event that the subsurface materials penetrated by the upper drillhole cave, or tend to cave, an outer, temporary surface casing shall be used to case out caving materials throughout the construction of the oversize drillhole. If the clay or other impermeable stratum is thirteen (13) feet or less below land surface, the watertight, nonperforated well casing and the upper, oversize drillhole shall extend to a minimum depth of eighteen (18) feet below land surface. If necessary to complete the well, the single, permanent well casing may be extended below the required sealing depth

prior to sealing the well with grout. If preferred, a smaller diameter casing, perforated liner, or well screen may be installed. The annular space between the permanent well casing and the upper, oversize drillhole shall be completely filled with grout in accordance with rules 690-210-300 through 690-210-360 after the permanent well casing is set into final position. The temporary surface casing shall be removed from the well as the annular space is filled. (See Figure 4, 1986.)

Sealing of Wells in Consolidated Formations

690-210-150(1) Wells drilled into a water-bearing rock formation overlain by clay, silt, sand, gravel, or similar materials, shall be constructed in accordance with one of the following methods:

(a) Method 1 - An upper drillhole, four (4) inches greater in diameter than the nominal diameter of the permanent well casing to be installed, shall extend from land surface to at least five (5) feet into solid, uncreviced, consolidated rock overlying the water-bearing rock formation below a depth of thirteen (13) feet. Unperforated permanent well casing shall extend to this same depth. The annular space between the casing and the drillhole wall within the rock formation shall be filled with cement grout. The upper annular space between the casing and the drillhole wall shall be filled from land surface to at least five (5) feet into an impermeable clay stratum below a depth of thirteen (13) feet. The annular space between the upper and lower required cement grout sealing intervals shall be filled with an impermeable sealing material or cement grout. If necessary to complete the well, a smaller diameter well casing, liner pipe, or well screen may be installed. If cement grout is placed by a suitable pump from the bottom of the casing to land surface (Methods A, B, D, Appendix 2), the upper drillhole shall be at least two (2) inches larger than the nominal diameter of the casing. (See Figure 5, 1986.)

(b) Method 2 - An upper drillhole, four (4) inches greater in diameter than the permanent well casing to be installed, shall extend from land surface to at least five (5) feet into an impermeable clay stratum below a depth of thirteen (13) feet. Unperforated, permanent well casing shall extend to and shall be driven into solid, uncreviced, consolidated rock overlying the water-bearing rock formation. A lower drillhole, equal in diameter to the inside diameter of the upper permanent well casing, shall be constructed at least five (5) feet into solid uncreviced rock overlying the water-bearing formation. A smaller diameter casing, at least two (2) inches smaller in diameter than the diameter of the upper permanent well casing, shall extend at least five (5) feet into the lower drillhole and at least eight (8) feet into the upper permanent well casing. The annular space between the upper oversize drillhole and the permanent well casing, and the annular space between the smaller diameter lower

casing and the lower drillhole, shall be completely filled with grout in accordance with rules 690-210-300 through 690-210-360 after the permanent well casing and the lower casing are set into final position. (See Figure 6, 1986.)

(c) Method 3 - An upper drillhole, four (4) inches greater in diameter than the permanent well casing to be installed, shall extend from land surface to at least five (5) feet into an impermeable clay stratum below a depth of thirteen (13) feet. A lower drillhole, at least two (2) inches greater in diameter than the diameter of the permanent well casing, shall be constructed at least five (5) feet into solid, uncreviced, consolidated rock by under-reaming methods. Unperforated, permanent well casing shall extend to and [shall] be driven into solid, uncreviced, consolidated rock at the bottom of the under-reamed section following placement of the sealing material. [overlying the water-bearing formation. A lower drillhole, at least two (2) inches greater in diameter than the diameter of the upper permanent well casing, shall be constructed at least five (5) feet into solid, uncreviced, consolidated rock by under-reaming methods. The upper permanent well casing shall be lowered to the full depth of the lower oversize drillhole.]

The annular space between the upper oversize drillhole and the upper permanent well casing shall be filled with cement grout using Method C or bentonite grout. [and t]The annular space between the lower under-reamed drillhole wall and the permanent well casing, shall be completely filled with grout applied under pressure in accordance with the appropriate Method A, B[, C,] or D, in Appendix 2. (See Figures 2, 1986 and 7, 1986.)

(2) In all cases, (Methods 1, 2, or 3 above), if materials penetrated by the upper oversize drillhole cave, or tend to cave, an outer temporary surface casing shall be used to case out all caving material throughout construction of the oversize drillhole. The temporary surface casing shall be withdrawn as the annular space is filled with grout.

Sealing of Filter Pack Wells with Surface Casing

690-210-160 If a permanent surface casing is installed in the construction of a filter pack well, a well bore having a nominal diameter of at least four (4) inches greater than the nominal diameter of the permanent surface casing shall extend from land surface to at least five (5) feet into a clay or other impermeable formation overlying the water-bearing zone. Unperforated watertight casing shall extend to this same depth and the annular space between the well bore and the surface casing shall be filled with grout. If the clay or other impermeable formation is at or near land surface, a minimum of eighteen (18) feet of unperforated casing shall be installed. A watertight, welded, steel plate at least three-sixteenths (3/16) of an inch in thickness shall be installed between the inner production casing and the outer surface casing at the well head.

A watertight fill pipe with threaded cap may be installed for the purpose of placing additional filter pack material in the well. (See Figure 8, 1986.)

Sealing of Filter Pack Wells Without Surface Casing

690-210-170 If a permanent surface casing is not installed in the construction of a filter pack well, a well bore having a nominal diameter of at least eight (8) inches greater than the nominal diameter of the permanent well casing shall extend from land surface to at least five (5) feet into a clay or other impermeable formation overlying the water-bearing zone. Unperforated watertight casing shall extend to this same depth and the annular space between the well bore and the permanent casing shall be completely filled with grout. If the clay or other impermeable formation is at or near land surface, the upper oversize drillhole and unperforated, permanent well casing shall extend to a minimum depth of eighteen (18) feet below land surface. A suitable packer shall be installed in the annular space between the filter pack material and the grout seal. A watertight fill pipe with threaded cap may be installed for the purpose of placing additional filter pack material in the well. The outside diameter of the fill pipe shall not exceed one-half the thickness of the grout seal surrounding the permanent well casing and shall be centered in the annular space. (See Figure 9, 1986.)

Additional Standards for Driven or Jetted Wells

690-210-180 All drive point wells or jetted wells shall have nonperforated, watertight pipe meeting the minimum specifications shown in Appendix 2, Table VI and extending a minimum distance of eighteen (18) feet below land surface. Drive pipe greater than three and one-half (3 1/2) inches shall comply with the minimum specifications in Rule 690-210-190. An upper drillhole at least four (4) inches greater in nominal diameter than the permanent production pipe shall extend at least eighteen (18) feet below land surface. The annular space shall be filled with grout. If temporary casing is used during construction, it must be removed during placement of the grout. (See Figure 11, 1986.)

Steel Casing

690-210-190(1) All steel casing installed, shall be in new or like new condition, being free of pits or breaks, and shall meet minimum American Society of Testing Materials (ASTM A-120)

specifications for steel pipe, for the sizes as set out in Table [III]IV, Appendix 2.

(2) All steel casing having a diameter larger than twenty (20) inches shall have a wall thickness of at least .375 inch.

(3) Steel casing installed in a well greater than a nominal diameter of ten (10) inches, having a wall thickness of .250 inch and meeting ASTM A-120 specifications must not exceed the following depth limitations (Diameter -Maximum Depth, respectively):

- (a) 12 inches - 250 feet;
- (b) 14-16 inches - 150 feet;
- (c) 18-20 inches - 100 feet;

(4) Steel casings of other ASTM specifications shall not be used without written permission of the Director. A written request to use casing of other specifications shall be submitted to the Director. This request shall include a description of the casing specifications and the reason for its use.

Publications: The publication(s) referred to or incorporated by reference in this rule are available for reference in [from] the office of the Water Resources Department.

Steel Casing Joints

690-210-200 All steel casing joints shall be welded or screw coupled and shall be watertight. If welded casing joints are used, the weld shall be a full penetrating weld at least equal in thickness to the wall thickness of the casing. Welded casing joints shall have a tensile strength equal to or greater than that of the casing.

Plastic Casing

690-210-210 Plastic casing shall not be driven and may only be installed in an oversized drillhole. Such casing shall be of polymerized vinyl chloride (PVC), type 1120 or 1220, SDR 21 (Class 200) or SDR 26 (Class 160), meeting the standards of the "National Sanitation Foundation" and ASTM D-2241-73 and ASTM D-1784-69. The well casing must be clearly marked by the manufacturer showing: nominal size, type plastic material, Standard Dimension Ratio (SDR), ASTM designation, and National Sanitation Foundation seal of certified approval. The maximum depth to which this plastic casing may safely resist collapsing forces is a function of the "Standard Dimension Ratio" (SDR), i.e., the ratio of the outside diameter to the casing wall thickness. The maximum depths have been computed for readily available SDR and are cited as:

- (1) SDR = 21 - Maximum Depth = 150 feet.

(2) SDR = 26 - Maximum Depth = 100 feet.

Publications: The publication(s) referred to or incorporated by reference in this rule are available for reference in [from] the office of the Water Resources Department.

Plastic Casing Joints

690-210-220 All plastic casing joints shall be watertight. Either "bell" type, threaded, or coupling hubs are approved. Hub couplings shall be of material meeting the specifications for plastic casings as set forth in rule 690-210-210. Joints shall be made by solvent cement in accordance with manufacturer's directions. Newly assembled joints require careful handling until the initial set has taken place, which varies with the temperature and the pipe size. The recommended initial set times are from manufacturer's recommendations (See Appendix 2, Table [I]V).

Inner Casing

690-210-230 Inner casing installed to prevent leakage of undesirable water into a well must meet the minimum requirements of well casing (690-210-190). The space between the two well casings shall be pressure grouted so as to prevent the movement of water between the two casings. The inner casing must be centered and must be a minimum of two inches smaller in diameter than the outer casing. The grout must be placed in a positive manner in accordance with method A, B, D, or E. (See Appendix 2)

Casing Shall Be Centered

690-210-240 In all instances, casings shall be centered in sealed intervals. Casing centralizers may be used to ensure centering. When sealing a well by Method E, casing centralizers shall be used. (See Figure 1, 1986.)

Top Terminal Height

690-210-250(1) The casing head or pitless unit of any well shall extend not less than twelve (12) inches above the finished ground surface or pumphouse floor, and not less than twelve (12) inches above the local surface runoff level. The ground surface immediately surrounding the top of the well casing or pitless unit should be graded so as to drain surface water away from the well. No casing shall be cut off below land surface except to install a basement offset or a pitless unit, or during permanent

abandonment of a well without permission of the Director.

(2) Application to the Director to reduce the top terminal height of casing shall include:

(a) A description of physical characteristics of the well site which make the requested change necessary; and

(b) A description of additional steps to be taken over and above the minimum standards in these rules which will assure adequate protection to the ground water resource.

(3) The Director may approve a reduction of the top terminal height of the casing only upon a determination that the additional precautions to be taken and specific physical characteristics of the site would prevent contamination of the ground water resource.

Openings in the Casing

690-210-260 There shall be no opening in the casing wall between the top of the casing and the bottom of the required casing seal except for pitless adapters, measurement access ports, and grout nipples installed in conformance with these standards. In no case shall holes be cut in the casing wall for the purpose of lifting or lowering casing into the well bore unless such holes are properly welded closed and watertight prior to placement into the well bore.

Pitless Well Adapters and Units

690-210-270 Surface seal requirements for well casing set forth herein shall also apply when a pitless adapter or unit is installed in a well. The seal shall cover that interval occupied by the pitless case from the point of casing connection to land surface. A grout seal shall not be required within the pitless unit sealing interval. The pitless adapter or unit, including the cap or cover, pitless case and other attachments, shall be designed and constructed to be watertight to prevent the entrance of contaminants into the well from surface or near-surface sources. Pitless units shall be vented to the atmosphere.

NOTE: Prior to installing pitless well adapt[er]s or units on public, community, municipal, or public utility water supply wells, contact the Department of Human Resources. (See references to Health Division regulation in Appendix 1, Table III).

Access Ports and Airlines

690-210-280 All wells shall be equipped with a usable access port with a minimum diameter of 3/4 inch. In addition, an airline with a pressure gauge adequate to determine the water

level in the well at any time may be installed. If an airline is installed, it must enter the well in a location other than the access port. If the well constructor does not install a pump in the well, the landowner will be required to provide the access port. (See Figure 17, 1986.)

Liner Pipe

690-210-290 Liner pipe installed through caving formations and installed without driving, may be of lighter weight than specified by [the] table IV under rule 690-210-190. Such lightweight pipe shall have a wall thickness equal to or greater than .188 inch. All liner pipe shall be of steel, in new or like new condition[s], being free of pits or breaks; or shall be of polymerized vinyl chloride (PVC) type 1220 or 1120, SDR 21 (Class 200), or SDR 26 (Class 160). Liner pipe installed in a well shall extend or telescope at least eight (8) feet into the lower end of the well casing. In the event that more than one string of liner pipe is installed, each string shall extend or telescope at least eight (8) feet into the adjacent larger diameter liner pipe. Liner pipe shall be removable. Liner pipe may be welded or hooked onto the permanent well casing but shall not be permanently fixed to a well casing or borehole wall using packers or grout which would prohibit the liner's removal. (See Inner Casing 690-210-230.)

Drill Cuttings or Chips

690-210-300 In no case shall drill cuttings or drill chips be used or allowed to fill, partially fill, or fall into the required sealing interval of a well during the construction or the completion of a well.

Cement Grout

690-210-310 When using cement grout as the sealing material in a well, it must meet the following requirements:

(1) Cement grout used to seal a well shall be composed of a uniformly mixed slurry of Portland cement or High Early Strength Type III Portland cement, and potable water, or High-alumina cement, and potable water mixed in the following proportions (Type of Cement - Gallons of Water Per Sack of Dry Cement, respectively):

- (a) Portland Cement - 4 1/2 to 6;
 - (b) High Early Strength Type III Portland Cement - 5 1/2 to 6 1/2;
 - (c) High-alumina Cement - 4 1/2 to 6.
- (2) Additives to increase fluidity, reduce shrinkage, or control time of set may be used in a cement grout mixture.

Expanding agents such as aluminum powder may be used at a rate not exceeding .075 ounce (1 level teaspoonful) per sack of dry cement. The powder shall not contain polishing agents. The addition of bentonite clay to a cement grout mixture is permissible but shall not in any case exceed five (5) percent by weight of dry cement. Calcium chloride may be added to a Portland cement grout to accelerate the set but shall not exceed two (2) pounds per sack of dry cement. High-alumina cement and Portland cement of any type shall not be mixed together for use in a well.

(3) Cement types other than those set forth herein shall not be used as a sealing material in a well except upon written approval of the Director of the Water Resources Department.

(4) In no case shall sand or aggregate be added to cement grout seal mixtures.

Concrete

690-210-[430]315 Concrete for use in the construction of a dug well, or for filling the annular space or well bore of a well, shall consist of clean, hard, and durable aggregate, and not less than five (5) sacks of Portland cement per cubic yard of concrete. Concrete will be allowed only when the oversize drill hole is a minimum of 8 inches larger in diameter than the well casing used in construction of the well. The maximum diameter of aggregate particles shall not exceed one and one-half (1 1/2) inches, but, in any case, shall not exceed one-fifth (1/5) or twenty (20) percent of the minimum width of the space to be filled. The ratio of coarse aggregate to fine aggregate (Passing No. 4, US Standard Sieve) shall be approximately one and one-half (1 1/2) to one (1) by volume, but, in any case, shall not exceed two (2) to one (1) nor be less than one (1) to two (2).

Methods of Placement of Cement Grout or Concrete

690-210-320 Cement grout or concrete [to be] used as a sealing material in a well shall be placed or forced upward from the bottom of the space to be grouted and shall be placed in one continuous operation without significant interruption. If temporary outer surface casing is used in the construction of the well, it shall be withdrawn as the grout or concrete is placed. (For acceptable methods of procedure, see Appendix 2 and Figure 2, 1986.)

Bentonite Grout

690-210-330 Bentonite used in construction of surface casing seals for [water] wells shall be within industry tolerances for [from] 6 to 8 mesh, dry granular western sodium bentonite. The bentonite shall be free of polymers.

Method of Placement of Bentonite Grout

690-210-340(1) An upper oversize drillhole, four inches greater than the nominal inside diameter of the permanent well casing, shall be constructed to a minimum depth of eighteen (18) feet. THE USE OF BENTONITE GROUT AS A SURFACE CASING SEAL SHALL NOT BE ALLOWED BELOW TWENTY-FIVE (25) FEET FROM LAND SURFACE. In the event that the subsurface materials penetrated by the oversize drillhole cave, or tend to cave, an outer temporary surface casing shall be used to case out the caving materials throughout construction of the oversize drillhole. The temporary surface casing shall be removed before completion of drilling.

(2) The annular space shall be free of water. In the event water is present or encountered during the construction of the oversized drillhole, bentonite shall not be used as grout material.

(3) After placement of the permanent casing, the annular space shall be filled to land surface with granular bentonite, in a dry condition. The annular space shall be kept full while drilling or driving casing. The annular space shall be tamped while placing bentonite to prevent bridging.

Resumption of Construction Following Placement of Cement Grout

690-210-350 The time of the final set for a cement grout mixture varies greatly in accordance with cement-water ratio and temperature. When cement grout is used to seal a well, construction should not resume in any way until after the final set of the cement grout mixture. Performance of all cement grout seals shall be the responsibility of the person responsible for the construction of the well. Recommended periods of time of final set are:

- (1) If Portland Cement is used - 72 hours;
- (2) If High Early Strength Type III Portland Cement is used - 48 hours;
- (3) If High-alumina Cement is used - 6 hours.

Movement of Casing After Cement Grouting

690-210-360 In no case shall the permanent well casing be moved or driven following the placement and initial set of the cement grout.

Well Test

690-210-370 Every well shall be tested for yield and drawdown for a period of not less than one hour either by bailing, pumping, or air testing. Any testing method that does not provide for drawdown measurements during testing is not an accurate or reliable test of yield.

Disinfection of a [Water] Well

690-210-380 Every new, altered, or reconditioned [water] well including pumping equipment, sand, or gravel used in filter pack wells and a well casing standing above the water table, shall be thoroughly hosed or sluiced with water, and shall be disinfected with a solution containing at least fifty (50) parts per million chlorine before being placed in the well. All water introduced into a well during construction shall be clean and potable. The well and its equipment, including the interior of the well casing, shall be thoroughly swabbed and cleaned to remove all of the oil, grease, and foreign substances upon completion of the well's construction. Following the completion of a well, and again after the pumping equipment has been installed, the well and its equipment shall be disinfected by thoroughly agitating and mixing in the well a solution containing enough chlorine to leave a residual of twenty-five (25) parts per million throughout the well after a period of twenty-four (24) hours. (See Chart Recommendations for Disinfection of [Water] Wells, Appendix 1.)

Completion of Wells

690-210-390 A well constructor or permitted landowner constructing his own well shall not remove the drilling machine from a well site unless it is immediately replaced by another drilling machine in operating condition prior to:

- (1) Completion of the well in compliance with rules 690-210-005 through 690-210-430 and a watertight seal, threaded or welded cap placed on the well in accordance with rule 690-220-005; or
- (2) Completion of the well in compliance with rules 690-210-005 through 690-210-430 and a pump installed; or
- (3) Abandonment of the well in compliance with rules 690-220-030 through 690-220-140.

[DUG WELLS]

Construction of Dug Wells

690-210-400 All dug wells greater than twelve (12) feet in depth shall be constructed with a watertight surface curbing extending from a minimum of twelve (12) inches above land surface to a depth of eighteen (18) feet below land surface. In the case of wells ranging from twelve (12) to twenty-one (21) feet in depth, water tight surface casing shall extend to within three (3) feet of the bottom of the well. Open wells, sometimes called sumps, which exceed ten (10) feet in average diameter are exempt from these construction requirements, but are subject to all the requirements covering the use of ground water (water right application).

Buried Slab Construction

690-210-410 In a buried slab type well, the slab shall be at least eighteen (18) feet below land surface and shall be at least three (3) inches in thickness. The slab shall be reinforced to withstand all stresses. The slab shall be sealed with cement grout at least one (1) foot thick, and the well bore backfilled with grout or concrete in accordance with rules 690-210-300 through 690-210-360 and with 690-210-430. (See Figure 12, 1986.)

Surface Curbing

690-210-420(1) The surface curbing required in rule 690-210-400 shall be of concrete, concrete tile, or steel. If concrete is used, the concrete wall thickness shall not be less than six (6) inches. In case of buried slab type well, well casing meeting the minimum specifications given in rule 690-210-190 through rule 690-210-220 shall be used. (See Figure 12, 1986.)

(2) If precast concrete tile or steel casing are used for the surface curbing, the well diameter to the bottom of the surface curbing shall be eight (8) inches greater than the outside diameter of the tile or steel, and the annular space shall be completely filled with grout or concrete. (See Figure 12, 1986.)

Special Temporary Standards for Repair, Maintenance and Delays in Completion of New Well Construction

690-210-510(1) An authorization for special temporary standards [form] from adopted uniform standards for construction and maintenance of [water] wells may be granted by the Director for a specified time period not to exceed one year. A request for such temporary special standard shall be in writing from the

landowner drilling their own well with a well construction permit or the bonded constructor, and shall include at a minimum:

- (a) The intended use of the well;
 - (b) The location of the well;
 - (c) The name and address of the owner;
 - (d) The location of and distance to the nearest well, septic tank and drainfield (if none are in within 500 feet, so indicate);
 - (e) The unusual conditions existing at the well site that create the need for special standards;
 - (f) The reasons that adherence to or compliance with the rules and regulations for minimum standards will not result in a satisfactory well;
 - (g) The proposed standards that the well constructor or landowner constructing the well believes will be adequate for the particular well;
 - (h) A diagram showing the pertinent features of the proposed well design and construction; and
 - (i) The date by which the well will be brought into full compliance with the minimum standards.
- (2) A copy of the approved special temporary standards shall be attached to each copy of the well report completed by the constructor for the subject well. The constructor shall note on the attachment or on the well report how and when the well was brought into full compliance with the minimum standards.
- (3) Authorization for temporary standards for maintenance and repair, but not for new well construction, may be extended by the Director if good cause is shown by the well constructor.

DIVISION 215

MAINTENANCE, REPAIR AND DEEPENING OF WELLS

Prevention of Ground Water Contamination

690-215-005 The landowner shall maintain all wells in a condition whereby they are not a hazard to life or property nor a source of contamination to or waste of the ground water supply. If, in the opinion of the Director, a well is a hazard to life or property or a source of contamination to the ground water supply, the Director may order discontinuance of or impose conditions upon the use of such well or order the well repaired or permanently abandoned in accordance with OAR Chapter 690, Divisions 215 and 220 of the Standards for Construction and Maintenance of Wells in the State of Oregon.

Notice Required to Maintain an Existing Well Following Construction of Replacement Well

690-215-010 Any time a new well is constructed to replace an existing well which is a source of contamination, loss of artesian pressure or waste, the existing well shall be repaired in compliance with these rules or abandoned in accordance with rules OAR 690-220-030 through 690-220-140.

Accessibility to Well for Reconditioning, Repair or Abandonment

690-215-015 To enable drilling equipment future access to the well for reconditioning, repair or abandonment, the property owner should maintain a minimum five-foot separation distance between the well and any permanent structure.

Down Well Continuous Water Treatment

690-215-017 (1) If a chemical is used to treat well water, it shall not be allowed to come into contact with the inside of the well casing. Down well treatment of well water will only be allowed if a commercial water treatment system is used. Delivery pipes or tubes designed for use with the treatment chemicals shall be used to place the chemicals into the water in the well. This rule does not apply when disinfecting the well and equipment following construction.
(2) In no event will farm chemicals, including herbicides, pesticides, fungicides or fertilizers be allowed to enter a well.

Valves and Casing on Artesian Wells

690-215-020 Valves and casing on all artesian wells shall be maintained in a condition so that the flow of water can be completely stopped when the water is not being put to beneficial use. All casing, liner pipe, and casing seals shall be maintained in a condition that will prevent surface or subsurface leakage of ground water. Valves shall be closed when water is not being put to beneficial use. During periods of subfreezing temperatures, a valve may be partially opened to prevent damage due to freezing.

Casing and Liner Pipe

690-215-030 All casing or liner pipe used in the repair or deepening of wells shall meet the minimum standards in rules 690-210-190 through 690-210-290.

Sealing of Casing

690-215-040 If in repair or deepening of a drilled well the old casing is withdrawn or advanced, the well shall be recased and resealed in accordance with the rules set forth in rules 690-210-[190]020 through 690-210-[360]510.
Sealing of Casing

Well Cover

690-215-050 All wells shall be securely covered to prevent any foreign substance from entering the well including any material which might contaminate the water-bearing zone.

Access Port or Airline

690-215-060 The access port or airline on all wells required by 690-210-280 shall be maintained in a condition that will prevent contamination of the water body. Access ports and airlines shall be maintained so that the position of the water table can be determined at any time.

Pressure Gauge

690-215-070 The pressure gauge and petcock valve required by rule 690-210-120 shall be maintained so that the artesian pressure can be accurately determined at any time. (See Figure 10.)

Flowmeters

690-215-080 The Director may require the landowner to install totalizing flowmeters on any well, either as a condition of a water right permit or at a later date as circumstances may warrant. The landowner may be required to install flowmeters on existing permitted wells and on wells which are exempted by ORS 537.545.

Conversion to an Artesian Well

690-215-090 If a well becomes artesian upon deepening, the well shall be cased, sealed and completed in accordance with rule 690-210-120.

Drilling in a Dug Well

690-215-100 In no case shall a dug well be deepened by drilling methods.

DIVISION 220

ABANDONMENT OF WELLS

Temporary Abandonment

690-220-005 Any well to be temporarily removed from service, temporarily abandoned due to a recess in construction, or temporarily abandoned before commencing service, shall be capped with a watertight seal, watertight welded steel cap, or threaded cap. In the event that temporary abandonment is to be of 90 days or less, the temporary steel cap may be welded to the well casing with a minimum of four (4) separate welds, evenly spaced, each at least one-half (1/2) of an inch in length. Steel or cast iron caps shall be at least three-sixteenths (3/16) of an inch in thickness.

Permanent Abandonment

690-220-030 Any well that is to be permanently abandoned shall be completely filled in such a manner that vertical movement of water within the well bore, including vertical movement of water within the annular space surrounding the well casing, is effectively and permanently stopped.

Abandonment of Uncased Wells in Unconsolidated Formations

690-220-040 Uncased wells to be abandoned that extend only into unconsolidated materials shall be completely filled with cement grout or concrete. (See Figure 13, 1986.)

Abandonment of Uncased Wells in Consolidated Formations

690-220-050 Uncased wells to be abandoned that penetrate a water-bearing rock formation shall be filled with concrete or cement grout, or alternating layers of cement grout or concrete and clean gravel throughout the water-producing horizon. A concrete or cement grout plug shall be constructed from the top of the rock formation to a depth of at least twenty (20) feet below the top of the rock formation. The remainder of the well

above the rock formation shall be filled to land surface with cement grout or concrete. Plugs of cement grout or concrete, at least three (3) feet in length, shall be placed in non-producing zones between all water-bearing zones. In all cases, a cement grout or concrete plug, at least three (3) feet in length, shall be constructed in a non-producing stratum immediately above the uppermost water-bearing zone. (See Figure 14, 1986.)

Abandonment of Cased Wells

690-220-060 If the well casing or the liner pipe is not removed during the abandonment of a well, the casing or liner shall be thoroughly ripped or perforated. The annular space between the casing or liner and the drillhole wall shall be effectively and completely filled with cement grout applied under pressure. The remainder of the well shall be filled with cement grout or concrete. Uncased horizons in a cased well to be abandoned shall be filled in accordance with rules 690-220-030 through 690-220-050. The casing of wells to be abandoned may be severed below land surface and removed. (See Figure 15, 1986.)

Abandonment of Artesian Wells

690-220-070 The flow of artesian wells to be abandoned shall be confined or restricted by cement grout applied under pressure, or by the use of a suitable well packer, or a wooden plug placed at the bottom of the confining formation immediately above the artesian water-bearing zone. Cement grout or concrete shall be used to effectively fill the well to land surface. (See Figure 16, 1986.)

Abandonment of [Drilled] Driven and Jetted Wells

690-220-080 A cement grout or concrete plug shall be placed opposite all perforations or openings in the well casing. The remainder of the well shall be filled with cement grout, or concrete.

Abandonment of Filter or Gravel Pack Wells

690-220-090 Filter or gravel pack wells may be abandoned only with prior written approval of the Director of the method proposed for abandonment of the particular well. Any method of abandonment proposed must ensure that all perforated sections of the casing will be pressure grouted throughout, and that the remainder of the well is filled with cement grout, or concrete.

Abandonment of Dug Wells

690-220-095(1) Abandonment of a dug well shall be approved by the department before work is started. The department shall be notified of the proposed abandonment. The notification shall include:

- (a) Location;
- (b) Name of the owner;
- (c) Well diameter;
- (d) Well depth;
- (e) Depth to water;
- (f) Type of well casing or liner material if any; and
- (g) The proposed method of abandonment.

(2) A method to be used in the abandonment will be approved by the department if the method will adequately protect the ground water resource. Dug wells penetrating more than one water bearing zone shall be abandoned in a manner to eliminate the possibility of leakage from one water bearing zone to another.

(3) The well shall be abandoned by a licensed well constructor, a landowner with a landowner well construction permit and bond or in the presence of the watermaster or other department representative.

Obstructions and Possible Contaminants

690-220-100 All obstructions or debris which may interfere with effective sealing operations shall be removed from the well to be abandoned. Any foreign matter capable of causing ground water contamination shall be removed prior to placing any sealing material.

Removal of Well Casing During Abandonment

690-220-110 If the casing of a well is removed during abandonment, the well shall be plugged and sealed in accordance with rules 690-220-030 through 690-220-050 and shall be filled with sealing materials as the casing is removed.

Cement Grout

690-220-120 Cement grout for use in abandonment operations shall conform to the requirements of rule 690-210-310.

Concrete

690-220-130 Concrete for use in abandonment operations

shall conform to the requirements of rule 690-210-430.

Method of Placement of Concrete or Cement Grout

690-220-140 Concrete or cement grout used as a sealing material in abandonment operations shall be introduced at the bottom of the well or required sealing interval and placed progressively upward to the top of the well. All such sealing materials shall be placed by the use of a grout pipe, tremie, or by dump bailer in order to avoid segregation or dilution of the sealing materials.

DIVISION 225

ENFORCEMENT

(See Figure 18, 1986)

Investigation of Alleged Violations

690-225-020 The Water Resources Director, upon the Director's own initiative, or upon complaint alleging violation of statutes, standards or rules governing construction, alteration, or abandonment of wells may cause an investigation to determine whether a violation has occurred. If the investigation indicates that a violation has occurred, the Director shall notify the persons believed responsible for the violation including but not limited to:

- (1) Any well constructor involved; or
- (2) The landowner, if the violation involves construction, alteration, operation, or abandonment of a well.

Enforcement Actions

690-225-030(1) If, after notice and opportunity for hearing under ORS 183.310 to 183.550 the Director determines that one or more violations have occurred, the Director may impose one or more of the following:

- (a) Provide a specified time for remedy;
- (b) Assess a civil penalty in accordance with the schedule of civil penalties in OAR 690-225-110;
- (c) Suspend, revoke, or refuse to renew the licenses when one or more persons responsible for the violation hold a well constructor's license;
- (d) Require that a person whose license has been refused renewal pass the constructor test before a new license is issued;
- (e) Impose any reasonable conditions on the well constructor's license to insure correction of the violation and future compliance with the law. These conditions may include but

are not limited to:

(A) Fulfilling any outstanding obligations which are the result of administrative action before the constructor can offer any services or construct, alter or abandon any well;

(B) Requiring additional advance notice to be given to the watermaster of construction, alteration or abandonment of any well;

(C) Requiring a seal placement notice be given to the watermaster 24 hours in advance of placing the seal; or

(D) Any other conditions the Director feels are appropriate.

(f) Order the landowner to repair or meet other conditions on use of the well, or order discontinuance of use and proper abandonment pursuant to ORS 537.775;

(g) Make demand on the well constructor's bond or on the landowner's bond. This may occur only if the Director has given the notice required in OAR 690-225-020 to the persons responsible for the violation within three years after the date the [water] well report is filed with the Department. If no [water] well report has been filed, the three year limitation shall not apply until such time as a [water] well report is filed;

(h) Take any other action authorized by law.

(2) An order may specify a schedule of escalating or cumulative sanctions to be assessed on specified dates until satisfactory correction of the violation has been completed.

(3) Any well constructor whose license is suspended or revoked shall not contract for well construction services or operate well drilling machines in the State of Oregon during the suspension or revocation period.

Multiple Violations and Consolidation of Proceedings

690-225-040 In cases of multiple or continuing violations, each occurrence of substantially the same activity and each day's continuance of a violation after the responsible party has been notified is a separate and distinct violation. Administrative enforcement proceedings for multiple violations may be consolidated into a single proceeding.

Factors Affecting Selection of Type and Degree of Enforcement

690-225-050 In selecting the appropriate type and degree of enforcement, the Director may consider the following factors:

(1) Whether the constructor's file demonstrates a pattern of prior similar violations;

(2) Whether the respondent has cooperated in attempting correction of any violation in a timely fashion;

(3) The gravity and magnitude of the violation including whether there is an immediate or long-term threat to human health or the ground water resource;

- (4) Whether the damage to the ground water resource is reversible;
- (5) Whether the violation in the instances cited was repeated or continuous;
- (6) Whether a cause of the violation was an unavoidable accident;
- (7) The opportunity and degree of difficulty to correct the violation;
- (8) The cost to the Department except for travel costs, after the initial field investigation, attempting to gain voluntary compliance of the cited violation. The costs may be considered until the Department receives respondent's answer to the written notice and opportunity for hearing; or,
- (9) Any other relevant factor.

Change in Enforcement Status

690-225-060(1) In the interest of achieving compliance, the Director at any time may reevaluate the status of the violations and take appropriate action, including reduction of the enforcement level or remission of all or part of any civil penalties assessed.

(2) The Director may terminate proceedings against a well constructor if the constructor provides acceptable evidence that:

(a) The landowner does not permit the constructor to be present at any inspection made by the Director; or

(b) That the constructor is capable of complying with recommendations made by the Director, but the landowner does not permit the constructor to comply. In such cases, the landowner is responsible for bringing the well into compliance pursuant to ORS 537.535, and if the landowner was not a party to the original enforcement proceeding the Director may initiate a proceeding to ensure that the landowner does so.

CIVIL PENALTIES

Assessment of Civil Penalties

690-225-100 Under OAR 690-225-030(1) the Director may at any time select the most appropriate enforcement tool, including assessment of civil penalties, to gain compliance. However, the Director shall not impose a civil penalty if compliance has been achieved in another manner prior to final decision in the proceeding.

Schedule of Civil Penalties

690-225-110(1) The amount of civil penalty shall be determined consistent with the following schedule:

(a) Not less than twenty five dollars (\$25) nor more than two hundred fifty (\$250) for each occurrence defined in the rules as a minor violation.

(b) Not less than fifty dollars (\$50) nor more than one thousand dollars (\$1,000) for each occurrence defined in the rules as a major violation.

(2) Table [1] located at the end of this Division, lists minor violations of well construction standards. All other violations are declared to be major.

**TABLE [1] I
(690-225-110(2))**

Oregon Statute Reference	Value Assignment	Title
ORS 537.762	Minor	REPORT OF COMMENCEMENT OF CONSTRUCTION
ORS 537.765	Minor	WELL REPORT
Administrative Rule Reference	Value Assignment	Title
Rule 690-205-060	Minor	D R I L L I N G M A C H I N E IDENTIFICATION
Rule 690-210-290	Minor	LINER PIPE
Rule 690-210-270	Minor	PITLESS WELL ADAPTERS and UNITS
Rule 690-210-370	Minor	WELL TEST
Rule 690-210-280	Minor	ACCESS PORT OR AIRLINE
Rule 690-205-080	Minor	WELL REPORT
Rule 690-230-050	Minor	DESCRIPTION OF PROPOSED USE
Rule 690-230-060	Minor	IDENTIFICATION OF INTENDED USE
Rule-690-230-080	Minor	PUMP TESTING OF LOW TEMPERATURE GEOTHERMAL REINJECTION WELLS
Rule 690-230-090	Minor	WATER TEMPERATURE MEASUREMENT

DIVISION 230

STANDARDS AND PROCEDURES FOR
LOW-TEMPERATURE GEOTHERMAL WELLS AND EFFLUENT DISPOSAL SYSTEMS

Policy and Purpose

690-230-005(1) All Low-Temperature Geothermal Fluids are part of the ground water resources of the State of Oregon and shall be administered by the Water Resources Commission (Commission) under the provisions of ORS 537.010 to 537.795. The Commission recognizes that these fluids are developed primarily because of their thermal characteristics and that special management is necessary. Reservoir assessment of Low-Temperature Geothermal Fluids shall be conducted by the Commission in the same manner as ground water investigations outlined in ORS 537.665 and ORS 537.685.

(2) The purpose of the following rules is to provide standards and procedures for the development, use and management of Low-Temperature Geothermal Fluids, while insuring proper management of all ground water resources so maximum beneficial use of the resource will be most effectively attained.

(3) These rules supplement OAR 690-200-005 to 690-220-140. Rules 690-60-050, paragraph 47 and 690-61-181 are hereby rescinded.

Definitions[:]

690-230-020(1) "Bottom Hole Temperature": means t[T]he maximum temperature measured in the well or borehole. It is normally attained directly adjacent to the producing zone, commonly at or near the bottom of the borehole, and will in all cases be greater than or equal to the temperature of fluid produced from the borehole.

(2) "Low-Temperature Geothermal Effluent": means t[T]he outflow, discharge [of]or waste fluid, with its associated dissolved or suspended constitu[t]ents (being original or introduced), that is produced by a Low-Temperature Geothermal Well and its utilization system.

(3) "Low-Temperature Geothermal Fluid": means:

(a) Any ground water produced from a Low-Temperature Geothermal Well which is used for its thermal characteristics; or

(b) Any other fluids, approved by the Director, that circulate, with or without withdrawal, within a Low-Temperature Geothermal Well, where in all cases of Subsections (a) and (b) of this section, the fluid is circulated because of its thermal characteristics, and is used for various heating and/or cooling purposes including, but not limited to, residential, commercial, industrial, electrical, agricultural and aquacultural applications.

(4) "Low-Temperature Geothermal Reinjection Well": means

a[A]ny well as defined under ORS 537.515(7) that is constructed or used for returning Low-Temperature Geothermal Effluent to a ground water reservoir.

(5) "Low-Temperature Geothermal Well": means a[A]ny well as defined under ORS 537.515(7) with a bottom hole temperature less than 250 F that is constructed or used for the thermal properties of the fluid contained within.

(6) "Nonstandard Low-Temperature Geothermal Effluent Disposal System": means a[A]ny Low-Temperature Geothermal Effluent Disposal System in which one or more of the following conditions are met:

(a) Any portion of the effluent is disposed of in a manner considered non-beneficial by the Director. This includes, but is not limited to, disposal via storm sewer, drainage hole or direct discharge to land surface or a surface water body.

(b) The effluent contains contaminants, other than heat, that have been added to the Low-Temperature Geothermal Fluid.

(c) The effluent is reinjected to a ground water reservoir that is not considered suitable by the Director. Factors which may render a ground water reservoir unsuitable include, but are not limited to, chemical or physical incompatibility of the fluids involved or adverse hydraulic characteristics of the receiving reservoir.

(d) There are existing or potential problems or special conditions as determined by the Director. Problems or special conditions resulting from the effluent disposal system which may warrant a nonstandard designation include, but are not limited to, instability of near-surface earth materials, undue alteration of thermal characteristics of ground water, unreasonable head changes or leakage of effluent back to the surface.

(7) "Secondary Use": means the c[C]onsumption of Low-Temperature Geothermal Effluent for beneficial use including, but not limited to, domestic, irrigation, stock watering, commercial and industrial uses.

(8) "Standard Low-Temperature Geothermal Effluent Disposal System": means a[A]ny Low-Temperature Geothermal Effluent Disposal System in which one of the following conditions are met:

(a) No contaminants except heat have been added to the Low-Temperature Geothermal Fluid and the effluent is put to a Secondary Use.

(b) No contaminants except heat have been added to the Low-Temperature Geothermal Fluid and the effluent is returned to the producing or other suitable ground water reservoir and there are no other existing or potential problems or special conditions as determined by the Director including, but not limited to, those factors, problems and conditions listed in Subsections (6)(c) and (d) of this rule.

WELL CONSTRUCTION STANDARDS

Low-Temperature Geothermal Well and Reinjection Well Construction

690-230-030(1) Low-Temperature Geothermal Wells and Reinjection Wells shall be constructed in conformance with applicable rules (OAR 690-200-005 to 690-220-140) with specific additions and modifications as described in OAR 690-230-005 to 690-230-140.

(2) Construction of a low-temperature geothermal well shall protect the ground water from contamination, waste and loss of artesian pressure. If utilization of the well causes heating or cooling of the casing resulting in thermal expansion or contraction of the casing to the point that adherence to the minimum well construction standards will not prevent or eliminate contamination, waste or loss of artesian pressure, the constructor shall request and obtain written approval from the Director to use construction methods, materials or standards to prevent the contamination, waste or loss. The request shall be in writing and submitted to the Director. Written approval from the Director must be obtained prior to completion of the well.

Low-Temperature Geothermal Reinjection Well Location

690-230-040(1) For appropriations not exceeding 15,000 gallons per day no Low-Temperature Geothermal Reinjection Well shall be located within 75 feet of any existing Low-Temperature Geothermal Well utilizing the same ground water reservoir without authorization from the Director, unless both the withdrawal and reinjection wells are on the same parcel of land and are used by the same ground water appropriator. [A variance from the 75-foot setback requirement may be issued by the Director, following a written request for special standards (described by OAR 690-200-020) by the [water] well constructor or landowner, who under the provisions of 537.753, is constructing the well, if] A request to place a reinjection well within 75 feet of a Low-Temperature Geothermal Well shall be in writing. The request shall be submitted to the Director listing the name and address of the property owners, street addresses of the wells and stating the reasons for placing the reinjection well closer than 75 feet.

The Director may approve placement of a Low-Temperature Geothermal Reinjection Well closer than 75 feet of an existing Low-Temperature Geothermal Well only upon determination by the Director that the hydrologic and thermal conditions [permit] allow closer spacing.

(2) For appropriations exceeding 15,000 gallons per day, the appropriator shall submit plans for review to the Director or his authorized representative, indicating separation distances between production and reinjection wells on the parcel of land on