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

690-210-315 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 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 If temporary outer surface casing is used in the construction of the well, it shall be withdrawn as the grout or concrete is placed.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 wells shall be within industry tolerances for 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 Well

690-210-380 Every new, altered, or reconditioned 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 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.

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 from adopted uniform standards for construction and maintenance of 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, Health Hazard, and Waste

690-215-005 The landowner shall maintain all wells in a condition where they are not a health threat, or health hazard, or a source of contamination or a source of waste of the ground water resource. If, in the opinion of the Director, a well is a health threat, or health hazard, or a source of contamination or a source of waste of the ground water resource, the Director may order discontinuance of or impose conditions upon the use of the 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 and Back-Siphon Prevention Devices

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 the 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 the pumping equipment.

(2) In no event shall agricultural pesticides and fertilizers be allowed to enter a well.

(3). As of January 1, 1992, back-siphon prevention equipment shall be installed on any irrigation system connected to a groundwater source when fertilizers or any other chemicals are applied through the system. The landowner or other responsible parties shall be responsible for assuring that the back-siphon prevention equipment is installed and functions properly. (See Figure 20, 1991.) The landowner or other responsible parties shall inspect the device at least once per year, prior to the first use of the year, to ensure that the device is installed and functions properly.

(a). The irrigation system shall contain:

(A). An automatic low-pressure drain which shall:

(i) be installed between the irrigation pump and the irrigation line check valve at the lowest point of the horizontal water supply pipeline.

(ii) be designed to drain all incidental leakage from the check valve out of the irrigation pipeline before that leakage enters the water supply.

(iii) be at least 3/4 inch in diameter with a closing pressure of not less than 5 psi.

(iv) use a corrosion-resistant tube, pipe, or similar conduit to discharge the solution at least 20 feet away and down-slope from the irrigation water source and any other water sources. At the discharge point there shall be an air gap between the discharge pipe and the discharged solution.

(v) not have any valves located on the outlet side of the drain tube.

(vi) have a dam or collection reservoir to prevent the discharged solution from pooling and draining back toward the water source.

(B). An inspection port which shall:

(i) be located on top of the pipeline between the irrigation pump and the irrigation pipeline check valve, directly overhead of the low-pressure drain.

(ii) have a minimum diameter opening of four inches from which the check valves and low-pressure drain shall be visible.

(iii) be quick coupling.

(C). An irrigation line check valve which shall:

(i) consist of at least a single check valve.

(ii) be located in the pipeline between the irrigation pump and the point of chemical injection into the irrigation pipeline, and downstream from a vacuum relief valve and automatic low-pressure drain.

(iii) be of heavy-duty construction with all materials resistant to corrosion or protected to resist corrosion.

(iv) be spring-loaded and provide a watertight seal against reverse flow.

(v) be labeled with the following information: manufacturer's name and model, working pressure in pounds per square inch (psi), maximum flow rate, and direction of flow.

(vi) not consist of metal-to-metal seal surfaces.

(vii) be designed and rated for pressures expected to be encountered, including those caused by pumping, water hammers, back-pressure, or other sources. Installation shall be according to design and manufacturer's specifications and recommendations.

(D). An air/vacuum relief valve which shall:

(i) be located on top of the horizontal irrigation pipeline between the irrigation pump and the irrigation line check valve.

(ii) have a total (individually or combined) orifice size of at least 3/4-inch diameter for a 4-inch pipe, a 1-inch diameter for a 5- to 8-inch pipe, a 2-inch diameter for 9- to 18-inch pipe, and a 3-inch diameter for a 19-inch and greater pipe.

(E). A chemical injection line check valve which shall:

(i) be located between the chemical injection pump and the point of chemical injection into the irrigation line.

(ii) be made of chemical-resistant material.

(iii) prevent irrigation water under operating pressure from entering the chemical injection line.

(iv) prevent leakage from the chemical supply tank on system shutdown.

(F). A system interlock which shall:

(i) mechanically or electrically connect the water supply pump and the chemical injection unit for the purpose of automatically shutting down the chemical injection unit in the event of water supply pump shutdown or failure.

(b). If modifications or changes in design, technology, irrigation practices, or other reasons warrant the use or placement of equipment in lieu of that specified herein, the Director may allow for such changes. Requests for modifications shall be in writing, detailing the existing system and uses, and shall include specifications on the proposed changes.The modification shall provide protection to the groundwater resource that is equal to or greater than that provided by the equipment required in this regulation.

(c). These regulations are in addition to equipment requirements for pesticide application under the Federal Insecticide, Fungicide and Rodenticide Act, and are not intended to replace those regulations.

(d). Irrigation systems that are subject to OAR 690-215-017(3) and are connected to a public water system, shall meet the cross-connection control requirements in OAR 333.

(e). Whenever the Director deems it appropriate, the Department may investigate alleged violation of statutes, standards or rules governing back-siphon prevention devices to determine whether a violation has occurred. Violations of OAR 690-215-017 may be administered under ORS 536.900(1)(c), ORS 537.990(3), or OAR 690 Division 260, as appropriate to gain compliance.

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 690-210-020 through 690-210-510.

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 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 well report is filed with the Department. If no well report has been filed, the three year limitation shall not apply until such time as a 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.

(c) First occurrence, in a calendar year, of a missing or late start card fee shall be one hundred fifty dollars ($150).

(d) Second occurrence, in a calendar year, of a missing or late start card fee shall be two hundred fifty dollars ($250).

(e) Third occurrence, in a calendar year, of a missing or late start card fee shall be two hundred fifty dollars ($250) and may include suspension of well constructors license, and any other action authorized by law.

(2) For purposes of assessing a civil penalty, the start card fee referred to inn (c), (d) and (e) above shall not be considered late if it is received in the Salem office of the Water Resources Department within five (5) days of the receipt of the start card.

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

TABLE 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	DRILLING MACHINE 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 PRODUCTION AND INJECTION WELLS AND EFFLUENT DISPOSAL SYSTEMS

Policy and Purpose

690-230-005 (1) All low-temperature geothermal fluids are part of the groundwater resources of the State of Oregon and shall be administered by the Water Resources Commission (Commission) under the provisions of ORS 537.010 to 537.796. 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 groundwater investigations outlined in ORS 537.665 and ORS 537.685.

(2) In areas where substantial thermal alteration exists, the Commission may declare a critical groundwater area, or may otherwise control use of groundwater, or order the discontinued use, repair or permanent abandonment of a well(s) causing substantial thermal alteration, in order to protect the thermal characteristics of the groundwater resource. The Commission may also regulate appropriations to limit thermal interference between wells. Low-temperature geothermal appropriations with a bottom hole temperature less than 60 degrees F shall not be protected from thermal interference caused by groundwater appropriations for other purposes.

(3) 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 groundwater resources so maximum beneficial use of the resource will be most effectively attained.

(4) These rules supplement OAR 690-200-005 to 690-225-110.

Definitions

690-230-020 (1) "Bottom hole temperature" means the 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 the outflow, discharge or waste fluid, with its associated dissolved or suspended constituents (being original or introduced), that is produced by a low-temperature geothermal well and its utilization system.

(3) "Low-temperature geothermal fluid" means any groundwater used for its thermal characteristics that is encountered in a well with a bottom hole temperature of less than 250 degrees Fahrenheit (F), or any other fluid that is circulated

within a well having a bottom hole temperature of less than 250 degrees F and used for its thermal characteristics.

(4) "Low-temperature geothermal injection well" means any well as defined under ORS 537.515(9) that is constructed or used for returning low-temperature geothermal effluent to a groundwater reservoir.

(5) "Low-temperature geothermal production well" means any well as defined under ORS 537.515(9) with a bottom hole temperature of less than 250 degrees F that is constructed or used for the thermal characteristics of the fluid contained within.

(6) "Nonstandard low-temperature geothermal effluent disposal system" means any 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 injected into a groundwater reservoir that is not considered suitable by the Director. Factors which may render a groundwater 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 other existing or potential site specific problems or conditions, that require the nonstandard designation of effluent disposal. Examples include, but are not limited to, instability of near-surface earth materials, undue alteration of thermal characteristics of groundwater, unreasonable head changes or leakage of effluent back to the surface.

(7) "Secondary use" means the consumption 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 any low-temperature geothermal effluent disposal system in which one or more of the following conditions are met:

(a) No contaminants , other than heat, have been added to the low-temperature geothermal fluid and the effluent is put to a secondary use.

(b) No contaminants, other than heat, have been added to the low-temperature geothermal fluid and the effluent is returned to the producing groundwater reservoir or other suitable groundwater reservoir as determined by the Director. In addition there are no other existing or potential problems or special conditions, as determined by the Director, that include, but are not limited to, those factors, problems and conditions listed in subsections (6)(c) and (d) of this rule.

Construction of Low-Temperature Geothermal Production and Injection Wells

690-230-030 (1) Low-temperature geothermal production and injection wells shall be constructed in conformance with applicable rules (OAR 690-200-005 to 690-225-110) with specific additions and modifications as described in OAR 690-230-005 to 690-230-140.

(2) Low-temperature geothermal production and low-temperature geothermal injection wells shall be constructed in a manner that protects groundwater from contamination, waste and loss of artesian pressure, and substantial thermal alteration.

(3) 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 groundwater contamination, groundwater waste, loss of artesian pressure, or substantial thermal alteration, then the licensed well constructor shall submit a written request to the Director to use alternate construction methods and/or materials to prevent groundwater contamination, groundwater waste, loss of artesian pressure, and substantial thermal alteration. Written approval from the Director must be obtained prior to completion of the well.

(4) A well constructor or owner of a low-temperature geothermal production or injection well may submit well construction plans to the Department for assistance and review of construction details.

Location of Low-Temperature Geothermal Injection Wells Not Exceeding 15,000 Gallons Per Day

690-230-040 (1) No low-temperature geothermal injection well with an anticipated injection rate of less than 15,000 gallons per day shall be located within 75 feet of any existing low-temperature geothermal production well utilizing the same groundwater reservoir without authorization from the Director unless both the production and injection wells are owned or used by the same person.

(2) A request to construct a low-temperature geothermal injection well within 75 feet of a low-temperature geothermal production well shall be made in writing to the Director. The request shall list the names and addresses of the property owners, street addresses of the wells, and shall state the reason(s) for locating the injection well closer than 75 feet to the production well. The Director may approve construction of an injection well closer than 75 feet to a production well only if the Director determines that the hydrologic and thermal conditions described in OAR 690-230-110 (1) justify the closer spacing.

Location of Low-Temperature Geothermal Injection Wells Exceeding 15,000 Gallons Per Day

690-230-045 The owner of any low-temperature geothermal injection well having an anticipated injection rate of greater than 15,000 gallons per day is required to have a separation distance between the low-temperature geothermal injection and production wells that is adequate to protect the production wells from substantial thermal interference. The Director shall make a decision on the proposed separation distance based on information supplied by the owner as per OAR 690-230-115.

Description of Proposed Well Use (Start Card)

690-230-050 For any low-temperature geothermal production or injection well, the report required under ORS 537.762 prior to commencing well construction shall identify the intended use of the well, the owner's name and the owner's mailing address.

Identification of Intended Well Use (Well Log)

690-230-060 Any low-temperature geothermal production or injection well shall be clearly identified as such on the water well report filed with the Water Resources Department under ORS 537.765.

Well-Head Protection Equipment

690-230-070 Adequate well-head equipment to insure public safety and the protection of the groundwater resource shall be immediately installed on any low-temperature geothermal production well or low-temperature geothermal injection well when the temperature of the fluid being withdrawn from, being pumped from, or flowing from the well bore exceeds 65 degrees C (150 degrees F) A variance from the requirement for well-head protection equipment may be granted if a written request demonstrates that the equipment is not necessary to safely complete the well.

Disposal of Low-Temperature Geothermal Fluids Produced During Drilling and Testing

690-230-075 Low-temperature geothermal fluids produced during drilling or testing of a low-temperature geothermal production or injection well shall be disposed of in a manner that minimizes hazards. For additional requirements on the disposal of low-temperature geothermal fluids produced during well drilling or testing, contact the Oregon Department of Environmental Quality.

Pump Testing of Low-Temperature Geothermal Injection Wells With an Anticipated Injection Rate of Less Than 15,000 Gallons Per Day

690-230-080 (1) Low-temperature geothermal Injection wells with an anticipated injection rate of less than 15,000 gallons per day shall be pump tested for a period of at least one hour. Test results must be recorded by the well constructor on the water well report. This minimum test shall be conducted as follows:

(a) Prior to testing, the static water level in the well shall be measured and recorded.

(b) The water shall be pumped into or from the well at a measured and steady rate. The pumping or withdrawal rate shall approximate the maximum anticipated injection rate.

(c) For tests that withdraw water from the well, only bailing or pumping the well is acceptable.

(d) At a minimum, the water level in the well shall be measured and recorded both at the end of pumping and after one hour of recovery.

(2) The Director may require the well owner to provide a more detailed test, separate from the water well report, that could include, but is not limited to, increased frequency of water level measurement, increased test duration and increased monitoring of observation wells. Such modifications will be required when possible impacts resulting from the development include, but are not limited to, thermal or hydrologic interference with existing water rights, water quality degradation or physical or mechanical failure of the well structure.

Pump Testing of Low-Temperature Geothermal Injection Wells With an Anticipated Injection Rate Exceeding 15,000 Gallons Per Day

690-230-085 (1) Low-temperature geothermal injection wells (other than flowing artesian wells) with an anticipated injection rate of greater than 15,000 gallons per day, shall be pump tested for a period of at least four hours. The pump test shall occur after the owner's pump test plan is approved by the Director, and prior to injecting into the well. The results of this test do not need to appear on the water well report. This test shall be in addition to the minimum one-hour test requirement under OAR 690-210-370. Requirements for conducting the minimum four-hour pump test as discussed in this section are as follows:

(a) Prior to testing, the well shall be idle for a period of at least four hours.

(b) The static water level in the well shall be measured at least three times, no less than twenty minutes apart, during the hour prior to pumping the well.

(c) The water shall be pumped into or from the well at a measured and steady rate. The rate shall approximate the maximum anticipated injection rate.

(d) The pump discharge shall be controlled as much as possible to maintain a constant rate during the test. The discharge rate shall be as close as reasonably possible to the

anticipated injection rate during normal use of the well. Discharge rate shall be recorded at the beginning of the test and once every hour thereafter.

(e) Water levels in the well shall be physically measured by a standard and acceptable method. Visual estimation of water level is not acceptable. Acceptable methods include:

(A) An electric water level measuring tape,

(B) An air line dedicated to the well,

(C) An acoustic sounder,

(D) An electronic pressure transducer, or

(E) Other water level measuring methods approved in advance by the Director.

(f) The water level measurements shall occur at least at the minimum frequency outlined below:

Time period	Water level measurement schedule
First 10 minutes	No more than 2 minutes apart
10 to 30 minutes	No more than 5 minutes apart
30 to 100 minutes	No more than 15 minutes apart
100 to 240 minutes	No more than 30 minutes apart

(g) After pumping stops, water level measurements shall be collected for a time equal to that of the pumping period, or until the well reaches 90 percent recovery from the maximum drawdown, whichever occurs first. Recovery water level measurements shall be collected on the same time schedule as described in OAR 690-230-085 (1)(f).

(h) The pump discharge shall be physically measured by a standard and acceptable method. Visual estimation of flow rate is not acceptable. Acceptable methods include:

(A) A properly installed flow meter, designed for geothermal use, which is functional and calibrated within reasonable limits for the type of meter,

(B) A properly installed weir or flume,

(C) A properly installed and calibrated orifice plate and manometer,

(D) Known volume/time calculations (including calibrated bucket and stopwatch up to 60 gallons per minute),

(E) Properly installed and used ultrasonic flow measuring devices, or

(F) Other discharge methods approved in advance by the Director.

(2) The owner may consult with the Department before selecting representative nearby wells for monitoring during the pump test. If monitoring wells are selected in absence of specific instructions from the Department, the measurement of water levels in each well shall adhere to the schedule established in OAR 690-230-085 (1) (f).

(3) The Director may require the owner of the well to have a pump test performed that is more detailed than the test requirements described in OAR 690-230-085(1)-(2). This more detailed test could include, but is not limited to, increased frequency of water level measurements, increased test duration and increased monitoring of observation wells. Such modifications will be required when possible impacts resulting from the proposed injection include, but are not limited to, thermal or hydrologic interference with existing water rights, water quality degradation or physical or mechanical failure of the well structure.

(4) For flowing artesian wells, pump test specifications shall be prescribed by the Department on a case-by-case basis.

Water Temperature Measurement

690-230-090 (1) The water well report prepared for any low-temperature geothermal well that is tested by pumping water from the well, shall include the temperature of the fluid, as measured at the discharge point at the beginning and end of a timed production test, as well as the maximum fluid temperature attained during the test. Bailing or pumping the well are acceptable methods of withdrawing water from the well during the test. Air testing is not acceptable.

(2) The well report prepared for any low-temperature geothermal well that is tested by pumping water into the well shall include the maximum temperature in the borehole and its corresponding depth.

(3) The well constructor is required to provide the temperature data on the water well report. The Director may use other temperature data in making the final determination of the bottom hole temperature.

Additional Standards for Low-Temperature Geothermal Injection Wells

690-230-100 Procedures required to inject effluent into a low-temperature geothermal injection well shall not cause failure of the well casing and/or seal materials or other components of the well structure, including but not limited to, movement, displacement or fracturing of the overburden.

Injection Plan For Wells With an Anticipated Injection Rate Not Exceeding 15,000 Gallons Per Day

690-230-110 No low-temperature geothermal injection well shall be used for injection without approval of the Director in accordance with OAR 690-210-070. The injection plan for the proposed injection of less than 15,000 gallons per day to a low-temperature geothermal injection well will consist of a water well report from both the injection and production wells. These well reports shall be sent to the Director for review. If the injection well has not yet been constructed, or if a water well report is not available from the injection or production well, acceptable data that shall be submitted as part of the injection plan include, but are not limited to, the following: geological information of the area, depth of the well(s) in question, water well reports from nearby wells, static water level data or water quality data from the well(s) in question. After review of the well reports, or other acceptable data, the Director may require water quality testing, as per OAR 690-230-115 (1)-(2), if the Director deems it necessary. The water quality testing may be required in the situations that include, but are not limited to, injection into a groundwater reservoir that is different from the producing groundwater reservoir, or when the well is of poor construction.

Injection Plan For Wells With an Anticipated Injection Rate Exceeding 15,000 Gallons Per Day

690-230-115 No low-temperature geothermal injection well shall be used for injection without approval of the Director in accordance with OAR 690-210-070. The injection plan for the proposed injection of greater than 15,000 gallons per day to a low-temperature geothermal injection well shall include, but is not limited to, the following:

(1) Details of well construction, including water well reports for the production well and the injection well,

(2) Description of the number and location of water bearing zones from both production and injection wells,

(3) Water temperature data from both the production and injection wells, and

(4) Water level data from both the production and injection wells. If information from the well report is not sufficient to determine the effects of injection, the Director may require additional geologic or hydrologic information, including but not limited to, temperature/depth logs of the wells.

(5) Water quality information including analysis by a laboratory certified by the Oregon Health Division for drinking water standards for the following parameters: arsenic, boron, calcium, carbonate or bicarbonate, chloride, fluoride, iron, magnesium, manganese, pH, potassium, silica, sodium, specific conductance, sulfate, suspended solids, total dissolved solids, and total coliform bacteria. If the low-temperature geothermal effluent is suspected to be of poor water quality or to be otherwise incompatible with the water in the receiving zone in the injection well, the Director may require additional specific water quality data. If the information on the well reports for the wells involved is not sufficient to determine the effects of injection, the Director may require additional geologic or hydrologic information, including but not limited to, temperature/ depth logs of the wells. The Director may waive the requirement for specific portions or all of the chemical analyses if the fluid quality is known to be suitable for the intended production and injection.

(6) A map indicating the location and elevation of both the production well and the injection well in accordance with OAR 690-230-045. All maps shall be drawn to a standard, even scale of not less than 4 inches = 1 mile. Small area maps may be more easily and clearly drawn to a larger scale, such as 1 inch = 400 feet. The well owner shall submit injection plans to the Director indicating proposed separation distances between production and injection wells on the parcel of land on which the production well is located, on the parcel of land on which the injection well is located, and on all adjacent parcels of land, as well as land surface elevation at each well head.

(7) Any planned safeguards to prevent substantial thermal or hydrologic interference with existing rights to appropriate groundwater and surface water and alteration of existing or potential drinking water supplies.

Processing of Applications

690-230-120 The appropriator shall make application for a water right to appropriate low-temperature geothermal fluid unless an exemption is provided for under ORS 537.545.

Exemption From Water Right Permit Application/Use of Low-Temperature Geothermal Fluid

690-230-130 (1) Low-temperature geothermal fluid appropriation for single industrial or commercial use including, but not limited to, electrical, agricultural, aquacultural, heating and/or cooling in an amount not exceeding 5,000 gallons per day shall be exempt from application for a water right as provided for under ORS 537.545.

(2) Low-temperature geothermal fluid appropriation for single or group domestic purposes including household heating and/or cooling shall be exempt from being required to apply for a water right as provided for under ORS 537.545 when the combined amount of groundwater for single or group domestic purposes, including household heating and/or cooling, does not exceed 15,000 gallons per day. Construction must comply with well construction and maintenance rules as per OAR 690-200-230.

(3) The exemptions under subsections (1) and (2) of this section apply to the use of groundwater for any such purpose to the extent that it is beneficial and constitutes a right to appropriate groundwater equal to that established by a groundwater right certificate.

Water Right Limitation for Nonstandard Effluent Disposal Systems

690-230-140 If the low temperature geothermal effluent is disposed of by way of a nonstandard low-temperature geothermal effluent disposal system, the right to appropriate the low-temperature geothermal fluid shall be inferior to all subsequent rights for beneficial consumptive use and/or to the rights of those appropriators who make use of a standard low-temperature geothermal effluent disposal system. If a nonstandard low-temperature geothermal effluent disposal system is upgraded to a standard low-temperature geothermal effluent disposal system the associated water right retains the priority date established upon initial filing.

DIVISION 235

GROUND WATER ADVISORY COMMITTEE

Ground Water Advisory Committee: Appointments, Terms, and Qualifications

690-235-005(1) There is created the Ground Water Advisory Committee consisting of five members appointed by the Director: two of whom shall be individuals from the well industry, two of whom shall be ground water geologists or hydrologists, and one of whom shall represent the public-at-large. Members shall be citizens of the United States and residents of Oregon.

(2) Each member shall be appointed for a term of four years from the date of the expiration of the term for which the predecessor was appointed, except when a vacancy occurs before the expiration of a term shall be filled by appointment for the remainder of the unexpired term only.

(3) Members shall be appointed from different geographical areas, and shall receive neither compensation nor expenses in the performance of their duties as a member.

(4) Officers of Committee: the Committee shall select one of its members as Chairman and another as Vice-chairman. Maximum terms of officers shall be two years for each position.

(5) Meetings of the Committee: the Committee shall meet at least once every three months at locations specified by the Director.

Ground Water Advisory Committee Duties

690-235-020 The Committee shall consider and advise the Director on all matters relating to:

(1) Rules for the development, use, and protection of ground water aquifers.

(2) Rules for examining and issuing of licenses for well constructors.