Water Well
Owner's Handbook
A guide to water wells in Oregon

Oregon Water Resources Department
725 Summer St. NE, Suite A
Salem, OR 97301

Oregon Health Authority
PUBLIC HEALTH

Why you should read this booklet

Groundwater is an important water source for homes, farms, industries and businesses in Oregon. This booklet provides general information about:

- Groundwater
- Water wells
- Well construction
- Protection of groundwater
- Well operation and maintenance
- Safe drinking water supply
- Water well abandonment
- Oregon rules and statutes on water wells

This information is valuable if you own, wish to construct or plan to abandon a water well in Oregon. It may also be helpful to people renting, selling or buying property where wells are or will be located to meet water supply needs. This information may not apply to all situations and may change. *Wells used for a public water system have different standards. Contact Oregon Drinking Water Services for information.*

Oregon Health Authority
PUBLIC HEALTH

The Water Resources Department recognizes the Oregon Health Authority's Domestic Well Safety Program and Drinking Water Services, and the Groundwater Advisory Committee (GWAC) who contributed to and reviewed this publication.

For questions on well water **quantity** or well construction requirements, please contact:

Oregon Water Resources Department
725 Summer Street NE, Suite A
Salem, OR 97301-1266
503-986-0900
www.wrd.state.or.us

For questions on water **quality** or wells used to serve a public water system, please contact:

Oregon Drinking Water Services
800 NE Oregon St, Suite 640
Portland, OR 97232-2162
971-673-0405
www.healthoregon.org/dwp

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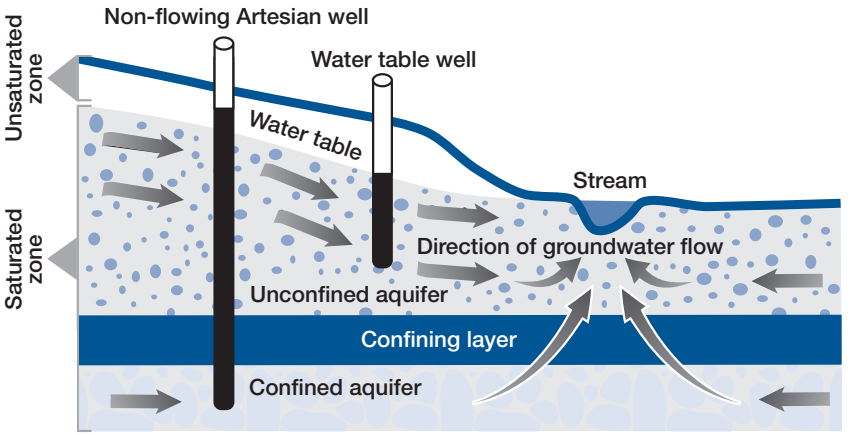
Basic groundwater and water well information

What is groundwater?

Groundwater is water that fills the pore spaces between sands, gravel or fractures in rock formations in the ground. It is a source of water supply for public, agriculture, commercial, industrial and domestic uses. Groundwater quality can vary based on geology, climate and land use.

Aquifer diagram



This diagram shows a typical aquifer system. Common definitions of groundwater and well terms are included in the back of this booklet.

The diagram above shows how rainfall gets through unsaturated soils to recharge the upper aquifer (the geologic materials that store and release 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 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, known as artesian pressure, as indicated by the rise in water level above the confining layer in a well that gets water from the confined aquifer.

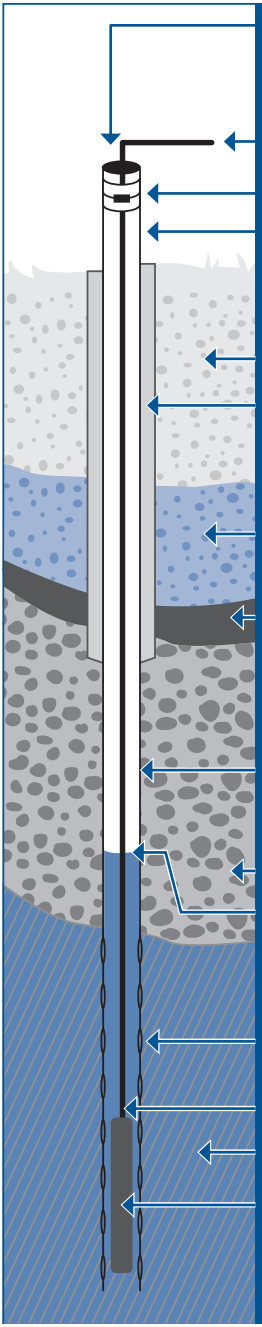
Groundwater flows from recharge areas (generally around uplands) to discharge areas (from lowlands to streams, lakes and springs). The flow path that groundwater takes may be very localized or can extend for many miles. Most groundwater is brought to the surface by water wells or discharges naturally into streams, lakes or springs.

What is a water well?

A water well is an artificial opening or artificially altered natural opening, however made, by which groundwater is sought, or flows under natural pressure, or is artificially withdrawn or injected. Examples would include holes drilled, bored, dug or jetted into the ground to reach water. Wells are usually held open by a pipe, well casing or a liner and can provide drinking water or can be used for non-potable uses such as irrigating and washing. A well is private or domestic if it serves water for no more than three households for drinking, culinary or household uses and is not used as a public water supply.

Water wells in unconfined aquifers are known as water-table wells. The water level in these wells is the same as the surrounding aquifer. A pump is used to bring water to the surface for use. Water wells 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.

Water well diagram



Access port
Wells must have a port to allow access for measuring water level.

To water delivery system

Well identification number

Top terminal height
The top of the well must be capped and extend at least one foot above finished ground surface or pump-house floor.

Sands and gravel

Well seal
The seal prevents surface water from entering the well. The well must be sealed to at least 18 feet or 5 feet into a consolidated layer, whichever is greater.

Water bearing sands and gravels

Impermeable layer
Water cannot penetrate this layer which prevents the upper aquifer from commingling with or contaminating the lower aquifer. Sealing the well below this point is required to prevent commingling.

Casing
The casing supports the sides of the well and prevents the well hole from caving.

Non water-bearing conglomerates

Static water level
The stabilization level or elevation of water surface in a well not being pumped.

Perforations
Holes in the casing allow water to enter the well.

Riser pipe and pump wiring

Water-bearing zone

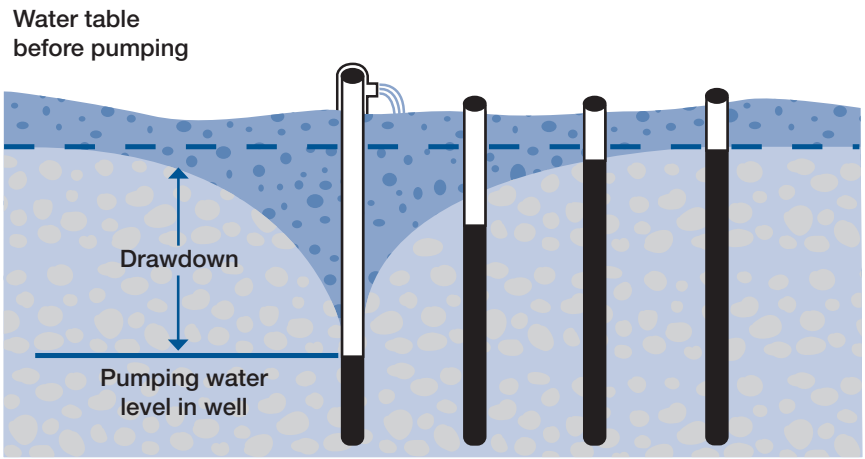
Pump
Sometimes the pump is mounted on the top of the well. Generally, domestic wells use submersible pumps.

This diagram shows the different components that make up a well.

How does a well work?

Wells are designed to be open to the aquifer; 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 the same. 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 allows groundwater to flow from the aquifer into the well from all directions to replace water that is pumped out. This process creates a circular depression, centered at the well, and 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, causing lower water levels in those boreholes. This influence of one well upon another is referred to as hydraulic interference, and in severe cases may prevent a well user from getting their typical quantity of water. Pumping groundwater from a well may also intercept groundwater flowing towards a stream, lake or spring. In cases where a well is located close to a stream, pumping the well may cause surface water to flow into the aquifer.

Hydraulic interference diagram



This diagram shows the influence of one well on other, also known as hydraulic interference.

Groundwater rights and exempt uses

Under Oregon law, "all water within the state from all sources of water supply belongs to the public." In general you must obtain a water right permit before using water from any well. However, there are exceptions called "exempt uses" (see ORS 537.545). These uses are excused from applying for a water right permit, but must be beneficial and without waste.

Pumping groundwater under the exemption carries the same weight as a water right and has a priority date. An exempt use is subject to the same privileges and restrictions as any water right permit or certificate and is subject to state water law. The Oregon Water Resources Department (OWRD) has the authority to regulate, reduce or stop groundwater withdrawals when they interfere with prior or "senior" water rights.

Exempt uses of groundwater include:

- Single or group domestic uses up to 15,000 gallons per day;
- Stock watering;
- Irrigation of any lawn or noncommercial garden of ½-acre or less;
- Down-hole heat exchangers;
- Single industrial or commercial development up to 5,000 gallons per day; or
- Irrigation of school property up to 10 acres in critical groundwater areas.

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).

The Oregon Water Resources Commission is responsible for managing the groundwater resource. In many areas, high demand of groundwater supplies has required that new uses be restricted or prohibited to protect existing water rights. This includes exempt

uses in some areas. **Before spending money on a planned well, you should consult OWRD to confirm Oregon water law allows the proposed use of water**.

Groundwater use registration

New wells constructed in Oregon that do not require a water right are subject to a one-time recording fee. This is separate from fees paid to the licensed water well constructor (driller). Landowners are also required to submit a map showing the well location on the tax lot.

When the well constructor notifies OWRD that new construction is to begin, the following occurs:

1. OWRD will send a postcard with information regarding the fee to the mailing address provided by the driller.
2. Within 30 days of completion of the well, the driller will submit a well log describing how the well was built.
3. Once OWRD receives the well log, a copy of a blank map of the property along with an invoice will be sent to the mailing address shown on the well log.
4. When the map and fee are received, OWRD will complete the recording process and make the map available for viewing, along with the well log, on the OWRD website.

The purpose of the fee and map is to improve the management of groundwater resources throughout the state. This is done in two ways:

- The map shows the location of the well within a tax lot, which OWRD uses to identify the supply and availability of groundwater.
- The fee is intended to support additional research in addition to evaluation of groundwater supplies, conducting groundwater studies, carrying out groundwater monitoring and processing groundwater data.

For more information about the groundwater use registration program please call 503-986-0861 or visit OWRD's website (see Useful web links section).

Obtaining groundwater rights

If you plan to use more groundwater than the exempt limit or for a use that is not exempt, a groundwater right permit is required before beginning construction of any proposed well. To apply for a new groundwater right permit, file an application with OWRD that includes a map of the proposed well location and place of proposed water use. The application is reviewed to ensure the use doesn't interfere with existing water rights or stream flow. You may need help from a certified water right examiner to collect and report data and conduct surveys when applying. The OWRD website lists examiners in your area. Some Oregon counties require land use permits for certain developments. Contact your county government for development requirements.

Estimating your groundwater needs

The U.S. Geological Survey (USGS) estimates that indoor water use averages 80 to 100 gallons per day for each person:

Table 1 Water use estimations

Bath	A full tub is about 36 gallons.
Shower	2–2.5 gallons per minute. Old shower heads use as much as 4 gallons per minute.
Teeth brushing	<1 gallon, especially if water is turned off while brushing. Newer bath faucets use about 1 gallon per minute, older models use more than 2 gallons.
Hands/face washing	1 gallon
Face/leg shaving	1 gallon
Dishwasher	20 gallons/load, depending on efficiency of dishwasher
Dishwashing by hand	4 gallons/minute for old faucets. Newer kitchen faucets use about 1–2 gallons per minutes.
Clothes washer	25 gallons/load for newer washers. Older models use about 40 gallons per load.
Toilet flush	3 gallons for older models. Most new toilets use 1.2–1.6 gallons per flush.
Glasses of water drunk	8 oz. per glass
Outdoor watering	2 gallons per minute

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 half a 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.

Managing water use

There are several ways to manage low yield wells to stretch a limited supply:

- Conservation - Install water savings appliances.
- Spread use over time - Examples include taking only one shower at a time or delaying uses such as laundry or dishwashing to times when demand is low.
- Storage - Add a storage tank to fill at times of low use.

A water meter can also be installed and used to measure how much water is being pumped. This information is valuable to understand and manage water use. Domestic well water meters vary in price from $50–$300. For other conservation tips, see page 10.

This photo is an example of a water meter device.

Water conservation saves money by reducing pumping costs and by extending the life of the pump and septic systems.

	Maintain the water delivery system to prevent leaks. If the pump cycles on and off when water isn't being used, it is likely there is a leak.
	Check for and fix leaky faucets inside and outside your home. One drop per second wastes 2,700 gallons of water per year.
	Install water-saving devices (front-loading washing machines, low-flow showerheads, low-flow toilets, water efficient dishwasher).
	Turn off water while brushing teeth, scrubbing 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 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 www.wrd.state.or.us/OWRD/Water_Conservation.shtml

Installing a measuring tube

A measuring tube in your well provides direct access to the groundwater to easily take an accurate measurement. A measuring tube is a slotted minimum 3/4-inch PVC pipe permanently installed on the pump column that provides unobstructed access to measure the groundwater level. Some areas of Oregon require measuring tubes be installed at the time of pump installation, repair or replacement.

Measuring tube diagram and specifications

Minimum specifications for measuring tube

Vented above and below well cap.

If well has a pitless adapter, the measuring tube terminates within **6 inches** of the top of well casing.

Measuring tube nominal 3/4 inch diameter schedule 40 PVC.

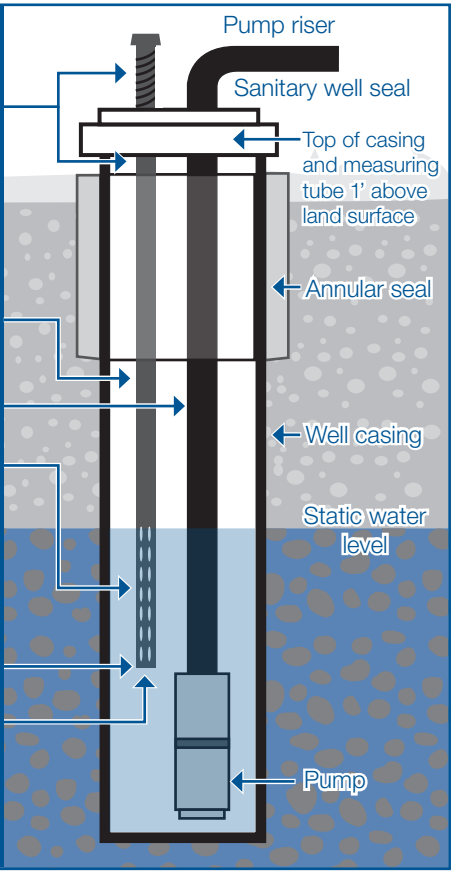
Attached to pump column at 10 foot intervals with 10 mil plastic tape.

Perforation/screen

- Lower 5 feet 0.020 inch machine-slotted well screen or
- Lower 20 feet extensively perforated with 1/8 inch holes.

Extends to top of pump.

Plug or cap.



This diagram details the recommended minimum standards for a dedicated measuring tube. The dedicated measuring tube shall not be reduced in size over the length of the pipe and shall remain free from wires and other obstruction.

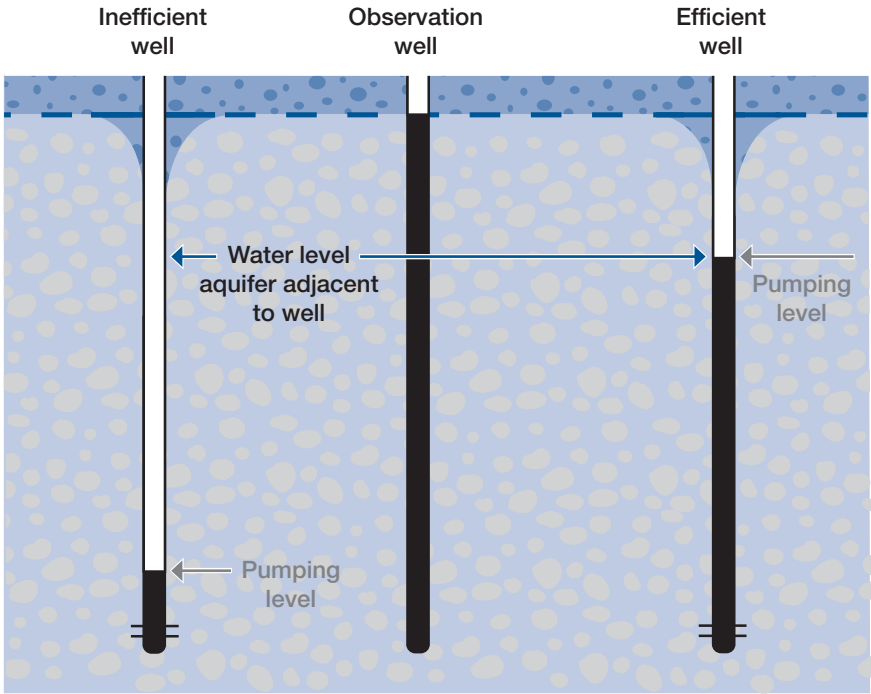
Water level measurement

You should 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. Measure and record the water level in the well at least twice a year, around 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.

Well efficiency

Water wells must be constructed to allow water to easily flow into the borehole from the aquifer. Supply problems may occur when the pump is turned on and the water level drops sharply to meet demand. Well production will be severely reduced and damage to the pump may occur if the water level drops to the pump intake level. This can also happen with aging wells due to the buildup of mineral deposits, silt or bacteria. Low well pressure is most often due to well inefficiency, not always because of neighboring wells. Well efficiency declines over time; periodic maintenance can help maintain well yield and prolong the life of the well. Efficiency and maintenance tips are provided in the well maintenance section.

Efficient well diagram



This diagram shows the pumping levels of efficient and non-efficient wells.

Sharing a water well

It is best to negotiate a written agreement between water users and well owners if you plan to construct a well to serve more than one household. Legal advice is generally sought for such an agreement. The agreement should address:

- 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 the lowest 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 ½-acre of irrigation for lawn and garden watering exempt from a water right permit be divided among the parties?

The Oregon Health Authority's Drinking Water Services requires water quality testing on wells that serve more than three households. Information on requirements can be found on their website or by calling Drinking Water Services.

Water well construction

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 keeps an online database of well logs to research information about wells in your area. You can also learn about the quantity and quality of well water from local water well constructors. Well constructors can help estimate well depth, yield and cost, and should be consulted for any planned construction.

Drilling a 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. Please refer to the OWRD website for further details and additional information. OWRD discourages landowners from constructing their own well. If you decide not to hire a professional and 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 apply for a permit, submit a $25 permit fee, and get a properly executed $5,000 landowner's bond. A well construction "start card" and fee of $225 is also required for construction of a new well, deepening of a well or conversion of a well.
- Follow groundwater law and the general standards for construction and maintenance of water supply wells in Oregon (OAR Chapter 690, Divisions 200 through 230) to construct, alter, deepen or abandon the well. Submit a map and $300 recording fee to OWRD for all new and converted water supply wells associated with an exempt groundwater use.

- Make sure that all equipment that will come into contact with your well water is approved by the National Sanitation Foundation (NSF) for use in drinking water facilities. Some materials used in well construction have led to contamination with phthalates, which can be harmful to health. These materials include PVC and electrical tape.

Oregon well construction standards

Oregon well construction standards (OAR 690-200 through 690-240) are designed to protect groundwater and the public by preventing contamination, waste and loss of artesian pressure in the aquifer.

There are cases when it may not be possible to construct or abandon a well 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 submit an application and receive approval for a "special standard" from OWRD before completing the work. While a special standard allows some flexibility 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.

If the well will be used to provide water to the public for consumption (four or more connections, or serving 10 or more people per day for at least 60 days per year), additional construction standards and requirements apply. For more information, contact Oregon Drinking Water Services.

Selecting a well constructor

Make sure you choose a water well constructor who is licensed and bonded in Oregon. Names of licensed constructors are available on the OWRD website, under the Wells and Well Construction link. The well log database lists water well constructors that have previously drilled wells in your area and have knowledge about local conditions.

Questions to ask a well constructor

Before hiring a well constructor and starting construction, you may want to ask the following questions:

- Do you have a valid Oregon water well constructor's license and bond?
- How long have you been in the business of constructing wells?
- Have you constructed wells in this area?
- Are there any known water quality issues in the area?
- Will there be a written agreement or contract?
- Does it cover all the work to be performed, including details and cost of construction?
- Can you provide references?

Well construction checklist

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

	Construction
	Mobilization cost
	Identification of drain fields, septic tanks and other sources of contamination
	Drilled hole diameter, changes in diameter with depth
	Approximate depth of well and cost per foot
	Sealing methods 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
	Intake diameter, perforated casing material or screens
	Start and completion dates
	Well identification number (see Well identification number section of this manual)
	Additional costs if the well is a flowing artesian well
	Abandonment procedures and costs if the well is unusable
	Start card fee and recording requirements
	Components
	Liner pipe (if necessary) and cost per foot
	Casing material, diameter and cost per foot

	Drive shoe (if necessary)
	Pump and installation costs (if the constructor provides this service)
	Guarantee of materials and labor
	Type of sanitary seal (well cap)
Testing and water quality	
	Well testing – method and duration of flow test, rate of flow, drawdown and recovery measurements
	Water quality testing – see Water quality testing section
	Static water level – method of measurement, when taken
	Well disinfection

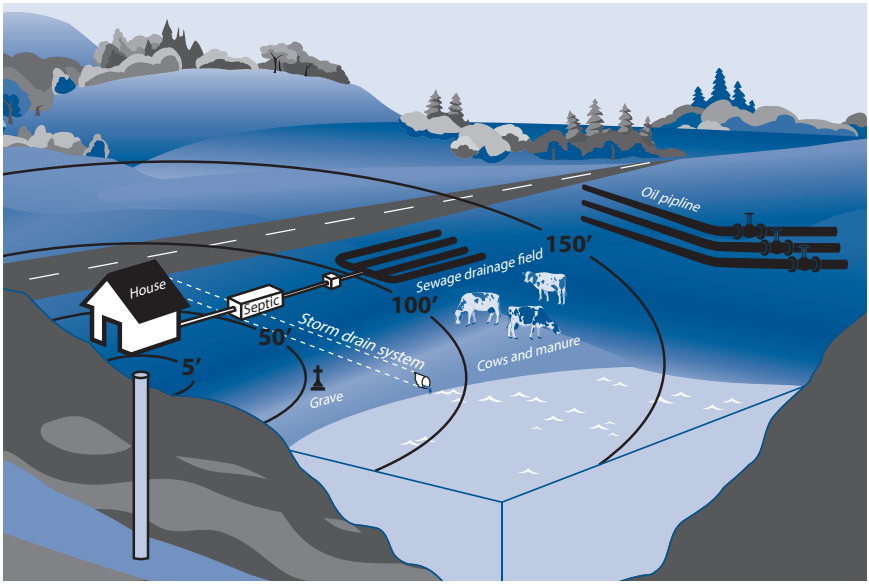
Selecting a site for your well

Before deciding where to drill your well and what materials should be used, ensure you will be in compliance with Oregon laws and construction standards, groundwater protection efforts and have access to a clean drinking water supply.

1. Oregon well construction standards (OAR 690-210-0030) require a minimum distance of:
    - Five feet from a permanent structure or the roof, eaves or overhangs of a permanent structure. This includes decks or other additions to the structure that may hinder the ability of a drilling machine to get over the well. This does not include pump houses or other outbuildings that are easily moved.
    - Fifty feet from septic tanks
    - Fifty feet from closed sewage, or storm drainage systems
    - One hundred feet from sewage disposal areas (drain fields)

2. Do not locate a well in an area prone to flooding. If there are no other options, take extra measures to protect the well head. State rules require the well head extend a minimum of 12 inches above the finished ground surface or pump house floor and a minimum of 12 inches above the local surface runoff level. The well should be located above (higher in grade) disposal areas if possible. Run surface drainage away from the well on all sides and divert up-slope drainage away from hillside wells by using berms or trenches.
3. You should site your well away from neighboring wells (100 feet minimum) to reduce the possibility of hydraulic interference, difficulties with neighboring septic systems or boundary line inaccuracies.

Well contamination diagram



This diagram represents common contamination sources and required setbacks for domestic wells.

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).

Purchasing and installing a pump

Well pumps are sold by pump contractors, some water well constructors, plumbing-supply dealers and various retail outlets. 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 when installing a pump. If a professional is not available, refer to the well log (see Water Well Documentation section) for information on well diameter, depth, yield and water level drawdown during the required well test to find a pump that best matches well production and water needs. A properly sized delivery system will have minimal friction loss. 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 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. It is used to track modifications to the well over time. All wells drilled, deepened, converted or altered after 1996 are required by law 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 or within 30 days of the sale. Well tags are available at no cost by completing an Application for Well ID Number form, available on the OWRD website, listed in the Useful Weblinks section of this handbook.

The well label should be permanently placed on the casing about six inches up from ground/floor level and easily visible. A large stainless steel hose clamp band available at many hardware stores is ideal for attaching. Only one well ID tag is needed for the life of the well. If the tag is badly damaged or lost, a replacement tag (with a new number) must be requested from OWRD.

A well tag, displaying the well identification (ID) number, should be on every well.

Water supply well report (well log)

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 built, altered, deepened or abandoned. Well logs are to be provided to both the person who contracted the construction of the well and to OWRD. Review the information when you receive the well log. Make sure the location information is correct and the well ID number on the well report matches the number on the well tag. Maintain the well records in a safe and accessible place. OWRD has copies of well logs for most water wells drilled in Oregon since 1955. Your unique well log number will begin with the first four letters of the county where the well is drilled.

How to read a well log

The well report contains "as built" information on the dimensions and materials used and found in the construction of the well. This information is important to pump installers or others that may work on the well or evaluate its condition in the future. Well report sections detail different aspects of the well construction. The sections vary over the years, but the main categories have largely remained the same.

All well reports received by OWRD are stamped and identified by a well log number placed at the top of the page. The number is a combination of the first four letters of the county where the well was drilled and a series of numbers. For example, a well report for a well drilled in Deschutes County will have a number resembling "DESC 012345." This number is generated by OWRD and will not appear on the customer copy well report received directly from the well constructor.

At the top right of the well report are three spaces to document the numbers associated with the well: the well ID, the number of the Start Card submitted to OWRD before well construction and the well log number of the original well report if the report is for a deepening, alteration or abandonment of that well.

Sample:

Water Supply Well Report (filled out)

STATE OF OREGON
WATER SUPPLY WELL REPORT
(as required by ORS 537.765 & OAR 690-205-0210)

MARI 9999

WELL I.D. LABEL# L 999999
START CARD # 999999
ORIGINAL LOG #

1 (1) LAND OWNER Owner Well I.D.
First Name JOHN Q. Last Name PUBLIC
Company
Address 1234 MAIN ST
City ANYTOWN State OR Zip 97000

2 (2) TYPE OF WORK [X] New Well [ ] Deepening [ ] Conversion [ ] Alteration (complete 2a & 10) [ ] Abandonment(complete 5a)

(2a) PRE-ALTERATION

	Dia	+	From	To	Gauge	Stl	Plste	Wld	Thrd
Casing:									

	Material	From	To	Amt	sacks/lbs
Seal:					

3 (3) DRILL METHOD [X] Rotary Air [ ] Rotary Mud [ ] Cable [ ] Auger [ ] Cable Mud [ ] Reverse Rotary [ ] Other

4 (4) PROPOSED USE [X] Domestic [ ] Irrigation [ ] Community [ ] Industrial/ Commericial [ ] Livestock [ ] Dewatering [ ] Thermal [ ] Injection [ ] Other

5 (5) BORE HOLE CONSTRUCTION Special Standard [ ] (Attach copy)
Depth of Completed Well 100 ft.

BORE HOLE

Dia	From	To
10	0	50
6	50	100

SEAL

Material	From	To	Amt	sacks/lbs
Cement	50		11	S
		Calculated		
Bentonite	50	0	9	S
		Calculated		

How was seal placed: Method [ ] A [ ] B [X] C [ ] D [ ] E
[ ] Other
Backfill placed from ft. to ft. Material
Filter pack from ft. to ft. Material Size
Explosives used: [ ] Yes Type Amount

5a (5a) ABANDONMENT USING UNHYDRATED BENTONITE
Proposed Amount Pounds Actual Amount Pounds

6 (6) CASING/LINER

Casing	Liner	Dia	+	From	To	Gauge	Stl	Plste	Wld	Thrd
◉	○	6	[X]	2	50	.250	◉	○	[X]	[ ]
○	◉	4	[ ]	20	100	sch40	○	◉	[ ]	[X]
○	○		[ ]				○	○	[ ]	[ ]
○	○		[ ]				○	○	[ ]	[ ]
○	○		[ ]				○	○	[ ]	[ ]

Shoe [ ] Inside [ ] Outside [ ] Other Location of shoe(s)
Temp casing [ ] Yes Dia From To

7 (7) PERFORATIONS/SCREENS
Perforations Method Saw
Screens Type Material

Perf/Screen	Casing/Liner	Screen Dia	From	To	Scrn/slot width	Slot length	# of slots	Tele/pipe size
Perf	Liner		79	99	.12	3	120	

8 (8) WELL TESTS: Minimum testing time is 1 hour
○ Pump ○ Bailer ◉ Air ○ Flowing Artesian

Yield gal/min	Drawdown	Drill stem/Pump depth	Duration (hr)
30		98	1

Temperature 50 °F Lab analysis [ ] Yes By
Water quality concerns? [ ] Yes (describe below) TDS amount 98 ppm

From	To	Description	Amount	Units

9 (9) LOCATION OF WELL (legal description)
County MARION Twp 7 S N/S Range 3 W E/W WM
Sec 23 NW 1/4 of the SW 1/4 Tax Lot 999
Tax Map Number 70323000999 Lot
Lat ° ' " or 44.94518 DMS or DD
Long ° ' " or -123.0271 DMS or DD
◉ Street address of well ○ Nearest address
1234 MAIN ST

10 (10) STATIC WATER LEVEL

	Date	SWL(psi)	+	SWL(ft)
Existing Well / Pre-Alteration				
Completed Well	02-12-2015			25

Flowing Artesian? [ ] Dry Hole? [ ]

WATER BEARING ZONES Depth water was first found

SWL Date	From	To	Est Flow	SWL(psi)	+	SWL(ft)
02-12-2015	45	50	20			25
02-12-2015	70	75	29			25

11 (11) WELL LOG Ground Elevation

Material	From	To
TOPSOIL	0	2
RED CLAY	2	34
BROWN BASALT	34	65
LIGHT GRAY BASALT	65	70
BROWN BASALT	70	72
BLACK BASALT	72	75
GRAY BASALT	75	100

Date Started 02-12-2015 Completed 02-12-2015

(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.
License 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.
License Number 9999 Date 02-15-2015
Signed
Contact Info (optional) JOHN Q. DRILLER

ORIGINAL - WATER RESOURCES DEPARTMENT
THIS REPORT MUST BE SUBMITTED TO THE WATER RESOURCES DEPARTMENT WITHIN 30 DAYS OF COMPLETION OF WORK. Form Version: 0.95

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/screens:** 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. On this section of the well report, the well constructor records the temperature and conductivity 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 **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.

Water well maintenance

Water wells provide direct access to groundwater commonly shared with others. Wells must be maintained to prevent health hazards, health threats or menace risks to public safety. Wells can contribute to contamination or waste of groundwater. It is recommended that well owners perform routine maintenance and testing.

The landowner is the one responsible for well maintenance. 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 investigate 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 components should be routinely examined and noted. These include:

- **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 one foot above land surface to prevent overland flow of water from entering the well. Ensure the casing is not damaged or compromised in any way and remains above land surface.
- **Well shelter** - Do not store poisons, pesticides, petroleum products or other hazardous materials in the shelter or near your well if it is contained within a shelter or pump house. Do not use it to shelter animals. Ensure there is no damage to your shelter.

Well performance and rehabilitation

Well performance will deteriorate over time as mineral deposits or bacterial growth builds up or it gets filled in with formation materials. A decline in performance may go unnoticed if the water needs are small on a high-producing well. Small reductions in well performance may be noticeable if a well is low-yielding. A baseline is needed to determine loss of performance. A pump test is commonly conducted when the pump is first installed to determine a flow rate. It is important to measure the pumping level in the well during the test; this is the measure of well performance. Periodically measuring well performance and recording the data will help with future decisions on well maintenance, safety and rehabilitation.

Checklist for well performance

	What is the static water level in the well prior to use?
	What is the pumping rate and level after a specified period of pumping (a four-hour test, for example)?
	Is the water sample visually clear and free from sand and silt?
	How rapidly does the water level recover after pumping?

Rehabilitating a well's performance may require it 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

You should adopt a testing schedule to make sure your well water remains safe to drink (see Table 2). Hidden contaminants could be present even if your water looks and tastes good.

How to test: The best way to have your well water tested is by an accredited laboratory. A list of locally available accredited laboratories is available at http://lams.nelac-institute.org/search

(searchable by state). Testing for water quality requires very specific sampling procedures. An accredited water testing laboratory can provide information on proper sampling procedures and supplies. If sampling directions are not available, refer to the sampling document available on the DWSP Web pages. (See Useful web links section.)

What to test for: It is recommended that well water be tested annually for nitrates and coliform bacteria. In addition, testing for arsenic should be done at least once to see if arsenic is present. Some areas in Oregon are particularly susceptible and certain counties are encouraged to routinely check their wells' arsenic levels. If arsenic is present in an initial test (above 8 ppb), you should retest. Upon the retest, if high concentrations continue (10 ppb or above), a treatment system should be installed. With any treatment system, testing should be done each year at point of use and every three years at the well head. Other contaminants should be tested on a less frequent or as-needed basis (see Table 2). Contact an accredited laboratory for the types and costs of water quality analysis available. Water quality testing for arsenic, coliform bacteria and nitrates is required during a property transfer. See **Buying or selling a property with a well** for more information.

Testing costs: Testing costs can vary and will depend on both the laboratory used and the tests performed. Estimated values are shown in Table 3 but always request a written estimate before submitting your water sample. For a list of accredited labs, visit http://lams.nelac-institute.org/search.

Interpreting your results: Public water systems in Oregon are regulated but private domestic wells are not. Routine testing is highly recommended if your well is used as a primary water source. Comparing your test results to public drinking water standards can help you interpret the water quality in your well. Your local laboratory, health department or the DWSP can help you interpret your results. Table 3 also provides some guidance.

The presence of a contaminant can be, but is not always, a threat to health. Vulnerable populations (e.g., children, the elderly, pregnant

women and autoimmune compromised individuals) are particularly susceptible. For more information on health effects, see the Water contamination and health effects section below.

Water contamination and health effects

Both natural and unnatural contaminants can make their way into your well and water supply. Natural chemical or mineral contaminants may include arsenic and radon. Unnatural contaminants such as pesticides, chemicals and bacteria can be found in your water as a result of land use practices, storm water overflow and other events happening near your well. Contaminants vary by location and all wells should be routinely monitored to ensure your and your family's good health. Contaminated water can transmit a variety of diseases. Have your water tested if you suspect your water may be contaminated.

Table 2* Testing recommendations reference table

Recommended test			Interpreting your results		
Test	Frequency	Cost	Results	Action procedures	Health effects
Coliform bacteria/*E. coli*	Annually	$20–50	Present	If present, retest a sample to ensure the result is accurate. If problem continues, consult a professional. Review the treatment section to determine if shock chlorination best fits your situation. Shallow or improper well construction is often the cause of bacteria in the water supply so hiring a professional to perform an inspection is recommended.	Fecal bacteria contamination, such as *E. coli*, may cause acute symptoms including nausea, diarrhea and vomiting.

Continued on next page

Table 2* Testing recommendations reference table

Recommended test			Interpreting your results		
Test	**Frequency**	**Cost**	**Results**	**Action procedures**	**Health effects**
Arsenic	At least once. If results are above 8ppb, retest. If second test is below 10 ppb (health standard) then consider a re-test in three years. If test is 10ppb or higher, install a treatment system and test every year at point of use and every three at well head.	$20–50 (more if speciated)	>.01mg/L (10 ppb)	Do not boil the water as it increases the concentration of arsenic due to evaporation. Install a treatment system or find an alternate water supply. A professional should be consulted in order to best match the treatment system with your well (reverse osmosis, anionic exchange or iron oxide filter).	Long-term consumption of water with arsenic above the drinking water standard may increase the risk of health problems of the skin, circulatory system, nervous system, lungs and bladder, including some forms of cancer.
Nitrate	Annually	$20–50	>10 mg/L (10 ppm)	Do not boil the water as it increases the concentration of nitrates due to evaporation. Identify and remove any possible sources of nitrates near the well (fertilizers, animal waste, sewage system, etc.). Contact a licensed well constructor to inspect your well for possible repairs and or treatment options.	Presence of nitrates in drinking water can cause a variety of chronic and acute effects. Infants are at a particularly strong risk for blue baby syndrome, with some cases resulting in death.
Other minerals (aluminum, barium, fluoride, iron, lead, mercury, etc.)	Every 5–10 years, unless significant changes occur in taste, odor, color, etc.	$20–50 ea Packages are often available from $250+	Drinking water standards vary per mineral. EPA's website provides acceptable levels.	Install a treatment system or find an alternate water supply. The appropriate treatment system depends on your overall water chemistry and the constituents that need to be removed. Consult a professional for more advice.	Health effects will vary dependent on minerals present. If you are concerned and expect contamination, first consult with your health provider. If you have additional questions or would like more information, a toxicologist at the Oregon Health Authority may be able to answer your questions.

**Table adapted from CA State Water Resources Control Board, GAMA Program*

Treatment options

Treatment options will depend on the type of contaminants in your well. Some problems may be easy to treat. Certain bacteria can sometimes be controlled by removing the source of the contamination, such as a dead mouse that fell into the well opening, followed by shock chlorinating the well and pipes. More persistent types of bacteria may require continuous treatment. Other types of contaminants may require more advanced treatments such as ion exchange or reverse osmosis. See Table 2 for more information. If water treatment is not an option, you may need to connect to a new water source or constructing a deeper well.

Shock chlorinating your well

The presence of coliform indicates bacterial contamination of the water. It may be necessary to disinfect your well and water supply lines if your water tested positive for coliform bacteria. After testing and receiving a test result indicating bacteria is present, do not drink the water without treating it and performing a thorough maintenance check. Some things to consider:

	Is there any damage to the well cap, well casing or well head? Do you see any cracks or holes?
	Was work recently done on the well?
	Is there standing water next to the well?
	Are livestock nearby?
	Were attachments left on the faucet when sampling? Was the sample bottle accidentally touched before collecting water? Did you collect sample from a swivel faucet?
	Is your well a shallow well?
	Are your storage tanks and pipes free of damage?
	Do you have an old or abandoned well nearby?
	Is your septic tank leaking or damaged?

If you answered yes to any of these questions, find and fix the problem, shock chlorinate your well and retest your water. Follow-up testing is needed to determine whether the disinfection treatment was successful. If coliform bacteria continue to be present in water samples, contact a licensed and bonded water well constructor to help determine if well construction is responsible for the contamination. To disinfect your well, please follow these instructions (this procedure is for emergency purposes only and should not be used on a regular basis):

1. **Obtain safe drinking water supplies for three to seven days.** You may boil the water for one minute as a short term solution, or use bottled water.
2. **Determine the correct amount of chlorine solution to use.** Use ordinary plain liquid bleach and consult Table 3. Refer to your well log to determine your well diameter and the depth of water from the water level to the bottom of the well (NOT total well depth).
3. **Dilute the bleach, 1 cup of bleach per 1 gallon bucket of water**.
4. **Pour the diluted chlorine solution down the well.** Do not splash.
5. **Flush the solution in the well.** Use a hose from an outdoor faucet and run the water, washing the sides of the well until you smell chlorine from the hose. This may take a few minutes.
6. **Run indoor faucets.** Run each faucet inside the home until you can smell chlorine. Turn off once the smell is noticeable.
7. **Allow water to sit in the plumbing for six to 12 hours.** Do not use the water.
8. **Remove chlorinated water.** Run a hose on grass or bare ground until you no longer smell chlorine.
9. **Retest after at least three days.** Do not drink the water until a test indicates there is no longer bacteria present.

If your water system has a storage tank, please refer to directions on the Drinking Water Services Web pages for proper bleach calculations based on volume. For well chlorination, use the table below:

Table 3 **Shock chlorination reference table**

	Well diameter (inches)					
Water depth (feet)	2 in	4 in	6 in	8 in	10 in	12 in
Less than 50'	1 cup	1 cup	2 cups	4 cups	8 cups	8 cups
50–100'	1 cup	2 cups	4 cups	8 cups	12 cups	12 cups
100–150'	1 cup	3 cups	6 cups	8 cups	16 cups	16 cups
150' +	1 cup	4 cups	8 cups	12 cups	16 cups	16 cups

Table adapted from Oregon State University Extension Well Water Program

Well abandonment

Unused wells that are not properly abandoned provide an open channel for disease organisms and other contaminants to travel deep into the ground. 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, waste of water, loss of artesian pressure and prevent physical injury. 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 that prevents any materials from entering the well. An access port must be maintained to determine the water level in the well at any time.
- **Permanent abandonment** — A well is considered permanently abandoned when it is completely filled so 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 (see Drilling a well section in this handbook). Dug well abandonments require approval by OWRD before the abandonment is started.

The appropriate abandonment method will depend on information from the well log and an onsite investigation of the well. A drilled well with steel or plastic casing will usually be abandoned by removing or ripping the casing and filling the borehole with cement from the bottom of the hole up to land surface. 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 in an emergency

In the event of a natural disaster (e.g., flood, earthquake, drought), your well may not be a safe source of water. The well can become damaged and contaminated and cause short and long-term health effects.

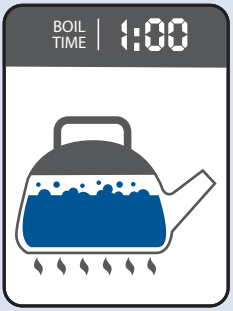
If you think your well has been flooded, EPA recommends the following first steps:

1. Stay away from the well pump while flooded to avoid electric shock.
2. Do not drink or wash from the flooded well to avoid becoming sick. Boiling your water for extended periods of time may increase the concentration of other contaminants.
3. Get assistance from a well or pump contractor to clean and turn on the pump.
4. After the pump is turned back on, pump the well until the water runs clear to rid the flood water. If the water does not run clear, a coliform bacteria test is recommended prior to using the well.

Repeated testing is strongly recommended to protect the safety of your drinking water.

If you do not have access to known clean drinking water (e.g., bottled water), follow the steps below as a temporary solution to ensure your water is safe to drink. You should follow similar procedures should any other disaster occur. Routine testing can help you know about your water quality prior to an emergency situation when water boiling may be necessary.

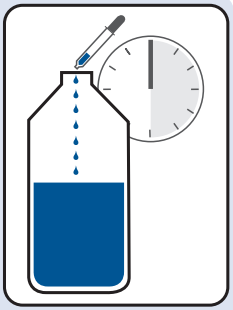
Steps to make sure your water is safe to drink after an emergency



Boil

Bring water to a rolling boil for 1 minute. Let it cool, and store it in clean containers with covers.

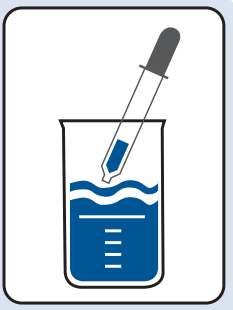
OR



Chemically treat

Add 1/8 teaspoon (or 8 drops) of regular, unscented, liquid household bleach for each gallon of water, stir it well and let it stand for 30 minutes before you use it. Store disinfected water in clean containers with covers.

AND



Have water tested

Have a professional service test the water to make sure the water is safe to consume.

Buying or selling a property with a well

Oregon well owners are not required to test their wells by law unless you plan to sell property with a private well source that provides domestic water uses. The Real Estate Transaction Act (RET), or ORS 448.271, requires testing of domestic well water during a real estate transaction. The Oregon RET Act states:

> **"In any transaction for the sale or exchange of real estate that includes a well that supplies groundwater for domestic purposes, the seller of the real estate shall, upon accepting an offer to purchase that real estate, have the well tested for arsenic, nitrates and total coliform bacteria. The Oregon Health Authority also may, by rule, require additional tests for specific contaminants in specific areas of public health concern. The seller shall submit the results of the tests required under this section to the authority and to the buyer within 90 days of receiving the results of the tests."**

The seller of the real estate or property is responsible for following the law. However, the seller can designate their attorney, real estate agent or broker, the laboratory person conducting the water testing or a private party to assist them in complying with water testing and reporting requirements. The potential buyer must be notified of the results within 90 days and results should be sent to Drinking Water Services. The test results are valid for one year.

The seller should complete a Domestic Well Testing For Real Estate Transaction form to make sure all necessary information is provided. You will need the following information to complete the form:

1. Property address
2. Township, range, section and tax lot (aka map-lot or tax-map #)
3. Well Log number (look up on the WRD online Well Log Query)
4. Well ID (see Well identification number section)
5. Contact information
6. Sample collection location

Blank forms are available from local real estate offices and online through the DWSP's Web pages. The completed Domestic Well Testing for Real Estate Transaction (RET) form **and** laboratory test results should be sent to:

Drinking Water Services
www.healthoregon.org/wells
Email: domestic.wells@state.or.us
Fax: 971-673-0979
Mail: P.O. Box 14350
Portland, OR 97293-0350

Oregon Water Resources Department contact information

Oregon Water Resources Department
725 Summer Street NE, Suite A
Salem, OR 97301-1266
Phone: 503-986-0900 Fax (wells): 503-986-0902

Well construction information Phone: 503-986-0852

Well log searches Phone: 503-986-0854

Well identification number information Phone: 503-986-0854

Groundwater use registration information Phone: 503-986-0861

Region offices/well inspectors

Northwest Region Well Inspector
725 Summer St NE, Suite A
Salem, OR 97301-1266
Water wells - Phone: 503-986-0895 Fax: 503-986-0903
Monitoring wells - Phone: 503-986-0895 Fax: 503-986-0903

Southwest Region Well Inspector
10 S Oakdale, Rm 309
Medford, OR 97501
Phone: 541-774-6880 Fax: 541-774-6187

South Central Region Well Inspector
231 SW Scalehouse Loop, Ste 103
Bend, OR 97702
Phone: 541-306-6885 Fax: 541-388-5101

North Central Region Well Inspector
116 SE Dorian Ave
Pendleton, OR 97801
Phone: 541-278-5456 Fax: 541-278-0287

Eastern Region Well Inspector
Baker County Courthouse
1995 3rd Street, Suite 180
Baker City, OR 97814
Phone: 541-523-8224 Fax: 866-214-3493

District watermasters

District 1, Tillamook
503-815-1967
Fax: 503-815-1968

District 2, Springfield
541-682-3620

District 3, The Dalles
541-506-2652
Fax: 541-506-2651

District 4, Canyon City
541-575-0119
Fax: 541-575-0641

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

District 6, La Grande
541-963-1031
Fax: 866-214-3493

District 7, Enterprise
541-426-4464
Fax: 888-572-7936

District 8, Baker City
541-523-8224 x231
Fax: 866-214-3493

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

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

District 11, Bend
541-306-6885
Fax: 541-388-5101

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

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

District 14, Grants Pass
541-479-2401
Fax: 541-479-2404

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

District 16, Salem
503-986-0889
Fax: 503-986-0903

District 17, Klamath Falls
541-883-4182

District 18, Hillsboro
503-846-7780
Fax: 503-846-7785

District 19, Coquille
541-396-1905
Fax: 541-396-1906

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

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

Useful terms, abbreviations and web links

(These definitions apply to this handbook only and do not necessarily match the definitions in Oregon statutes or rules.)

Terms

ACCESS PORT: A minimum ½-inch opening in the upper portion of a water well to allow a clear entry to determine the water level in the well at any time. Access ports must be capped or plugged when not being used to prevent surface water or contaminants from entering the well.

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

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

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.

BOREHOLE: A dug, driven, jetted, drilled or augered hole into the ground to access water for a well.

CASING: A pipe or conduit installed in the borehole to support the sides of the well and prevent it from caving. Casing is used, along 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.

HYDRAULIC INTERFERENCE: The influence of one well upon another.

LINER PIPE: An inner pipe or conduit installed inside the casing or lower borehole to protect against caving and provide protection for the pump. The liner pipe may not be permanently affixed to the borehole wall or casing.

MEASURING TUBE: A dedicated 3/4-inch (minimum) PVC tube installed into a well to provide access for water level measurements.

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

PRIVATE DOMESTIC WELL: A water well used by no more than three residences to supply water for drinking, culinary or household uses, and is not used as a public water supply.

PUBLIC WATER SYSTEM (PWS): A system that provides the public with piped water for human consumption. A PWS has more than three service connections or supplies water to a public or commercial establishment that operates at least 60 days per year, and is used by 10 or more individuals per day.

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 the top terminal height to be a minimum of 12 inches above the finished ground surface or pump house floor, and a minimum of 12 inches above the local surface runoff level.

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 or through which ground water flows under natural pressure, or is artificially withdrawn or injected.

WELL DEVELOPMENT: 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 (ID) NUMBER: A preprinted stainless steel numbered label attached to the well casing. This unique number is assigned to only one well and 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 how much water the well produces. 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 for new wells (also referred to as pump or flow test).

Units of measurement

Units of measurement	Water quality indicator	
ppb	Parts per billion	ppb= ppm/1000
ppm	Parts per million	ppm = ppb x 1000
mg/L	Milligram per liter	equal to ppm
µg/L	Microgram per liter	equal to ppb

Abbreviations

CDC	Centers for Disease Control
EPA	Environmental Protection Agency
OAR	Oregon Administrative Rule
OHA	Oregon Health Authority
ORS	Oregon Revised Statute
OWRD	Oregon Water Resources Department
DWSP	Oregon Domestic Well Safety Program
USGS	United States Geological Survey

Web links

American Groundwater Trust
www.agwt.org/

Centers for Disease Control (CDC)
www.cdc.gov/healthywater/drinking/private/wells/

Environmental Protection Agency (EPA)
http://water.epa.gov/drink/info/well/

National Groundwater Association - Well Owner
www.wellowner.org/

Oregon Department of Environmental Quality (DEQ)
www.deq.state.or.us/wq/dwp/wellowners.htm

Oregon Department of Geology and Mineral Industries
www.oregon.gov/DOGAMI/

Oregon Health Authority - Drinking Water Services
www.healthoregon.org/dwp

Oregon Health Authority (OHA) - Domestic Well Safety Program (DWSP)
www.healthoregon.org/wells

Oregon State University (OSU) Extension Services - Well Water Program
http://wellwater.oregonstate.edu/

Oregon Water Resources Department (OWRD)
www.wrd.state.or.us/

United States Geological Survey (USGS)
http://water.usgs.gov/ogw/

Water Systems Council
www.watersystemscouncil.org/

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				
Date	Water level below land surface	Well status	Pump idle time	Measured by

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