

OREGON ADMINISTRATIVE RULES
 WATER RESOURCES DEPARTMENT
 CHAPTER 690 DIVISION 200
 WATER SUPPLY WELL CONSTRUCTION STANDARDS

TABLE 200-1

WHICH SET OF STANDARDS APPLIES?

The Department currently regulates the construction of borings through which ground water could become contaminated. The type of boring (and its purpose) will determine which set of regulations apply. Questions often arise as to how a certain boring is to be regulated. In general, if the purpose of a boring is to seek water then it is considered a well. The table below lists common types of holes and which category they fall into. This is not a complete list of borings and there are other types of borings regulated by other agencies. Contact the Water Resources Department if there is a question as to what standard applies or what agency may need to be contacted.

The general standards and their Oregon Administrative Rule reference are:

Water Supply Wells	OAR 690-200 through 690-235
Monitoring Wells	OAR 690-240
Other Holes	OAR 690-240-0030
Geotechnical Holes	OAR 690-240-0035

Description of Boring:	Standards that Apply
Air Sparging [<i>Hole</i>] <u>Well</u>	[<i>Geotechnical Hole</i>] <u>Monitoring Well</u>
Aquifer Storage and Recovery Well	Water Supply Well
Cathodic Protection Hole	Geotechnical Hole
Community Well	Water Supply Well
Construction Hole	Other Hole
Dewatering Well	Water Supply Well
Domestic Well	Water Supply Well
Drive Point (Coring)	Geotechnical Hole
Drive Point Well (Dewatering)	Water Supply Well
Drive Point (Water Sampling)	Monitoring Well
Drive Point (Water Supply)	Water Supply Well
Dry (Disposal) Well	Other Hole
Elevator Shaft	Other Hole
Extraction Well	Monitoring Well
Gas Migration Hole	Geotechnical Hole
Geothermal Well	Water Supply Well
Gravel Pit	Other Hole
Heat Exchange Hole (Closed Loop)	Geotechnical Hole
Heat Exchange Hole (Open Loop)	Water Supply Well
Horizontal Drain (Slope Stability)	Geotechnical Hole
Horizontal Well (Monitoring)	Monitoring Well
Horizontal Well (Water Supply)	Water Supply Well
Hydrologic Data Hole	Geotechnical Hole
Inclinometer	Geotechnical Hole
Industrial Well	Water Supply Well

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Injection Well (Water)	Water Supply Well
Irrigation Well	Water Supply Well
Monitoring Well (>72 Hours)	Monitoring Well
Municipal Well	Water Supply Well
Observation Hole	Monitoring Well
Permeability Test Hole	Geotechnical Hole
Piezometer (Electric)	Geotechnical Hole
Piezometer (Pneumatic)	Geotechnical Hole
Piezometer Well	Monitoring Well
Piling Hole	Other Hole
Post Hole	Other Hole
Power Pole Hole	Other Hole
Public Supply Well	Water Supply Well
Remediation Or Recovery Well	Monitoring Well/Water Supply Well
Rock Boring (<10 Feet)	Other Hole
Rock Boring (>10 Feet)	Geotechnical Hole
Seismic Shot Hole	Geotechnical Hole
Slope Stability Hole	Geotechnical Hole
Soil Boring (<10 Feet)	Other Hole
Soil Boring (>10 Feet)	Geotechnical Hole
Soil Vapor Hole	Geotechnical Hole
Sparging [<i>Hole</i>] <u>Well</u>	[<i>Geotechnical Hole</i>] <u>Monitoring Well</u>
Storm Water Disposal	Other Hole
Sump	Other Hole (if < 10 ft. deep and > 10 ft. dia.)
Temporary Monitoring Well (<72 Hours)	Geotechnical Hole
Trench	Other Hole
Underground Storage Tank (UST) Pit	Other Hole
Vapor Extraction Hole	Geotechnical Hole
Wetland Delineation Hole	Other Hole

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OREGON ADMINISTRATIVE RULES
WATER RESOURCES DEPARTMENT
CHAPTER 690 DIVISION 210
WATER SUPPLY WELL CONSTRUCTION STANDARDS

690-210-0310

Cement Grout

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 0.075 ounce (one 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 percent (5%) by weight of dry cement. Calcium chloride may be added to a Portland cement grout to accelerate the set but shall not exceed two 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.

(5) The volume of sealing material required shall be calculated prior to seal installation. The calculated volume and actual volume used shall be reported on the water supply well report.

(Stat. Auth.: ORS 183, ORS 536, ORS 537 & ORS 540)

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OREGON ADMINISTRATIVE RULES
WATER RESOURCES DEPARTMENT
CHAPTER 690 DIVISION 210
WATER SUPPLY WELL CONSTRUCTION STANDARDS

690-210-0340

Method of Placement of Unhydrated Bentonite

(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 18 feet **below land surface**. The use of unhydrated bentonite as a [*surface*]casing seal shall not be allowed [*below 50 feet from*]**deeper than 200 feet below** 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*]**during** construction of the oversize drillhole. The **outer** temporary surface casing shall be removed **during seal installation and** before completion of the well.

(2) In the event **ground**water is [*present or*]encountered during the construction of the oversize drillhole, only **unhydrated** bentonite chips manufactured to be [*greater than 1/4*] **3/8** inch [*or*]**to 3/4 inch, pellets or** tablets shall be allowed in the [*sealing interval*]**water-filled portion of the annulus**. A maximum of [*25*]**50** feet of water may be present [*within*]**in** the sealing interval. [*Granular bentonite may be used if the annular space is dry*]**Unhydrated bentonite shall be screened across a minimum 1/4 inch mesh screen prior to being placed in the water-filled portion of the annulus to minimize the introduction of bentonite dust into the seal interval. Unhydrated bentonite shall not be used:**

(1) **In the water-filled portion of a temporary casing; or**

(2) **If there is any uphole flow in the annular seal interval.**

(3) [*Placement of bentonite shall conform to the manufacturer's specifications and result in a seal that is free of voids or bridges.*]**Unhydrated bentonite may only be used as an annular seal material below the water level in a well when the groundwater it comes in contact with does not exceed 800 parts per million (ppm) total dissolved solids (TDS).**

(a) Unhydrated bentonite may be used as an annular seal material in water supply wells exceeding 800 ppm TDS if the bentonite manufacturer provides documentation that their product can be used in water that exceeds 800 ppm TDS.

(A) Prior Department approval is required before placement.

(B) The bentonite manufacturer's documentation and Department approval shall be submitted with the Water Supply Well Report as required in OAR 690-205-0210.

(b) In all cases, the TDS shall be reported on the Water Supply Well Report as required in OAR 690-205-0210.

(c) Regardless of the reported TDS, the quality of the water in the well shall not interfere with the proper hydration of bentonite.

(4) After placement of the permanent casing, the annular space shall be filled to land surface with bentonite. The annular space shall be kept full **of bentonite to land surface** while drilling or driving casing. A

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calibrated sounding [*or tamping tool*]**tape with weight** shall be used **continuously** in the sealing interval during [*pouring*]**bentonite placement** to measure fill rate and to **check for and** break up possible bridges, [*or cake formations. Care shall be taken to minimize the introduction of bentonite dust into the sealing interval.*]

(5) **Placement of bentonite shall conform to the manufacturer's specifications and result in a seal that is free of voids or bridges. Care shall be taken to minimize the introduction of bentonite dust into the sealing interval.** [*Pour rate shall be three minutes or slower per 50 pound sack in the water-filled portion of the annulus.*]

(6) **The volume of sealing material required shall be calculated prior to seal installation. The calculated volume and actual volume used shall be reported on the water supply well report.**

(7) **Unhydrated bentonite chip, pellet or tablet annular seals shall be hydrated from land surface with potable water prior to removing the drilling machine from the well site. The hydration shall begin once all of the bentonite annular seal material has been placed and shall end when the annular seal interval refuses to take more water or after at least one annular space volume of water has been placed.**

(8) **Granular bentonite may only be used as an annular seal material in a dry annular space above the interval where water was first encountered. Granular bentonite shall not be screened or hydrated during placement.**

(9) **Pour rate shall be two minutes or slower per 50 pound sack in the water-filled portion of the annulus.**

(Stat. Auth: ORS 536.090 & ORS 537.505 – ORS 537.795)

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OREGON ADMINISTRATIVE RULES
WATER RESOURCES DEPARTMENT
CHAPTER 690 DIVISION 215
ALTERATION, DEEPENING, MAINTENANCE AND REPAIR OF WATER
SUPPLY WELLS

690-215-0045

Deepening of Wells

(1) [The static water level shall be recorded prior to and after deepening a well. Both readings shall be recorded on the well log.] **Only the following wells may be deepened without an approved special standard:**

(A) Wells with well reports that describe the original construction. The original well report must be:

(a) Referenced on the deepening well report; or

(b) Attached to the deepening well report.

(B) Wells that are recased and resealed to meet the current minimum well construction standards.

(2) [The deepening of a water supply well shall not result in the commingling of aquifers.] **The static water level shall be measured prior to and after deepening any well. Both readings shall be recorded on the well log.**

(3) If the deepening of an existing well results in access to a new aquifer then prior to completion of deepening work all previous aquifers, including previous aquifers that have gone dry or are low-producing, shall be cased and sealed off using the methods described in OAR 690-210.

(4) The deepening of a water supply well shall not result in the commingling of aquifers.

(Stat. Auth: ORS 183, ORS 536, ORS 537 & ORS 540)

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OREGON ADMINISTRATIVE RULES
 WATER RESOURCES DEPARTMENT
 CHAPTER 690 DIVISION 240
 MONITORING WELL, GEOTECHNICAL HOLE AND OTHER HOLE
 CONSTRUCTION STANDARDS

TABLE 240-1

CONSTRUCTIONS STANDARDS THAT APPLY

The Department regulates the construction of borings through which ground water may [be] become contaminated. The type of boring (and its purpose) will determine the construction standards that apply. The table below lists common types of holes and the standards that apply. This is not a complete list of borings and there are other types of borings regulated by other agencies. Contact the Water Resources Department if you have any questions.

The construction standards and the Oregon Administrative Rule that apply are as follows:

- | | |
|--|---------------------------------------|
| 1. Water Supply Wells | OAR 690-200 through 690-235 |
| 2. Monitoring Wells, Geotechnical Holes
and other Holes | OAR 690-240 through 690-240-0640 |
| Other Holes | OAR 690-240-0030 |
| Geotechnical Holes | OAR 690-240-0035 through 690-240-0049 |

Type of Boring	Construction Standards that Apply
Air Sparging [Hole] <u>Well</u>	[Geotechnical Holes] <u>Monitoring Wells</u>
Aquifer Storage and Recovery Well	Water Supply Wells
Cathodic Protection Hole	Geotechnical Holes
Community Well	Water Supply Wells
Construction Hole	Other Holes
Dewatering Well	Water Supply Wells
Domestic Well	Water Supply Wells
Drive Point (Core holes)	Geotechnical Holes
Drive Point Well (Dewatering)	Water Supply Wells
Drive Point (Water Sampling)	Monitoring Wells
Drive Point (Water Supply)	Water Supply Wells
Dry (Disposal) Well	Other Holes
Elevator Shaft	Other Holes
Extraction Well	Monitoring Wells
Gas Migration Hole	Geotechnical Holes
Geothermal Well	Water Supply Wells
Gravel Pit	Other Holes
Ground Source Heat Pump Borings (Closed Loop)	Geotechnical Holes
Ground Source Heat Pump Borings (Open Loop)	Water Supply Wells
Horizontal Drain (Slope Stability)	Geotechnical Holes

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Horizontal Well (Monitoring)	Monitoring Wells
Horizontal Well (Water Supply)	Water Supply Wells
Hydrologic Data Hole	Geotechnical Holes
Inclinometer	Geotechnical Holes
Industrial Well	Water Supply Wells
Injection Well (Water)	Water Supply Wells
Irrigation Well	Water Supply Wells
Monitoring Well (>72 Hours)	Monitoring Wells
Municipal Well	Water Supply Wells
Observation Hole	Monitoring Wells

Permeability Test Hole	Geotechnical Holes
Piezometer (Electric)	Geotechnical Holes
Piezometer (Pneumatic)	Geotechnical Holes
Piezometer Well	Monitoring Wells
Piling Hole	Other Holes
Post Hole	Other Holes
Power Pole Hole	Other Holes
Public Supply Well	Water Supply Wells
Remediation Or Recovery Well	Monitoring Well/Water Supply Wells
Rock Boring (<10 Feet)	Other Holes
Rock Boring (>10 Feet)	Geotechnical Holes
Seismic Shot Hole	Geotechnical Holes
Slope Stability Hole	Geotechnical Holes
Soil Boring (<10 Feet)(geophysical borings)	Other Holes
Soil Boring (>10 Feet)(geophysical borings)	Geotechnical Holes
Soil Vapor Hole	Geotechnical Holes
Sparging [Hole] <u>Well</u>	[Geotechnical Holes] Monitoring Wells
Storm Water Disposal	Other Holes
Sump	Other Holes (if < 10 ft. deep and > 10 ft. dia.)
Temporary Monitoring Well (<72 Hours)	Geotechnical Holes
Trench	Other Holes
Underground Storage Tank (Ust) Pit	Other Holes
Vapor Extraction Hole	Geotechnical Holes
Wetland Delineation Hole	Other Holes

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OREGON ADMINISTRATIVE RULES
WATER RESOURCES DEPARTMENT
CHAPTER 690 DIVISION 240
MONITORING WELL, GEOTECHNICAL HOLE AND OTHER HOLE
CONSTRUCTION STANDARDS

690-240-0035

Geotechnical Holes: General Performance and Responsibility Requirements

(1) A geotechnical hole is defined in OAR 690-240-0010(36). Geotechnical holes, cased or uncased, are generally constructed to evaluate subsurface data or information (geologic, hydrogeologic, chemical, or other physical characteristics). Geotechnical holes are divided into the following classifications:

- (a) Temporary (abandoned within 72 hours) geotechnical holes;
- (b) Cased permanent geotechnical holes;
- (c) Uncased permanent geotechnical holes; or
- (d) Slope stability geotechnical holes.

(2) A geotechnical hole report shall be signed by a professional and must be submitted to the department if the geotechnical hole is:

- (a) Greater than 18 feet deep;
- (b) Within 50 feet of a water supply or monitoring well;
- (c) Used to make a determination of water quality; or
- (d) Constructed in an area of known or reasonably suspected contamination.

(3) Geotechnical holes between ten and eighteen feet in depth that do not meet any of the criteria spelled out in OAR 690-240-0035(2) do not require a geotechnical hole report to be filed with the Department, but shall be required to have a professional as described in OAR 690-240-0035(4)(c) be responsible for the construction and abandonment of the geotechnical hole.

(4)(a) Although enforcement actions may be exercised against other parties, the landowner of the property where the geotechnical hole is constructed is ultimately responsible for the condition, use, maintenance, and abandonment of the geotechnical hole;

(b) Conversion of a geotechnical hole to a water supply or monitoring well shall be considered by the Department on a case by case basis;

(c) When a geotechnical hole report is required, or if it is between 10' and 18' in depth, the professional responsible for the construction, alteration or abandonment of a geotechnical hole shall have one of the following certifications or licenses at the time the professional signs the geotechnical hole report:

- (A) A valid Oregon Monitoring Well Constructor's License;
- (B) A valid Oregon Water Supply Well Constructor's License;
- (C) Valid certification by the State of Oregon as a Registered Geologist; or
- (D) Valid certification by the State of Oregon as a Professional Engineer.

(d) The professional shall provide proof of license, certification or registration and photo identification to Department employees upon request.

(e) In order to protect the ground water resource, all geotechnical holes shall be constructed, operated, used, maintained, and abandoned in such a manner as to prevent contamination or waste of ground water, or loss of artesian pressure.

(f) If the geotechnical hole is completed above ground, it shall have a minimum casing height of one foot above finished grade and a lockable cap with lock shall be attached to the top of the casing. If a geotechnical hole, except a slope stability hole, is completed flush with the land surface, a lockable watertight cap with lock, shall be attached to the top of the casing. A vault or monument designed to be watertight, level with the ground surface, shall be installed to prevent the inflow of surface water. The cover must be designed to withstand the maximum expected loadings.

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- (5)(a) A 'Geotechnical Hole Report' shall be prepared for each geotechnical hole, including unsuccessful geotechnical holes, constructed, altered, converted, or abandoned if the hole meets any of the requirements of OAR 690-240-0035(2) above.
- (b) The 'Geotechnical Hole Report' shall be filed with the Department within 30 days of the completion of the geotechnical hole;
- (c) The report shall be prepared in triplicate on forms furnished or previously approved in writing by the Water Resources Department. The original shall be furnished to the Director, the first copy shall be retained by the professional, and the second copy shall be given to the landowner or customer who contracted for the construction of the geotechnical hole;
- (d) In the event any drilling equipment or other tools are left in a geotechnical hole the professional shall enter this fact on the Geotechnical Hole Report;
- (e) A copy of any special authorizations or special standards issued by the Director shall be attached to the Geotechnical Hole Report. See OAR 690-240-0006 for information concerning special standards;
- (f) The report of geotechnical hole construction shall include, as a minimum, the following:
- (A) Landowner name and address;
 - (B) Started/Completed date;
 - (C) Location of the geotechnical hole by County, Township, Range, Section, tax lot number, if assigned, street address, or nearest address, and either the 1/4, 1/4 section or Latitude and Longitude as established by a global positioning system (GPS);
 - (D) Use of geotechnical hole;
 - (E) Type of geotechnical hole;
 - (F) Depth;
 - (G) Map showing location of geotechnical hole on site must be attached and shall include an approximate scale and a north arrow;
 - (H) General hydrologic and geologic information as indicated on the Geotechnical Hole Report; and
 - (I) Such additional information as required by the Department.
- (6) Temporary geotechnical holes:
- (a) Temporary geotechnical holes include but are not limited to: drive points, soil and rock borings, temporary sample holes, permeability test holes, and soil vapor holes;
 - (b) Temporary geotechnical holes shall be abandoned within 72 hours of initial construction;
 - (c) Any temporary casing that has been installed shall be removed as part of the abandonment.
- (7) Cased permanent geotechnical holes:
- (a) Cased permanent geotechnical holes include but are not limited to: gas migration holes, cathodic protection holes[,] **and** vapor extraction holes[, and air sparging holes];
 - (b) If permanent casing is installed in a geotechnical hole, it shall meet the casing requirements in OAR 690-240-0430, 690-210-0210, or 690-210-0190 and the sealing requirements in 690-240-0475.
- (8) Uncased permanent geotechnical holes:
- (a) Uncased permanent geotechnical holes include but are not limited to: pneumatic and electrical piezometers;
 - (b) Temporary casing can be used during the construction of the uncased permanent geotechnical hole but must be removed prior to completion. Surface casing (5 feet maximum) may be installed for placement of logging or recording equipment.
- (9) Slope stability geotechnical holes.
- (a) Slope stability geotechnical holes include but are not limited to: slope instrumentation holes such as slope inclinometers, and slope remedial holes.
 - (b) Slope stability geotechnical holes are defined in OAR 690-240-0010(7[2]**4**). Such holes shall be constructed, operated, used, maintained, and abandoned in such a manner as to prevent contamination or waste of ground water.
 - (c) When a Geotechnical Hole Report is required under OAR 690-240-0035(2) for a slope stability geotechnical hole that is constructed to facilitate water level measurements, an affidavit from an engineer or geologist qualified to perform geotechnical investigations shall be attached to the Geotechnical Hole Report. The affidavit shall have the qualified engineer or geologist's stamp on it and shall certify that the slope stability geotechnical hole is on a landslide or a mass-wasting feature.
- (10) Geotechnical Holes abandonment:

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- (a) Geotechnical holes shall be abandoned so that they do not:
- (A) Connect water bearing zones or aquifers;
 - (B) Allow water to move vertically with any greater facility than in the undisturbed condition prior to construction of the geotechnical hole; or
 - (C) Allow surface water to enter the hole.
- (b) Temporary geotechnical holes constructed to collect a water quality sample shall be abandoned in accordance with OAR 690-240-0510.

(Stat. Auth: ORS 537.780)

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OREGON ADMINISTRATIVE RULES
WATER RESOURCES DEPARTMENT
CHAPTER 690 DIVISION 240
MONITORING WELL, GEOTECHNICAL HOLE AND OTHER HOLE
CONSTRUCTION STANDARDS

690-240-0046

Grouting of Uncased Boring

(1) Grouting of an uncased boring shall be completed after the heat exchange loop is installed. The boring shall be completed in a manner to allow ease in locating including but not limited to the use of marking or locating magnetic tape if maintenance or abandonment is necessary. The area near land surface where the ground source heat pump boring will be connected to a manifold or to the closed loop system may be filled with earth materials.

(2) Sealing shall be completed using active solids content bentonite grout slurry (minimum 20% active solids by weight) or high solids fluid mixture of cement. Controlled density fill (CDF), fly ash, drill cuttings or drilling fluids shall not be used in grouting the uncased boring.

(3) Mixes of bentonite or cement slurry shall be installed by pumping through a grout pipe in a continuous operation from the bottom of the boring upward. The grout pipe shall extend the full depth of the borehole before pumping begins. Minimum slurry volume used shall be equal to or exceed the calculated annulus volume in the borehole. Grouting material shall surround all pipes remaining in the borehole.

(4) The quality of the water in the boring shall not interfere with the proper hydration of bentonite.

Stat. Auth.: Stats. Implemented: Hist. WRD 1-2012, f. & cert. ef. 2-2-2012

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