

Pump Tests



Pump Test

Requirements

For Groundwater

Right Holders

State of Oregon
Water Resources Department
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Pump Test Requirements For Groundwater Right Holders



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PUMP TEST REQUIREMENTS FOR GROUNDWATER RIGHT HOLDERS

Introduction

Oregon law now requires many well owners in the state to conduct pump tests of their wells and submit the results to the Water Resources Department. This new law was enacted by the 1987 Legislature to provide important statewide information on groundwater resources and to provide an early warning of groundwater aquifer depletion. Wells which must be tested under this new law are all those which are listed as a source of water on a water right permit, certificate or registration statement. No pump tests are required for domestic wells, stock wells, or other wells for which a water right is not required.

A pump test, also known as a well test or an aquifer test, provides valuable information on the water-bearing earth materials (or groundwater aquifers) penetrated by the well. It also provides information on the performance of the well. **A pump test is not really a test of the pump, but rather a test of the well and aquifer.**

The Water Resources Department provides a form on which to submit pump test results. Pump test information must be submitted on this form. The form can be obtained by contacting the department.

Pump Tests

A pump test provides information on the properties of the groundwater aquifer that delivers water to the well. This information, combined with information the well driller provides, can be used to determine how easily water moves through the ground and how effectively water is stored in the aquifer. The pump test can also provide information on how efficiently the well produces water. When a well develops a problem, a pump test can provide clues as to whether the problem is caused by the well itself, the pumping and distribution system, or depletion of the aquifer.

A pump test consists of three phases. The **pre-pumping phase** includes several depth-to-water measurements made prior to pumping the well to determine any natural fluctuations in water level.

The actual **pumping phase** of the test consists of pumping the well at a constant rate for a period of four hours. As the well is pumped, the water level will drop. During pumping, the depth to water is periodically measured and recorded.

The **post-pumping or recovery phase** of the test occurs after the pump is turned off. After pumping stops, depth-to-water measurements continue at specified time intervals as the water rises, or recovers, in the well.

Wells That Need to be Tested

Any well that is listed as the source of water on a water right permit or certificate or on a groundwater registration statement is subject to these requirements. The pump test requirements do not apply to domestic wells, stock wells, or any other wells that do not require a water right. Additional exceptions to the requirements are listed below.

Wells That May be Exempted

Under certain circumstances, some wells may be exempt from part or all of the pump test requirements. Well owners must submit all requests for partial or full exemptions from the pump test rules in writing to the Water Resources Department.

If a well is the source of irrigation water for land temporarily taken out of production under a government program, the owner may request an exemption from the pump test requirements until crop production on the land is resumed.

If a landowner has a number of wells which are within five miles of each other and which produce from the same aquifer, only one of the wells may have to be tested. In order to test only one of the wells, the owner must request an exemption for the others from the Water Resources Department. The request must include some documentation, such as well logs, which verify that the wells are producing from the same aquifer. If the wells

are producing from different aquifers, or are farther than five miles from the pumped well, they must be tested separately.

If a well has a diameter of greater than 36 inches and a depth less than 30 feet, an exemption may be requested.

Exemptions may also be requested for excavations that produce water from horizontal screens embedded in a gravel pack (infiltration galleries) or vertical caissons that produce water from a radiating system of horizontal casings or screens (collection wells).

If a pump test has been performed on a well in the ten-year period prior to the due date for the pump test required by the Water Resources Department, **and** if this previously conducted test meets the Department's specifications for pump tests, then the owner may be granted an exemption from the test. A request for an exemption must be submitted in writing and the results of the previous test must be reported on the Department's test report form.

In some cases, it will be extremely difficult or inconvenient to conduct a pump test that meets all of the Water Resources Department's requirements. In such cases, well owners may request an exemption from part of the requirements and/or a time extension. The Water Resources Department will not grant an exemption if only minor modifications are needed such as installing an access port for water level measurement. The Department may verify by field inspection any claims that a well cannot be pump tested.

Deadlines for Pump Tests

The deadline to submit a pump test depends on the priority date of the water right. Generally, the priority date is the date on which the application for the water right was originally filed.

If the water right for a well was applied for on or after December 20, 1988, the owner must submit the results of a pump test before a water right certificate will be issued. A pump test must be submitted before the ten-year anniversary of the priority date whether or not a certificate is issued within that time.

If the water right was originally applied for before December 20, 1988, the results of a pump test must be submitted on or before the next ten-year anniversary of the priority date.

To determine the deadline for a pump test you need to know the month, day and year of the priority date for the water right. The month and day of the deadline will be the same as the original priority date. The year of the deadline will be the year between 1990 and 1999 that has the same last digit as the year of the priority date.

Examples of Deadlines

Priority Date

June 12, 1936
September 2, 1947
August 18, 1962
October 8, 1975

Pump Test Deadline

June 12, 1996
September 2, 1997
August 18, 2002
October 8, 1995

Results of a test can be submitted to the Water Resources Department before the deadline. This allows people to take advantage of pump testing opportunities that may arise during pump installation or service, or as part of a land sale transaction.

After a pump test has been conducted on a particular well, static water level measurements must be submitted on or before every ten-year anniversary of that pump test.

If the deadline for a test cannot be met, the owner may submit a request for a time extension. The request must be in writing and should include justification for the extension and a suggested testing date.

Qualifications to Conduct Pump Tests

Pump tests must be conducted by qualified individuals. The well owner may conduct the test, or may designate another person to do the test as long as that person meets certain qualifications.

The following persons are eligible to conduct these pump tests:

1. The owner of the well to be tested.
2. A full-time employee of the well owner who routinely works with and is familiar with wells and pumps.

3. Individuals whose primary occupation involves well pump installation, service or testing.
4. Individuals within the following professional groups, provided they have significant experience conducting pump or aquifer tests:
 - Registered geologists or engineering geologists
 - Licensed well drillers
 - Certified water rights examiners
 - Registered professional engineers

Well owners who decide to conduct the pump tests themselves should become thoroughly familiar with all the test requirements. These requirements are described in the Water Resources Department's administrative rules OAR 690-217 and are summarized in this brochure. Some specialized equipment is needed to conduct pump tests.

If a test is submitted which does not meet all the requirements, it may not be accepted by the Water Resources Department.

PUMP TEST SPECIFICATIONS

Pre-pumping Phase

The well to be tested cannot be pumped for at least sixteen hours before testing begins.

The depth to water in the well must be measured at least three times within the hour before testing begins. These readings must be taken at 20-minute intervals.

If the well to be tested is a flowing artesian well¹ with a pump, the well must be shut in for at least 16 hours before testing begins. In addition, the shut-in pressure must be measured at least three times, at 20-minute intervals, within the hour before testing begins.

Pumping Phase

The well must be pumped continuously for at least four hours during the test. During pumping, the depth to water must be

¹ A flowing artesian well is a well that will freely flow water, without the use of a pump, when the well head is open to the atmosphere

measured at timed intervals as close as possible to the following schedule:

For the first ten minutes of pumping, water level readings must be no more than two minutes apart.

From ten to thirty minutes of pumping, readings must be no more than five minutes apart.

From thirty minutes to four hours of pumping, readings must be no more than fifteen minutes apart.

During pumping, the discharge rate must remain as constant as possible and as close to the normal pumping rate of the well as possible. Discharge must be recorded at the beginning of the test and once an hour during pumping. If the water discharged during the pump test is not put to its normal beneficial use, it should be disposed of in an appropriate manner and not allowed to accumulate on the ground around the well.

If the well to be tested is a flowing artesian well with a pump, a pressure gauge must be used to record water column pressure as long as the water level in the well is above ground level. Results should be reported as pounds per square inch (PSI). If the water level drops below ground level (pressure drops below zero PSI), water levels must be measured by one of the methods listed below in the section on water level and flow rate measurement methods.

Because flowing artesian wells require special testing procedures, the Water Resources Department encourages well owners to contact the Department for guidance in the testing of these wells.

Post-pumping or Recovery Phase

After the pump is turned off, the depth to water in the well must be measured while the water level "recovers" from pumping. After pumping, water level measurements must be taken for a period of four hours or until only ten percent of the maximum drawdown remains, whichever occurs first. "Drawdown" is the distance the water level is lowered as a result of pumping. Maximum drawdown generally occurs at the very end of pumping, just before the pump is turned off.

After pumping is stopped, the depth to water must be measured at time intervals as close as possible to the following schedule:

For the first ten minutes after pumping stops, water level readings must be no more than two minutes apart.

From ten to thirty minutes after pumping stops, readings must be no more than five minutes apart.

From thirty minutes to four hours after pumping stops, readings must be no more than fifteen minutes apart.

If the well to be tested is a flowing artesian

well with a pump, the well should be shut-in once the water level has recovered to ground level and the well has begun to flow freely again. After shut-in, several pressure readings should be taken at 15-minute intervals until the pressure stabilizes.

Water Level and Flow Rate Measurement Methods

Only certain methods are allowed for measuring the depth to water and the pump discharge.

The depth to water must be measured using one of the following methods:

- 1) Electric water level measuring tapes
Electric tapes may be commercially manufactured, have markings no more than five feet apart, and be accurate to 0.5 percent.
- 2) Air lines
Air lines may be used if the depth to water is greater than 300 feet. Gauges used to measure air line pressures must be properly calibrated and have marked intervals of one PSI or less. The length of the air line must be verified by measuring the water level with an electric tape at least once before the test.
- 3) Acoustic sounders
Acoustic sounding devices manufactured specifically for measuring the depth to water in wells

are allowed. The accuracy of the acoustic sounder must be verified by measuring the water level with an electric tape at least once before the test.

- 4) Electronic pressure transducers
Calibrated electronic pressure transducers designed specifically for measuring water levels and coupled to appropriate output devices or data loggers are allowed provided they have an accuracy of 0.5 percent.

Other methods to measure depth to water may be approved by the Water Resources Department if requested in writing **prior** to the pump test.

Pump discharge must be measured by one of the following methods:

- 1) Flow meters
Permanently or temporarily installed mechanical flow meters may be used provided they are installed according to the manufacturer's specifications and are properly calibrated.

Ultrasonic flow meters are allowed provided they are used according to the manufacturer's specifications.
- 2) Orifice plate and manometer
Properly used orifice plate and manometer combinations are allowed.

3) Weir or flume

Properly constructed and installed weirs or flumes are allowed. Type of device must be specified and methods used for calculation must be provided.

4) Volume/time calculations

Determining the flow rate by measuring the amount of time it takes to fill a known volume is acceptable. A 5-gallon bucket may be used if the flow rate is 60 gallons per minute or less. A 55-gallon drum may be used if the flow rate is greater than 60 gallons per minute.

Other methods to measure pump discharge may be approved by the Water Resources Department if requested in writing **prior** to the pump test.

Nearby Wells and Streams

In order to determine the possible effects of surface water sources on pump test results, it is important to note nearby streams, lakes or ponds within one quarter of a mile of the tested well. The pump test form has a space to enter the approximate distance between the well and the surface water body and the approximate elevation difference between the surface water and the ground level at the well.

In order to determine the possible effects of the pumping of any nearby wells on the pump test, it is important to note any wells you are

aware of within one thousand feet of the tested well that are pumping large amounts of water. This does not include domestic or stock wells, since they usually produce only small amounts of water. The pump test form has a place for you to enter any information you have about pumping of nearby wells during or immediately prior to the test.

ADDITIONAL INFORMATION

If you would like additional information about pump test requirements, would like to find out if and when you need to submit the results of a test, or would like copies of the pump test form, please contact:

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