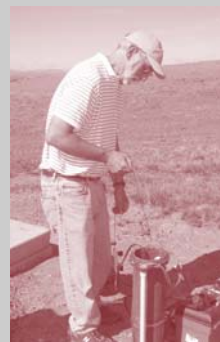


WATER WELL OWNER'S HANDBOOK

A Guide to Water Wells in Oregon



Oregon
Water Resources
Department

March 2010

Why Should You Read This Booklet?

Groundwater is an important water source for homes, farms, industries, and businesses. This booklet provides general information about groundwater, water wells, well construction, protection of groundwater, well operation and maintenance, and well abandonment in Oregon.

This information is valuable for individuals who own, wish to construct, or plan to abandon a water well in Oregon. It may also be helpful to people selling or buying property where wells are located or needed to meet water-supply needs. This information may not be applicable for all situations and is subject to change.



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The Department recognizes the Ground Water Advisory Committee for their review and contributions to this publication.

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Common Well and Groundwater Terms

ACCESS PORT: A minimum ½” opening in the upper portion of a water supply well to permit unobstructed entry to determine the water level in the well at any time. Access ports must capped or plugged when not being used to prevent surface water or contaminants from entering the well casing.

AQUIFER: A water-bearing body of naturally occurring earth materials that is sufficiently permeable to yield usable quantities of water to wells and/or springs.

ARTESIAN AQUIFER: A confined aquifer in which groundwater is under sufficient head to rise above the level at which it was first encountered, whether or not the water flows at land surface. If the water level stands above land surface the well is a flowing artesian water supply well.

BENEFICIAL USE: The reasonably efficient use of water without waste for a purpose consistent with the laws, rules, and the best interests of the people of the state.

CASING: Pipe or conduit installed in the borehole to support the sides of the well and prevent caving. Casing is used, in conjunction with proper seal placement, to protect the well from contamination and waste of groundwater.

CASING SEAL: A water tight seal established between the casing and borehole wall to prevent the inflow and movement of surface water or shallow groundwater into the aquifer. A well seal is also used to prevent the outflow and waste of water under artesian pressure.

COMMINGLING: Occurs when a well draws water from more than one aquifer. Commingling of aquifers is not permitted by Oregon well construction standards.

LINER PIPE: An inner pipe or conduit installed inside the casing or borehole below the casing to protect against caving and provide protection of the pump.

MEASURING TUBE: A dedicated minimum ¾-inch PVC tube inserted into a well to provide access for the collection of water level measurements.

PERFORATIONS: Openings in the casing or liner, which allow water to enter the well.

PUMP: A device that mechanically moves water from the well to the surface.

STATIC WATER LEVEL: The stabilized level or elevation of water surface in a well not being pumped, commonly expressed as depth to water from land surface.

TOP TERMINAL HEIGHT: The top of the casing. Oregon well construction standards require that the top terminal height be at a minimum of 12 inches above the finished ground surface or pumphouse floor.

WATER TABLE: The upper water surface of an unconfined aquifer.

WELL: Any artificial opening or artificially altered natural opening, however made, by which groundwater is sought, flows under natural pressure, or is artificially withdrawn or injected.

WELL DEVELOPMENT: Involves vigorously pumping or purging the well to clean out drill cuttings and maximize water production. Development is used to reduce or eliminate clay, silt, or sand in the production water.

WELL IDENTIFICATION NUMBER: A preprinted stainless steel numbered label attached to the well casing. This unique number is assigned to only one well and will be used to track any future modifications to the well.

WELL LOG or WATER SUPPLY WELL REPORT: A report provided by the well constructor that describes the physical construction of the well, geologic materials, and the water encountered. These terms are interchangeable.

WELL YIELD TEST: A test made to determine the rate the well produces water. The static water level, date, type of well test, and length of the test period are recorded on the well log. A one-hour minimum well test is required when the work is completed on new wells. (also referred to as pump or flow test)

Handy Web links:

Oregon Water Resources Dept:

<http://www.wrd.state.or.us/>

Dept of Human Services Drinking Water Program:

<http://www.oregon.gov/DHS/ph/dwp/index.shtml>

Oregon Dept of Environmental Quality:

<http://www.deq.state.or.us/WQ/groundwater/agencies.htm>

Oregon Dept of Geology and Mineral Industries:

<http://www.oregon.gov/DOGAMI/>

US Geological Survey:

<http://water.usgs.gov/ogw/>

American Groundwater Trust:

<http://www.agwt.org/gwinfo.htm>

National Groundwater Association; Well Owner

<http://wellowner2.org/2009/>

Water Systems Council:

<http://www.watersystemscouncil.org/>

Basic Groundwater and Water Well Information

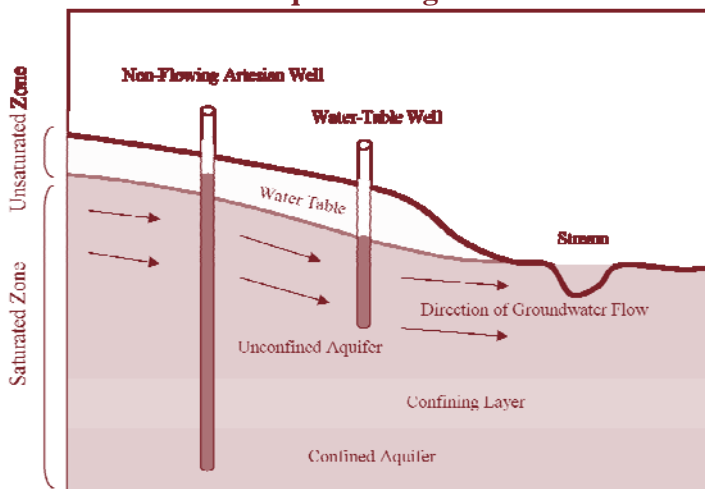
What is Groundwater?

Groundwater is water in the subsurface that fills the pore spaces between sands and gravel or fractures in rock formations. In many areas it is a source of water supply for municipal, agriculture, commercial, industrial and domestic uses. The simplified diagram below illustrates how rainfall infiltrates through the unsaturated soils to recharge the upper *aquifer* (the geologic materials that store and transmit groundwater). In this example, the upper aquifer is considered *unconfined* because there is no layer above that restricts the rise and fall of the *water table* (the upper surface of the saturated zone). The water table will rise and fall in response to many influences, but commonly in response to the addition of water (recharge) and the removal of water (discharge) from the aquifer.

The lower aquifer in the diagram is considered *confined* because it is bounded by geologic materials that restrict groundwater movement, identified in the diagram as the *confining layer*. This aquifer is under pressure, referred to as *artesian pressure*, as indicated by the rise in water level above the confining layer in a well which develops water from the confined aquifer.

Groundwater flows from recharge areas (generally around uplands) to discharge areas (generally in the lowlands) to streams, lakes and springs). The flow path that groundwater takes from recharge area to discharge area may be very localized or can extend for many miles.

Aquifer Diagram



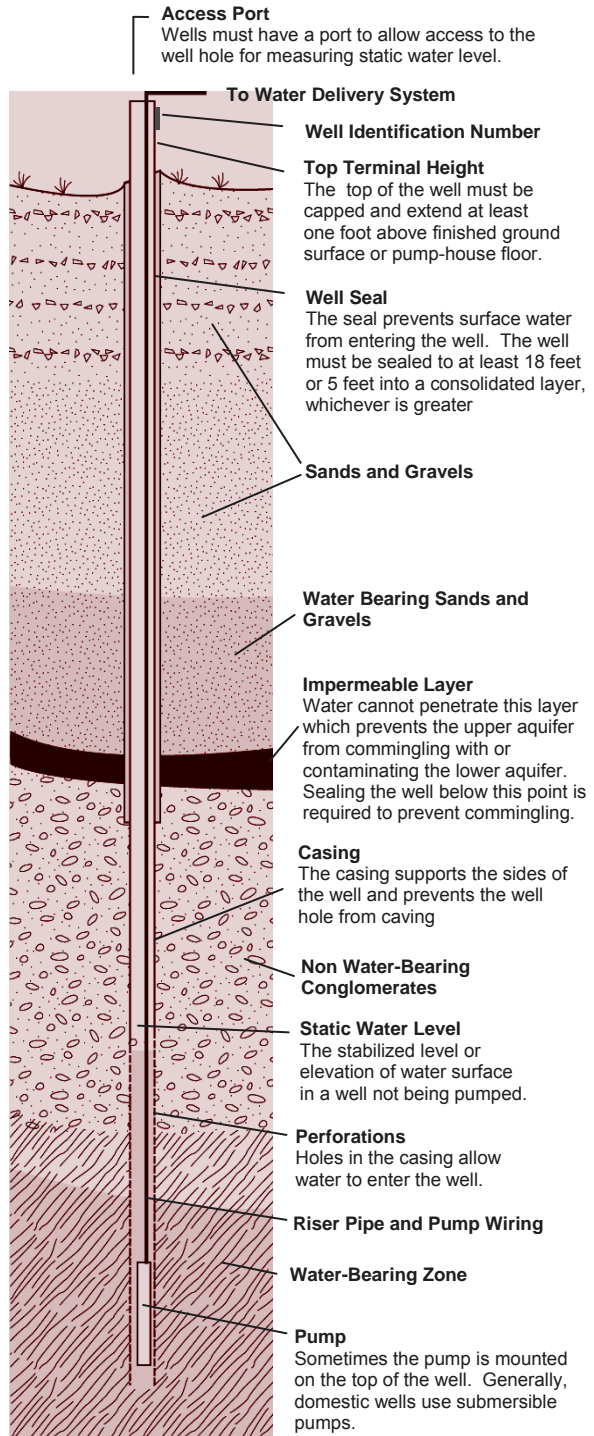
This diagram shows a typical aquifer system.

Common definitions relating to groundwater and wells are located in the front of this booklet.

What is a Water Well?

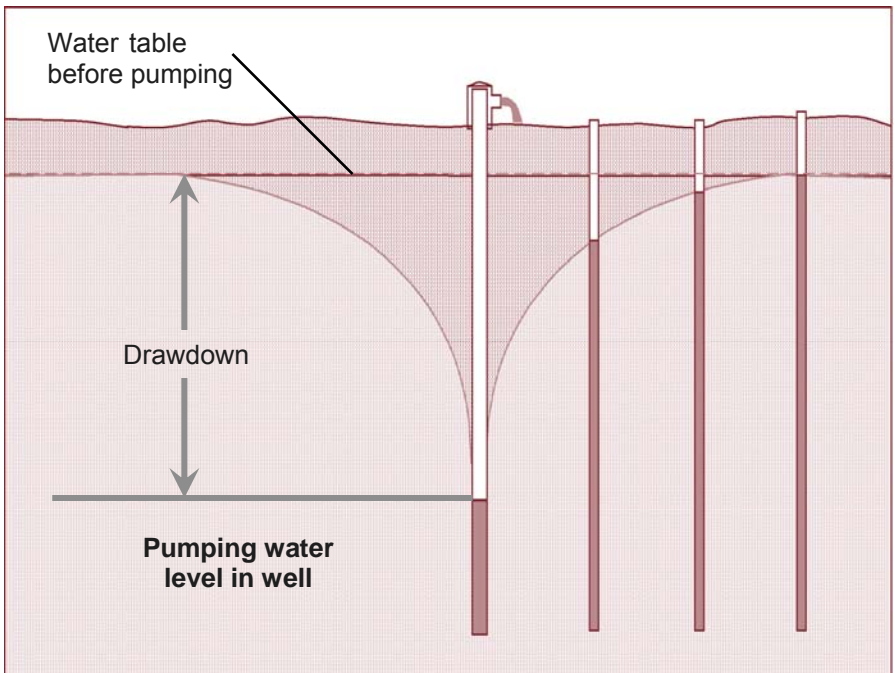
A well is a hole that is drilled, bored, or dug into the ground to reach water. It is usually held open by a pipe, well casing, or a liner. A pump is used to bring water to the surface of the land for use.

Water wells located in unconfined aquifers are known as water-table wells. The water level in these wells is the same as the water level in the surrounding aquifer. Water wells located in confined aquifers are known as artesian wells. Pressure causes the water level to rise in the well to an elevation higher than the water level in the surrounding aquifer. Sometimes this water may be under enough pressure to flow out of the top of the well casing. This type of well is called a flowing artesian well.



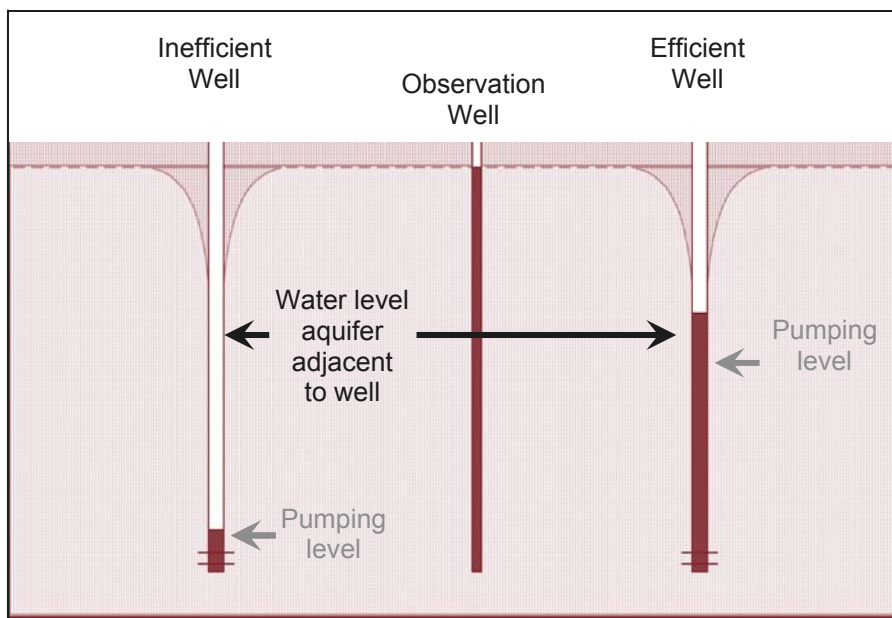
How Does a Well Work?

Wells are designed to be open to the aquifer; that is, water is free to move into the well from the aquifer. When completely at rest, the water level in a well and the groundwater level in the aquifer outside the well are equivalent. When a pump in a well is turned on, the water level in the borehole drops in response to the extraction of water from the well, setting up a pressure gradient between the well (low pressure) and aquifer outside the well (higher pressure). This gradient promotes water flow from the aquifer into the well from all directions to replace water being extracted. This circular depression, centered at the well, is referred to as the *cone of depression*. As water continues to be pumped from the well (and the aquifer) the cone of depression will expand over time and may eventually intersect other wells, thus reducing the water levels in those boreholes. The hydraulic influence of one well upon another is referred to as *hydraulic interference*, and in severe cases may prevent a well user getting their customary quantity of water.



Well Efficiency

Water wells must be constructed to allow water to easily flow into the borehole from the aquifer. If not, supply problems may occur when the pump is turned on and the water level drops sharply to meet pump demand (imagine the difficulty of drawing water through a straw that is plugged). If the water level drops to the pump intake, well production will be severely reduced. This scenario also commonly arises in wells as they age and the pathway for water flow into the borehole is reduced by build up of mineral deposits, siltation or bacterial growth. Many ground-water supply complaints that are suspected to be caused by hydraulic interference between neighboring wells are, upon investigation, found to be reduced yields owing to a diminishment in well efficiency. Wells naturally decline in efficiency over time and periodic maintenance can help maintain well yield and prolong the life of the well. A very important piece of information to know about your well is *what is the pumping level in your well after a specified period of pumping at a known rate?* Knowing this will help determine whether your well is in need of rehabilitation. This and other tips are provided in a later section titled Well Maintenance. Contact a Licensed Water Well Constructor for more information on well maintenance and rehabilitation.



Estimating Your Groundwater Needs

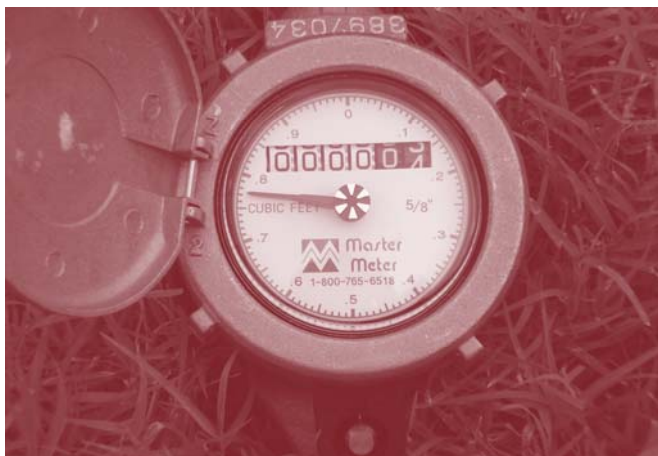
The U.S. Geological Survey estimates that in-house use averages 80 to 100 gallons of water per day for each person. The largest household use is flushing toilets followed by showers and baths. Daily use per person can drop dramatically, by installing water saving devices.

A well producing $\frac{1}{2}$ gallon per minute will yield 720 gallons of water per day and supply the inside water needs of most households. However, this low yield may not be adequate during periods of peak water demand.

There are several ways to manage water systems with low yield wells to stretch a limited supply.

- Conservation - Install water savings appliances. (See tips on page 26)
- Spread use over time - Examples include taking only one shower at a time or delaying some uses such as laundry or dishwashing to times when demand is low.
- Storage - Add a storage tank that can be filled at times of low use.

A water meter is used to measure how much water is being pumped. This information is valuable to better understand and manage water use. Domestic size well meters are available for less than \$300.



Water Rights and Exempt Uses

Under Oregon law, all water including groundwater is publicly owned. With some exceptions, water users must obtain a permit or water right from the Oregon Water Resources Department (OWRD) to use a well. Some uses, referred to as “exempt uses”, are exempt from the water right permitting process. Exempt uses carry the same rights and responsibilities as a certificated water right:

- Have a priority date as indicated on the well log
- Water must be used beneficially and without waste
- Exempt uses are subject to curtailment during periods of shortages in order to protect a senior right.

Following are some common uses exempted from the water right permitting process:

- Single or group domestic purposes up to 15,000 gallons per day;
- Stock watering;
- Watering any lawn or non-commercial garden not exceeding ½ acre in area;
- Down-hole heat exchangers;
- Any single industrial or commercial development up to 5,000 gallons per day.

Exempted uses are on a per-property or per-development basis. Adding additional wells does not increase an exempt limitation. (For example, adding a second well does not increase the irrigation exemption to more than ½ acre)

Recording an Exempt Use Well

Landowners of property on which a well is drilled for an exempt use purpose are required to provide OWRD, within 30 days after well construction completion, a map locating the well and an exempt use recording fee. The fee is used to evaluate groundwater supplies, conduct groundwater studies, carry out groundwater monitoring, and process groundwater data. For more information about exempt use wells please call 503-986-0861.

Obtaining Water Rights

If you plan to use more water than the exempt limit allows or for a use that is not exempt, a water right permit is required before beginning construction of any proposed well. To apply for a new water right permit, an application is filed with OWRD that includes a map of the proposed well location and place of proposed water use. The application is reviewed to insure the use doesn't interfere with existing water rights or stream flow. Application forms, information, and a list of Certified Water Right Examiners to assist

with the application process, are available on the OWRD website at www.wrd.state.or.us. If you have questions or need assistance, contact your Watermaster. (see page 29 for contact information) In addition, some Oregon counties may require land use permits for certain developments. Contact your county government for their development requirements.

The Oregon Water Resources Commission is responsible for managing the groundwater resource. In many areas, high demand on the groundwater supply has required that new uses be restricted or prohibited to protect existing water rights. This includes exempt uses in some areas. Before making any expenditure on a planned well, you should consult OWRD to confirm that your proposed use of water is allowed by Oregon water law.

Water Well Construction

Oregon Well Construction Standards

Oregon well construction standards are designed to protect groundwater and the public by preventing contamination, waste, and loss of artesian pressure in the aquifer. Oregon well construction standards, Oregon Administrative Rule 690-200 through 690-240, may be found on the OWRD website at www.wrd.state.or.us.

In some cases, it may not be possible to construct or abandon a well in a manner that meets the minimum construction standards. When the minimum construction standards cannot be met, the person responsible for drilling, altering, or abandoning the well must make application and receive approval for a “special standard” from OWRD before completing the work. While a special standard allows deviation from the minimum well construction standards, the alternate construction method must provide equal or better protection to the groundwater resource.

Landowners may be required to repair or abandon wells that are not constructed to standards. OWRD will look first to the well constructor to determine if the well was constructed properly, however if the constructor is unable or unwilling to perform the repairs, the landowner is ultimately responsible.

Planning Your Well

The amount and quality of groundwater in an area can depend on yearly rainfall, geologic conditions, topography, distance to nearby wells, and

surface water supply. OWRD maintains an online database of well logs that can be used to research information about wells in your area. You can also learn about the quantity and quality of well water in your area from water well constructors familiar with your area and neighbors with wells. Well constructors can help you estimate well depth, yield, and cost.

Selecting a Well Contractor

Make sure you choose a water well constructor who is licensed and bonded in Oregon to construct water wells. Names of licensed constructors are available on the OWRD website, www.wrd.state.or.us under the *Groundwater* link. The well log database can be used to find water well constructors that have drilled in your area and have knowledge about the types of rock encountered during drilling, well yields and well construction requirements.

Landowners in your area that have had wells drilled are often good sources for recommendations of reliable well contractors.

Questions to Ask a Well Contractor

- Do you have a valid Oregon Water Well Constructor's license and bond?
- How long have you been in business and constructing wells?
- Have you constructed wells in this area?
- Are there any known water quality issues in the area?
- Do you have references that you can provide?
- Will there be a written agreement or contract?
- Does it cover the work to be performed?
- Does it include details and costs of well construction?

Well Construction Checklist

This checklist will help ensure there is agreement between you and the well constructor about work to be done. All of the items below should be addressed.

- Mobilization cost;
- Hole diameter, changes in diameter with depth;
- Casing material and diameter, cost per foot;
- Who will identify location of drainfields, septic tanks, and other sources of contamination;
- Drive shoe, if necessary;

- Approximate depth of well. Set limits based on geology and individual needs; and cost per foot;
- Liner pipe, if necessary; and cost per foot;
- Sealing method; interval and costs;
- Well development – method and duration of well development to maximize yield, and completion criteria (for example, sand-free or mud-free water), drawdown; and recovery time;
- Well testing – method and duration of flow test, rate of flow, drawdown and recovery measurements;
- Static water level – method of measurement, when taken;
- Intake diameter, perforated casing material, or screens;
- Well disinfection;
- Additional costs if the well is a flowing artesian well;
- Abandonment procedures and costs if the well is unusable;
- Pump and installation costs (if the constructor provides this service);
- Guarantee of materials and labor;
- Start and completion dates;
- Well identification number (label);
- Type of sanitary seal (well cap);
- Start card fee and recording requirements.

Selecting a Site for Your Well

Before deciding where to drill your well, work with your water well constructor to review the following information:

- Oregon well construction standards require a minimum distance of 50 feet from septic tanks, closed sewage, or storm drainage systems and 100 feet from sewage disposal areas, such as drain fields. See OAR 690-210-0030 for all placement requirements.
- Wells should be located at least five feet from buildings to allow equipment access for maintenance, repair, testing, re-drilling, or pump work.
- Avoid building a permanent structure over a well that would restrict access by equipment used for maintenance or repair.

- Maintain access to and room for maneuvering around your well for pump trucks and drill rigs necessary for repair or maintenance.
- Run surface drainage away from the well on all sides; divert up-slope drainage away from hillside wells using berms or trenches.
- Locate the well above (higher in grade) disposal areas if possible.
- Site your well away from neighboring wells to reduce the possibility of hydraulic interference.
- Do not locate a well in an area prone to flooding, or take extra measures to protect the well head.
- Site your well far from neighboring wells to reduce the possibility of hydraulic interference.
- Site wells a safe distance from property line, to avoid difficulties with neighboring septic systems or boundary line inaccuracies.
- Anyone digging on private property or public right of way is required to call the Oregon Utility Notification Center two business days prior to digging. 1-800-332-2344 or 811
www.callbeforeyoudig.org

Drilling your Own Water Well

A water well is much more than just a hole in the ground. To prevent groundwater contamination, waste, and loss of artesian pressure a well must be constructed using proper methods, materials and equipment. Licensed and bonded Water Well Constructors have the equipment, knowledge, and experience required for proper well construction. For this reason, OWRD discourages landowners from constructing their own well. If you decide to construct, alter, deepen or abandon a water well by yourself on your own property you must:

- Obtain a Landowner's Water Well Permit from OWRD. You must submit an application, a \$25 application fee, and a properly executed \$5,000 landowner's bond.
- Construct, alter, deepen or abandon the well according to groundwater law and the general standards for construction and maintenance of water supply wells in Oregon.

An application for a Landowner's Water Well Permit, a bond form, and a copy of current state well construction standards and regulations is available from the OWRD website at www.wrd.state.or.us.

Well Abandonment

Unused wells that are not properly abandoned provide avenues for movement of contamination, waste, or loss of artesian pressure. Ultimately, landowners can be held responsible for harm to the groundwater resource resulting from old or unused wells. Oregon's well abandonment standards are designed to prevent contamination of the well or aquifer by surface and subsurface leakage which may carry harmful chemicals or bacteria. The standards also seek to prevent physical injury, waste of water and loss of artesian pressure. OWRD has minimum standards that describe the acceptable methods for two types of well abandonment.

Temporary Abandonment — A well is considered temporarily abandoned when it is taken out of service. Owners of temporarily abandoned wells intend to bring the well back into service at a future date. Temporarily abandoned wells must be covered by a watertight cap or seal which prevents any materials from entering the well and maintain an access port.

Permanent Abandonment — A well is considered permanently abandoned when it is completely filled so that movement of water within the well is permanently stopped. With the exception of dug wells, a permanent abandonment must be performed by a licensed Water Well Constructor, or the landowner under a Landowner's Water Well Permit. Dug well abandonments require approval by OWRD before the abandonment is started.

The appropriate permanent abandonment method will depend on information obtained from an examination of the well log and an onsite investigation of the well. Generally, a drilled well with steel or plastic casing will be abandoned by either removing or ripping the casing and filling the borehole with cement from the bottom of the hole up. Bentonite may be used in the abandonment process but certain restrictions apply (see OAR 690-220-0115 for details). Any pump, wiring, or debris in the well must be removed before the abandonment material is placed.

Water Well Documentation

Well Identification Number

The Well Identification (ID) Number (also called a “well tag” or “well label”) is a unique number that links a well with a paper record. All wells drilled, deepened, converted or altered after 1996 are required to be labeled with a Well ID Number. For wells without a Well ID Number, the owner of the property is required to obtain one at the time of property transfer. The Well ID Number is used to track modifications to the well over time. A Well ID Number may be obtained at no cost by completing an “Application for Well ID Number”. The application is available on the OWRD website at www.wrd.state.or.us or by calling 503-986-0854.

The well label should be permanently affixed to the casing in an easily visible location. A large stainless steel hose clamp band available at many hardware stores is ideal for attaching. Only one well label is needed to be placed on each well. Well labels should not be removed from the well.



Water Supply Well Report

Water Supply Well Reports (also referred to as well logs or well reports) are prepared by a Water Well Constructor and describe how the well was constructed. Well logs are to be provided to the person who contracted for the construction of the well and to OWRD. Upon receiving the well log, take the time to review the information on it. Make sure the location information is correct and that the well ID number on the well report matches the number on the well tag. Verify that the construction information is as discussed with the well constructor. Maintain the well records in a safe, accessible place.

OWRD has copies of well logs for most water wells drilled in Oregon since 1955. They are available from the OWRD website at:
www.wrd.state.or.us.

How to Read a Water Supply Well Report

The well report contains important “as built” information on the dimensions and materials used and encountered in the construction of the well. This information is important to pump installers or others that may work on the well or evaluate the condition of the well in the future. Well reports have numbered sections detailing different aspects of the well documentation. The section numbers have varied somewhat over the years, but the main categories have largely remained the same.

All well reports received at OWRD are stamped or otherwise identified by a well log number placed at the top of the well report. The number is a combination of the first four letters of the county the well was drilled in and a six-digit number. For example, a well report for a well drilled in Deschutes County will have a number resembling DESC 012345. As this number is generated by OWRD it will not appear on “customer copy” well reports received directly from the well constructor.

At the top right of the well report are three spaces to document 1) the well label (see previous section on Well Identification Number), 2) the number of the Start Card submitted to OWRD prior to well construction, and 3) the well log number of the original well report, only if this well report is for a deepening, alteration or abandonment of that well.

STATE OF OREGON
WATER SUPPLY WELL REPORT
(as required by ORS 537.765)

WELL I.D. # L _____

START CARD # _____

Instructions for completing this report are on the last page of this form.

(1) LAND OWNER _____ Well Number _____
Name _____
Address _____
City _____ State _____ Zip _____

(2) TYPE OF WORK ☒ New Well
☐ Deepening ☐ Alteration (repair/recondition) ☐ Abandonment ☐ Conversion

(3) DRILL METHOD
☒ Rotary Air ☐ Rotary Mud ☐ Cable ☐ Auger ☐ Cable Mud
☐ Other _____

(4) PROPOSED USE
☒ Domestic ☐ Community ☐ Industrial ☐ Irrigation
☐ Thermal ☐ Injection ☐ Livestock ☐ Other _____

(5) BORE HOLE CONSTRUCTION Special Construction: ☐ Yes ☒ No
Depth of Completed Well 47.5 ft.
Explosives used: ☐ Yes ☒ No Type _____ Amount _____

BORE HOLE				SEAL			
Diameter	From	To	Material	From	To	Sacks or Pounds	
10"	0	22'	Bentonite	0	22'	12 sacks	
8"	22'	47.5					

How was seal placed: Method ☐ A ☐ B ☐ C ☐ D ☐ E
☒ Other Bentonite placed dry
Backfill placed from _____ ft. to _____ ft. Material _____
Gravel placed from _____ ft. to _____ ft. Size of gravel _____

(6) CASING/LINER

Diameter	From	To	Gauge	Steel	Plastic	Welded	Threaded
Casing: 8"	41'	46'	250	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Liner: _____

Drive Shoe used ☒ Inside ☐ Outside ☐ None
Final location of shoe(s) 46'

(7) PERFORATIONS/SCREENS

From	To	Slot Size	Number	Diameter	Tele/pipe size	Casing	Liner
						<input type="checkbox"/>	<input type="checkbox"/>

(8) WELL TESTS: Minimum testing time is 1 hour
☒ Pump ☐ Bailor ☐ Air ☐ Flowing Artesian

Yield gal/min	Drawdown	Drill stem at	Time
20	4'		1 hr.

Temperature of water 54 +/- Depth Artesian Flow Found _____
Was a water analysis done? ☐ Yes ☐ By whom _____
Did any strata contain water not suitable for intended use? ☐ Too little
☐ Salty ☐ Muddy ☐ Odor ☐ Colored ☐ Other _____
Depth of strata: _____

(9) LOCATION OF WELL (legal description)
County _____
Tax Lot _____ Lot _____
Township _____ N or S Range _____ E or W WM
Section _____ NE 1/4 NE 1/4
Lat _____ " or _____ (degrees or decimal)
Long _____ " or _____ (degrees or decimal)
Street Address of Well (or nearest address) _____

(10) STATIC WATER LEVEL
22' ft. below land surface. Date 06/20/2005
_____ ft. below land surface. Date _____
Artesian pressure _____ lb. per square inch. Date _____

(11) WATER BEARING ZONES
Depth at which water was first found 23'

From	To	Estimated Flow Rate	SWL
23'	47'	20	22

(12) WELL LOG

Material	From	To	SWL
Top soil	0	2	
Brown clay	2	15	
Brown sand and gravel	15	32	
Reddish brown sand and gravel	32	47	22
Blue clay	47	47.5	

Date Started _____ Completed _____

(unbonded) Water Well Constructor Certification
I certify that the work I performed on the construction, deepening, alteration, or abandonment of this well is in compliance with Oregon water supply well construction standards. Materials used and information reported above are true to the best of my knowledge and belief.
WWC Number _____ Date _____
Signed _____

(bonded) Water Well Constructor Certification
I accept responsibility for the construction, deepening, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon water supply well construction standards. This report is true to the best of my knowledge and belief.
WWC Number _____ Date _____
Signed _____

(1) Landowner: Identifies the owner or company that contracted for the construction of the well. The address is the owner or company address and not necessarily the address of the well. This section may also include the owner's well name or identification.

(2) Type of Work: This information describes whether the well is new construction or an alteration, conversion, deepening or abandonment of an existing well. Newer well reports require additional information on the existing materials and depth of the well prior to alteration.

(3) Drill Method: Identifies the type of drilling method used in the construction of the well.

(4) Proposed Use: This field identifies the intended water use of the well.

(5) Bore Hole Construction: Describes the completed depth of the well and whether a Special Standard for construction was received from OWRD prior to completion. This section also describes the diameter of the well borehole and the materials used and where they were placed during construction to seal the well from unintended water movement and contamination. Typical seal materials used are cement and bentonite (a swelling clay material). The method used to place the seal materials is documented here, and whether any backfill materials (such as concrete or gravel) or a filter pack was used (a uniform sand or gravel placed to prevent sediment from entering a well).

(5a) Abandonment Using Unhydrated Bentonite: In the event a well is permanently abandoned using unhydrated bentonite, the water well constructor provides both the calculated amount of bentonite necessary, based upon the construction of the well to be abandoned, and the actual amount of bentonite used.

(6) Casing/Liner: Casing and liner serve to hold the formation open to maintain an open, vertical borehole and as protective housing in the well for the down-hole pump equipment. As the diameter and type of casing and/or liner used may change in the construction of a well, this section is where the well constructor documents the materials used.

(7) Perforations: Casings and liners may be perforated to allow water to flow from the formation into the well, or a screen may be placed in the well to do the same. This section identifies where the screens or perforations are placed.

(8) Well Tests: This section documents how the yield of a well was determined. Air tests have become the most common method reported on well reports. For most wells, a pump test of several hours duration will provide the best measure of a well's performance. This section on the Well Report also provides the well constructor the place to document the temperature of the water and any water quality concerns.

(9) Location Of Well: Here the well constructor provides the county the well was drilled in and describes the location by public land survey (Township, Range, Section, quarter section and quarter-quarter section, tax lot). In addition to the street (or nearest) address of the well, a well constructor may provide a location of the well by latitude and longitude. The initials DMS and DD stand for Degrees Minutes Seconds and Decimal Degrees, which indicates which units (DMS or DD) the latitude and longitude are provided in.

(10) Static Water Level: A static water level (SWL) is a very important piece of information on a well report. It represents the water level in the well after the well has recovered from construction and testing. It is important the well be given ample opportunity to come to rest before a measurement is taken and reported. The measurement reported is generally in feet of water, either below or above a measuring point, such as the top of casing. Measurements above land surface indicate flowing artesian conditions and the water level is often accompanied with a (+) sign in front of it (+10.5 would mean 10.5 feet above land surface). Artesian pressure may be expressed as pounds per square inch (PSI). For a well alteration, including well deepening, a measurement of SWL is required prior to work and after work is complete. In this section a well constructor also records the depth that water was first found and the depth of each water bearing zone along with its estimated flow rate.

(11) Water Bearing Zones: This section notes the depth below land surface where water was first encountered. In the table, the depth and thickness of each water bearing zone is listed including the driller's estimated flow rate and the static water level for each zone.

(12) Well Log: Here the well constructor provides the ground elevation of the site, if known, and the depths of the various geologic materials encountered during the drilling process. At the bottom of this section is the date well construction was started and completed.

Purchasing and Installing a Pump

Well pumps are sold by pump contractors, some water well constructors, plumbing-supply dealers, and various retail outlets. The well log provides information on well diameter, depth, yield, and water level drawdown during the required well test. Using this information a pump can be selected that best matches well production and water needs. In addition, the delivery system should be sized to deliver the volume of water pumped with minimal friction loss. When installing a pump OWRD recommends using a professional pump installer who can match pump size, well production, delivery system, and water needs to most efficiently withdraw groundwater from your well.

Selecting a pump with a capacity greater than the well yield can cause problems, such as muddy or sandy water, pump failure, or even well failure.

Water Well Maintenance

Water wells provide direct access to a groundwater supply commonly shared by many. Wells must be maintained in a manner that do not contribute to contamination or waste of groundwater. The landowner has responsibility for maintenance of their well. If well construction problems are discovered that may contribute to contamination or waste of groundwater, the landowner may be required to repair or abandon the well to eliminate the problem. OWRD will look first to the well constructor to determine if the well was constructed to standards. However, if the constructor is unable or unwilling to perform the repairs, the landowner is ultimately responsible.

Well Cap - Periodically check the sanitary seal/well cap on top of the well casing to ensure it is tight fitting and in good repair. If the well cap is vented make sure the vent is screened and free of debris.

Well Casing - Minimum well construction standards require sound casing a minimum 1-foot above land surface to prevent overland flow of water from entering the well. See that the casing is not damaged or compromised in any way and that the casing remains above land surface (special standards may be approved for an engineered below-ground vault).

Well Shelter - If your well is contained within a shelter or pumphouse, do not store poisons, pesticides, petroleum products, or other hazardous materials in the shelter or near your well. Do not use it to shelter animals.

Well Performance and Rehabilitation

Well performance will deteriorate over time as the well experiences a buildup of mineral deposits or bacterial growth, or is filled in with formation materials. If the water needs are small on a high-producing well then the decline in performance may go unnoticed. If a well is low-yielding then even small reductions in well performance may be noticeable. To determine loss of performance it is necessary to have a baseline of information. A pump test is commonly conducted to determine a flow rate of the well over a specified period. In conducting these tests it is important to measure the pumping level in the well during the test. This is the measure of well performance. As well performance diminishes, drawdown during pumping will increase. Periodically measuring well performance and recording the data will assist in future decisions on well maintenance and rehabilitation.

Checklist for well performance:

- What is the static water level in the well prior to use?
- What is the pumping rate after a specified period of pumping (a four-hour test, for example)?

- What is the pumping level after a specified period of pumping?
- Is the water sample clear and free from sand and silt?
- How rapidly does the water level recover after pumping?

Rehabilitating a well's performance may require the well to be cleaned out and surged, or have the screen or perforations cleaned. Contact a water well constructor or pump installer to determine whether your well would benefit from rehabilitation. Well rehabilitation is usually a less expensive alternative to deepening or replacing a well.

Water Quality Testing

Testing for water quality requires very specific sampling protocols. An accredited water testing laboratory can provide information on proper sampling procedures. The EPA recommends that well water be tested annually for nitrates/nitrites and coliform bacteria. Other contaminants, such as arsenic, should be tested on a less frequent or as-needed basis. Contact a local water testing laboratory for the types and costs of water quality analysis available. It is important to remember that the presence of a contaminant is not always a threat to health or a serious nuisance. Discuss your results with a certified laboratory or local health department. The Oregon Department of Human Services - Drinking Water Program lists Oregon accredited labs at:
www.oregon.gov/DHS/ph/orelap/docs/acclab.pdf.

Disinfecting Your Well

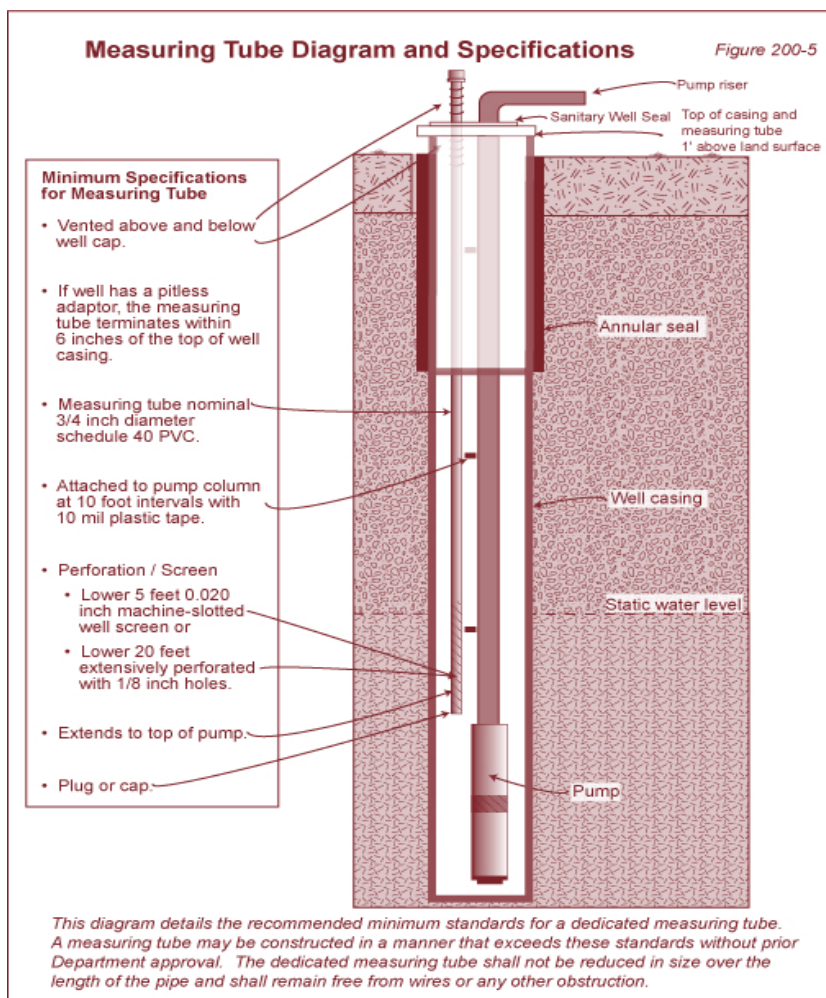
It may be necessary to disinfect your well and water supply lines if your water tested positive for coliform bacteria (the presence of coliform is an indicator of bacteriological contamination of the water). Follow-up testing is necessary to determine whether the disinfection treatment was successful. The repeated presence of coliform bacteria in water samples may indicate a local source of bacteria combined with poor or improper well construction that allows contaminated water into the well (always make sure that proper sampling protocols were used in water sampling). Contact a licensed and bonded water well constructor for assistance in evaluating if well construction is allowing the contamination. To learn how to properly disinfect your well, please review the Oregon Department of Human Services—Drinking Water Program instructions at: www.oregon.gov/DHS/ph/dwp/docs/notices/WellDisinfection.pdf.

Water Management

Installing a Measuring Tube - A measuring tube in your well will make groundwater level measurements easier to collect by preventing the meter wire from hanging up. A measuring tube is a slotted minimum 3/4-inch PVC pipe permanently installed on the pump column and is used to insert a probe to measure the groundwater level. Tubes are required in some areas of Oregon to be installed at the time of pump placement.

www1.wrd.state.or.us/pdfs/DIV_20200.pdf

Contact a local pump installer to have a dedicated measuring tube installed in your well.



Water Level Measurement

Keep a permanent record of the depth to water from a reference point such as the top of the well casing. These measurements can provide an early warning of groundwater supply problems. It is recommended that the water level in the well be measured and recorded at least twice a year. Measurements should be made on approximately the same dates each year, usually in the spring and fall. Let the well rest without pumping for several hours before measuring. If you have any questions about how to do this, ask your well constructor or pump installer. A groundwater level measurement log is located at the back of this handbook.

Water Use Measurement

A totalizing flow meter will provide information on the rate water is being pumped and the total volume of water used over time. A flow meter is a valuable tool to quantify how much water is actually being used and better manage use. (see page 9)

Sharing a Water Well

If you plan to construct a well to serve more than one household, a carefully drawn agreement should be negotiated. Generally, legal advice is sought for such an important document between water users and well owners. The agreement should address these questions:

- Who will maintain the well?
- Who may access the well for maintenance?
- Under what conditions can the property on which the well is located be bought and sold?
- How will power costs and water availability be shared?
- What is each party's interest or right to use the water?
- If the properties are to be served by individual pumps, whose pump will be lowermost in the well?
- What type of organization will manage operation of the well now and in the future?
- How will costs of well reconstruction or pump replacement be shared?
- How will the 1/2 acre of irrigation for lawn and garden watering exempt from a water right permit be divided among the parties?

The Oregon Department of Human Services Drinking Water Program has water quality testing requirements on wells serving more than 3 households. More information is available at:

<http://www.oregon.gov/DHS/ph/dwp/index.shtml>

Water Conservation Tips

- Water conservation saves money each month by lowering pumping costs and over the long term by extending the life of the pump and septic systems.
- Maintain water conveyance system to prevent leaks. If the pump cycles on and off when water isn't being used, you likely have a leak.
- Install water-saving devices (front-loading washing machines, low flow showerheads, low-flow toilets, water efficient dishwasher).
- Check for and fix leaky faucets inside and outside your home. One drop per second wastes 2,700 gallons of water per year.
- Do not run water continuously while brushing teeth, washing hands or shaving.
- Run full loads of dishes and laundry.
- Reduce water use in your lawn or garden during periods of rainfall. Rain sensors on compatible automatic watering systems will do this automatically.
- Use low-flow outdoor irrigation devices such as drip irrigation systems.
- Landscape with low-water need or native plants.
- Allow lawns to go dormant during dry periods.
- Limit car washing and use a shutoff nozzle on the hose when you do. Wash your car on the lawn (with biodegradable soap) to allow infiltration into the ground.
- Divert runoff from roofs, sidewalks, and driveways into rain gardens or yard areas to recharge groundwater supplies.
- Install a rainwater harvesting system to store surplus rain water from roofs for outside watering.

Additional water conservation information is available at:

http://www.wrd.state.or.us/OWRD/Water_Conversation.shtml

Domestic Well Testing for Real Estate Transactions

Oregon Revised Statutes 448.271(1) requires the seller of real estate containing a well that supplies water for domestic purposes to have the well tested for arsenic, nitrates, and total coliform bacteria and report the results to the Oregon Department of Human Services Drinking Water Program.

Additional information is available at:

<http://oregon.gov/DHS/ph/dwp/index.shtml>

Tips when purchasing property with a well:

Conduct a well yield test- A well yield test is not required during real estate transactions, however having one conducted can provide current information on sustained well yield up to the pump capacity. The yield reported on a well log may not be accurate, especially on older wells. Sellers and buyers should not rely exclusively on well report information.

Make a taste and smell test - Water that passes a water quality test may still not be palatable. Although water treatment systems are available to address these concerns, there can be significant cost to purchasing and maintaining these systems.

Water Well Records

It is a good idea to keep your well records, including a copy of your well log, pump information, water quality, and flow testing information in one safe place. This water well file should include:

- Copy of the well construction contract and receipt;
- Pump installation or maintenance receipts or information;
- Well maintenance receipts or information;
- Copy of the Well Log (Water Supply Well Report);
- Water quality test results;
- Water level measurements collected.

The Water Well Maintenance Log on pages 30 and 31 will help you keep track of maintenance and repairs, groundwater quality tests, and groundwater level measurements in one convenient location.

Oregon Water Resources Department Contact Information

Oregon Water Resources Department

725 Summer Street NE, Suite A

Salem, Oregon 97301-1266

Phone: 503-986-0900 Fax: 503-986-0902

Exempt Use Well Recording Information

Phone: 503-986-0861

Regional Well Inspectors

Northwest Region Well Inspector

725 Summer St NE, Suite A

Salem, Oregon 97301-1266

Water Wells - Phone: 503-986-0895 Fax: 503-986-0903

Monitoring Wells - Phone: 503-986-0802 Fax: 503-986-0903

Southwest Region Well Inspector

942 SW 6th St, Suite E

Grants Pass, Oregon 97526

Phone: 541-471-2886 x228 Fax: 541-471-2876

South Central Region Well Inspector

1128 NW Harriman St

Bend, Oregon 97701

Phone: 541-388-6669 Fax: 541-388-5101

North Central Region Well Inspector

116 SE Dorian Ave

Pendleton, Oregon 97801

Phone: 541-278-5456 Fax: 541-278-0287

Eastern Region Well Inspector

Baker County Courthouse

1995 3rd Street, Suite 180

Baker City, Oregon 97814

Phone: 541-523-8224 Fax: 866-214-3493

District Watermasters

District 1, Tillamook
503-842-2413 x119
Fax: 503-842-2722

District 9, Vale
541-473-5130
Fax: 541-473-5522

District 15, Roseburg
541-440-4255
Fax: 541-440-6264

District 2, Springfield
541-682-3620
Fax: 541-746-1861

District 10, Burns
541-573-2591
Fax: 541-573-8387

District 16, Salem
503-986-0893
Fax: 503-986-0903

District 3, The Dalles
541-298-4110
Fax: 541-298-2459

District 11, Bend
541-388-6669
Fax: 541-388-5101

District 17,
Klamath Falls
541-883-4182 x223
Fax: 541-885-3324

District 4, Canyon City
541-575-0119
Fax: 541-575-2248

District 12, Lakeview
541-947-6038
Fax: 541-947-6063

District 18, Hillsboro
503-846-4881
Fax: 503-846-4887

District 5, Pendleton
541-278-5456
Fax: 541-278-0287

District 13, Medford
541-774-6880
Fax: 541-774-6187

District 19, Coquille
541-396-3121 x253
Fax: 541-396-6233

District 6, La Grande
541-963-1031
Fax: 541-963-9637

District 14, Grants Pass
541-471-2886 x222
Fax: 541-471-2876

District 20, Oregon City
503-722-1410
Fax: 503-722-5926

District 8, Baker City
541-523-8224
Fax: 541-523-

District 21, Condon
541-384-4207
Fax: 541-384-2167

Water Well Maintenance Log

Well Information		
Water Well Report No.	Well Identification No.	Date of Construction
Company Name or Name of Well Constructor		

Pump Installation and Maintenance				
Date	Company Name or Pump Installer	Pump Depth	Water Level	Work Performed

Well Maintenance and Repair			
Date	Company Name or Well Contractor	Water Level	Type of Maintenance or Repair Performed

Groundwater Quality Test Results		
Date	Name of Certified Lab	Test Results

Groundwater Level Measurements				
Description of Measuring Point				
Date	Water Level Below Land Surface	Well Status	Pump Idle Time	Measured By



**State of Oregon
Water Resources Department**
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