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

APPENDIX **210-**3

I. Recommended Methods of Placement of Cement Grout (OAR 690-210-0320)

Method A - The well bore shall be plugged with a drillable plug or bridge at the lowest point to be sealed. A well casing with a float shoe at its lower end shall be placed in the well and suspended slightly above the point of bearing. A grout pipe shall be run inside the casing to the check valve. The grout pipe shall be connected to a suitable pump and water or drilling fluid shall first be circulated to clear the annular space. Grout shall be pumped through the grout pipe until clean grout completely fills the interval to be sealed. The grout pipe shall then be removed and the cement allowed to set. (See Figure 210-**1**[5])

Method B - Grout shall be placed by pumping or air pressure injection through a grout pipe installed inside the casing from the casing head to a point five (5) feet above the bottom of the casing. The grout pipe shall extend through an airtight sealed cap on the head of the well casing. The casing head shall be equipped with a relief valve and the grout pipe shall be equipped at the top with a valve permitting injection. The lower end of the grout pipe and the casing shall be open. Clean water shall be injected down the grout pipe until it returns through the casing head's relief valve. The relief valve is then closed and injection of water is continued to clean the hole until it flows from the bore hole outside the casing that is to be grouted in place. Without significant interruption, grout shall be substituted to water and, in a continuous manner, injected down the grout pipe until it returns to the surface outside of the casing. A small amount of water may be used to flush the grout pipe, but the pressure should remain constant on the inside of the grout pipe and the inside of the casing until the grout has set. Pressure shall be maintained for at least twenty-four (24) hours, or until such time as a sample of the grout indicates a satisfactory set. Cement grout shall be used for this procedure with a minimum annular space of one (1) inch completely surrounding the casing. (See Figure 210-**1**[5])

Method C - The well bore shall be plugged with a drillable **plug**[packer] or bridge at the lowest point to be sealed. The well casing shall be firmly seated at the bottom of the drillhole. A grout pipe shall be run to the bottom of the hole through the annular space between the casing and the well bore. After water or any other drilling fluid has been circulated in the annular space sufficiently to clear obstructions, the grout pipe shall be connected to a suitable pump and grout shall be pumped through the grout pipe until clean grout is circulated to land surface, or until grout completely fills the interval to be sealed. The lower end of the grout pipe shall remain submerged in grout while grout is being placed. The grout pipe shall be withdrawn before the initial set of the grout. (See Figure 210-**1**[5])

Method D - The well bore shall be plugged with a drillable **plug**[packer] or bridge at the lowest point to be sealed. After the casing is run and landed, a casing plug, having a length greater **than**[that] the diameter of the casing, shall be placed in the casing. If the drillhole is free of mud or water, this lower separation plug may be eliminated. A measured amount of cement grout necessary to completely fill the annular space of the interval to be grouted is pumped or placed by bailer in the casing. A second casing plug, having a length greater that the diameter of

the casing, shall be placed in the casing above the grout. The casing shall then be capped with a pressure cap and shut-off valve, and shall be connected to a suitable pump. The casing shall then be raised far enough above the point of bearing to clear the first separation plug. Water or drilling mud shall then be pumped under pressure into the casing forcing the grout and upper casing plug down the casing. The position of the plug must be known at all times. A small amount of grout may remain in the lower end of the casing. When the plug reaches the point desired above the bottom of the casing, the pump shall be stopped and the casing seated. (See Figure 210-**1**[5])

Method E - The well bore shall be plugged with a drillable **plug**[packer] or bridge at the lowest point to be sealed. A sufficient amount of cement grout to completely fill the interval of the well to be sealed shall be placed at the bottom of the drillhole by pump bailer or grout pipe. The well casing shall have centering guides attached at appropriate intervals to keep the casing centered in the bore hole. The bottom of the well casing shall be fitted with a tight drillable plug and shall be lowered into the drillhole forcing the grout upward into the annular space. Gravity installation without the aid of a grout pipe shall not be used. In no instance shall this method be used deeper than thirty (30) feet and in no case for a municipal, community, or public water supply well. (See Figure 210-**1**[5])

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OAR 690-210-0030

(1)(h) Within 500 feet of a hazardous waste storage, disposal or treatment facility without written permission of the Director[.]**; or**

OAR 690-210-0030(1)(i) Within 25 feet of an underground or aboveground petroleum storage tank that is used for residential purposes; or

OAR 690-210-0030(1)(j) Within 50 feet of an underground or aboveground petroleum storage tank that is used for commercial purposes.

(5) To enable drilling equipment future access to the water supply well for alteration, repair, or abandonment, the property owner should maintain a minimum twenty-foot separation distance between the well and any power pole.

([5]**6**) Additional **Oregon Health Authority** setback standards [may]apply to wells used for public water systems. See OAR 333-061-0050(2) or contact the Oregon Health Authority for more information.

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690-210-0140

Sealing of Water Supply Wells in Unconsolidated Formations with Significant Clay Beds

Water supply wells drilled into water-bearing [strata]**intervals** 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 feet into [a]**the** clay **interval**[or other impermeable stratum] overlying the water-bearing zone. In all cases, an upper oversize drillhole, at least four 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 **interval**[or other impermeable stratum] is 13 feet or less below land surface, the watertight, nonperforated well casing and the upper, oversize drillhole shall extend to a minimum depth of 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, 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**[full of] grout in accordance with OAR 690-210-0310 through 690-210-0360 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 210-3).

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690-210-0150

Sealing of Water Supply Wells in Consolidated Formations

(1) Water supply wells drilled into a water-bearing rock formation overlain by clay, silt, sand, gravel, **cobbles**, or similar materials, shall be constructed in accordance with one of the following methods:

(a) Method 1 (Continuous Seal):

(A) An upper **oversize** drillhole, **at least** four 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 feet into solid, [uncreviced]**unfractured**, consolidated rock overlying the water-bearing rock formation below a depth of 13 feet. Unperforated permanent well casing shall extend to this same depth.

(B) The annular space between the **permanent well** casing and the drillhole wall within the **consolidated** rock formation shall be filled with grout **using an approved grout placement method**.

(C) The upper annular space between the **permanent well** casing and the drillhole wall shall be filled **with grout using an approved grout placement method** from land surface to at least five feet into a[n impermeable] clay **interval**[stratum] below a depth of 13 feet.

(D) The annular space between the upper and lower sealing intervals shall be filled with[an impermeable sealing material] **grout using an approved grout placement method**.

(E) [If necessary to complete the well, a]**A** smaller diameter [well casing,]liner pipe[,] or well screen may be installed **to complete the well**.

(F) If cement grout is placed by a suitable method from the bottom of the **permanent well** casing to land surface (Methods A, B, D, Appendix 210-3), the upper drillhole shall be at least two inches larger than the nominal diameter of the **permanent well** casing. (See Figure 210-4);

(b) Method 2 (Step-Down Casing**/Inner Casing**):

(A) An upper **oversize** drillhole, **at least** four inches greater in diameter than the **upper** permanent well casing to be installed, shall extend from land surface to at least five feet into a[n impermeable] clay **interval**[stratum] below a depth of 13 feet.

(B) Unperforated, permanent well casing shall extend to, and be driven into, solid, [uncreviced]**unfractured**, consolidated rock overlying the water-[ ]bearing rock formation.

(C) A lower drillhole, [equal in diameter to the]**at least as large as the** inside diameter of the upper permanent well casing, shall be constructed at least five feet into solid [uncreviced]**unfractured consolidated** rock overlying the water-bearing **rock** formation.

(D) A smaller diameter **steel well** casing, at least two inches smaller in diameter than the diameter of the upper permanent well casing, shall extend at least five feet into[the] **solid unfractured consolidated rock overlying the water-bearing rock formation** [lower drillhole] and at least eight feet into the upper permanent well casing.

(E) The annular space between the upper oversize drillhole and the **upper** permanent well casing, and the annular space between the smaller diameter lower **permanent well** casing and the lower drillhole, shall be completely filled with grout **using an approved grout placement method**[in accordance with OAR 690-210-0310 through 690-210-0360] after the **upper** permanent well casing and the lower **permanent well** casing are set into final position. (See Figure 210-5);

(c) Method 3 (Under-Reaming):

(A) An upper **oversize** drillhole, **at least** four inches greater in diameter than the permanent well casing to be installed, shall extend from land surface to at least five feet into a[n impermeable] clay **interval** [stratum]below a depth of 13 feet.

(B) A lower drillhole, at least two inches greater in diameter than the diameter of the permanent well casing **to be installed**, shall be constructed at least **fifteen**[five] feet into solid, [uncreviced]**unfractured**, consolidated rock **overlying the water-bearing rock formation** by under-reaming methods.

(C) Unperforated, permanent well casing shall extend to and be driven into solid, [uncreviced]**unfractured**, consolidated rock **overlying the water-bearing rock formation** at the bottom of the under-reamed section following placement of the [sealing]**casing seal** material.

(D) The annular space between the upper oversize drillhole and the [upper]permanent well casing shall be filled with cement grout using Method C or **unhydrated** bentonite. 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 **grout placement**[the appropriate] Method A, B, or D, in Appendix 210-3.

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(E) Casing seals may not be placed in unconsolidated formation materials using the under-reaming method.

(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.

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690-210-0155

Additional Standards for Artesian Water Supply Wells

(1) Water supply wells penetrating into an artesian aquifer shall have an upper oversize drillhole **at least** four inches greater in diameter than the nominal diameter of the permanent well casing **to be installed**. Watertight unperforated casing shall extend and be sealed at least five feet into the confining **interval**[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 method from the bottom of the casing (Methods A, B, [and]**or** D, in Appendix 210-3 and Figure 210-1), the diameter of the upper **oversize** drillhole shall be at least two inches larger than the nominal diameter of the **permanent well** casing.

(2) To complete the well, [smaller diameter]**inner** casing, [perforated]liner, or a well screen may be installed. When artesian pressures are encountered in the absence of a confining **interval**[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 **interval**[formation], set forth in section (1) of this rule.

(3) If an artesian water supply well flows at land surface, the well shall be equipped with a control valve and a watertight mechanical cap, threaded or welded, 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 dead- end line. A petcock valve shall be placed between the gauge and well casing. (See Figure 210-7).

(5) All flowing artesian water supply 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.

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690-210-0280

Access Ports**, Dedicated Measuring Tubes** and Airlines

(1) Water supply wells without installed pumps:

(a) All water supply wells **without installed pumps, including wells that have been temporarily removed from service, temporarily abandoned due to a recess in construction, or temporarily abandoned before commencing service, shall be properly covered and** shall be equipped with a usable access port with a minimum diameter of 1/2**-[**]inch for the purpose of determining the water level in the well at any time.

(b) Access ports shall be installed prior to the Water Supply Well Constructor removing the well drilling machine from the well site.

(2) Water supply wells with installed pumps:

(a) Dedicated measuring tubes **that meet the requirements of OAR 690-215-0060 shall**[are recommended to] be installed on all **water supply** wells at the time of pump installation**, pump repair, or pump replacement**.

(b)[Where required,] **D[**d]edicated measuring tubes shall be a minimum of 3/4-inch **diameter** schedule 40 PVC **and shall** extend[ing] to the top of the pump (See [Dedicated Measuring Tube Diagram and Specifications in] Figure 200-5).

(c) The 3/4-inch diameter dedicated measuring tube may be reduced in size to 1/2-inch where it goes through the watertight well cap, but shall not be reduced in size over the length of the pipe.

(d) An airline is not a substitute for a required dedicated measuring tube and, if installed, must enter the well in a location other than the access port.

(3) Access ports, dedicated measuring tubes or airlines **on all water supply wells** shall**:**

(a) [b]**B**e capped and be a minimum of twelve inches above finished ground surface or pumphouse floor (See Figure 210-12) (See Figure 200-5)[.]**; and**

(b) [The access port, airlines and dedicated measuring tube**s** on all water supply wells required by OAR 690-210-0280 shall b]**B**e maintained in a condition that will prevent

contamination of the ground[ ]water **resource[**, and shall remain unobstructed and be maintained by the landowner so that the water level can be determined at any time.]**; and**

(c) Remain free from wire or other obstruction and be maintained by the landowner so that the water level can be determined at any time.

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Language to be added is bolded and underlined.