

**Guidance on Acceptable Means of Measuring or Estimating  
Pumpage from High Capacity Wells  
Private Water Supply Section, Bureau of Drinking Water and Groundwater,  
Wisconsin Department of Natural Resources  
April 18, 2007**

**Introduction**

Wisconsin 2003 Act 310 (also known as the Groundwater Protection Act or High Capacity Well Law) requires that the department collect pumping data from high capacity well owners. Therefore, you as the owner or operator of the well must collect or estimate pumpage data from your high capacity well system.

A high capacity well is any well on a high capacity property. A high capacity property is one property that has a total of 70 gallons per minute (gpm) or more total pumping capacity of all wells. Therefore, a farm that has a large irrigation well and a small residential well on the same property would have two high capacity wells, both the irrigation well and residential well. The flow rate for naturally flowing wells is also included in the total capacity for the property.

The following has occurred or is expected to occur during the foreseeable future:

- Fall 2006 through Spring 2007 – The department sent mailings to all high capacity well owners asking that the owner verify information about ownership of their high capacity wells. From that information, the department is updating ownership records for high capacity wells.
- Spring 2007 – The department will mail information (including this document) to high capacity well owners about acceptable methods to measure or estimate the amount of water that they pump from high capacity wells.
- July 2007 – Chapter NR 820, Wisconsin Administrative Code is expected to become effective. This rule will include requirements for reporting the amount of pumpage from high capacity wells.
- Fall 2007 and fall of subsequent years – The department will send reporting forms to high capacity well owners to report their well pumpage.
- March 1, 2008 and March 1 of subsequent years, submittal deadline for well owners to report pumpage to the department for the prior year.

**Detailed Requirements for Pumpage Estimation or Measurement**

Use Table 1 or 2 to determine the available approved methods, Table 1 is for wells with a capacity of less than 70 gallons per minute (gpm) and Table 2 for wells with a greater capacity.

Community water supplies that are regulated by the Public Service Commission (PSC) may have more stringent requirements than outlined in this guidance. Where there are inconsistencies between this guidance and PSC requirements, you should comply with the PSC requirements instead of this guidance.

A small number of high capacity well approvals that have been issued specify more stringent monitoring and reporting requirements (some industrial wells, water systems serving public utilities, certain public water supply systems, etc.). The owners of those systems are already reporting pumpage and shall continue to follow previously established reporting requirements.

If a flow meter or hour meter needs to be installed on your high capacity well, you should install it by one of the following dates:

- Industrial wells with a pumping capacity of 500 gpm or more – hour meters by July 1, 2007 or flow meters by October 1, 2007.
- Irrigation wells with a pumping capacity of 500 gpm or more – hour meters by August 1, 2007 or flow meters by April 30, 2008.
- Other wells with a pumping or flowing capacity of 70 or more gallons per minute – hour meters by August 1, 2007 or flow meters by October 15, 2008.
- Wells with a pumping capacity less than 70 gallons per minute that do not use an estimation method – October 1, 2007.

When you submit pumpage data for the 2007 calendar year, you may estimate pumpage for months prior to the dates that are listed above. If there is a better method to measure or estimate pumpage for your particular installation, you may contact the department and ask for approval for that estimation method. Contact information is at the bottom of Tables 1 and 2.

**Table 1**

**Wells with a Pumping or Flowing Capacity of Less Than 70 Gallons per Minute**

<p>Estimate Pumpage for Residential Use (Homes, Condominium Homes, Apartments, Trailer Homes, Etc.)</p>	<p><u>This method may only be used if the water is used solely for domestic purposes in a residence.</u> Assume 2,000 gallons of water per resident per month, thus multiply the average number of residents served by the well during each month by 2,000 to estimate the number of gallons that were pumped during each month. Wells that serve a condominium clubhouse, swimming pool at a condominium or apartment complex, etc., should have a water meter installed.</p>									
<p>Estimate Pumpage for Dairy and Animal Husbandry Where a Flow Meter is Not Installed.</p>	<p>For farms with cattle or poultry, well(s) used to supply water for the animals and related uses (including milk processing, equipment cleaning, etc.) can be estimated at the following gallons per animal per month:</p> <table border="0" style="width: 100%;"> <tr> <td>Dairy cattle, 1,800.</td> <td>Beef cattle, 750.</td> <td>Horses, 350.</td> </tr> <tr> <td>Hogs, Ostriches and Emus, 100.</td> <td>Sheep, Goats, Llamas, Alpacas, 60.</td> <td></td> </tr> <tr> <td>Turkeys, 6.</td> <td>Chickens, 3.</td> <td></td> </tr> </table> <p>If more than one well is in use, divide the total estimated water usage by the number of wells and report that result for each well. If the well(s) serves both a residence and is also used for animals, use the values listed above for animals and also assume an additional 2,000 gallons per person per month for residential uses.</p>	Dairy cattle, 1,800.	Beef cattle, 750.	Horses, 350.	Hogs, Ostriches and Emus, 100.	Sheep, Goats, Llamas, Alpacas, 60.		Turkeys, 6.	Chickens, 3.	
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<p>Estimate or Measure Pumpage for Wells Used for Agriculture, Other Than for Animals and Not for Irrigation</p>	<p>If the well is for limited use with a pumping capacity of 20 gpm or less, such as minor cleaning purposes along with restrooms in a barn or shop, use an estimate of 20 gallons per person per day. If the well is used for irrigation, food processing or washing agricultural products, a meter or hour meter is necessary.</p>									
<p>Estimate Pumpage for Campgrounds</p>	<p>Estimate 10 gallons per day per person if no showers or laundry machines are provided, otherwise assume 35 gallons per day per person at the campground that day.</p>									
<p>Estimate Pumpage for Hand and Wind Powered Pumps</p>	<p>For hand operated pumps, assume 1,000 gallons per month during months when the well is used. For wind powered pumps, contact the department, see note 3 below.</p>									
<p>Estimate Pumpage for Flowing Wells  (For purposes of this guidance, “pumpage” includes water that flows from a flowing well, including wells without a pump installed.)</p>	<ul style="list-style-type: none"> <li>• Pumpage can be measured with a totalizing flow meter.</li> <li>• If the flow rate is reasonably constant, a flow rate may be estimated based on the time to fill a five gallon bucket or small barrel of known volume. If the flow rate is not reasonably constant, take several measurements at different times and different months to, then calculate an average.</li> <li>• A licensed driller or pump installer may install equipment to estimate the flow rate using a method described in Appendix 16 of <i>Groundwater and Wells</i>, 1986, F.G. Driscoll, Johnson Division. A person who holds an applicable credential under Chapters 443 or 470, Wis. Stats. may also estimate the actual flowing rate.</li> <li>• Or, contact the department with other proposed methods, see note 3 below.</li> </ul>									
<p>Measurement Options for All Situations Including Situations Not Listed Above.</p>	<ul style="list-style-type: none"> <li>• Pumpage can be measured with a totalizing flow meter. Record the meter reading on the first or last day of each month, the difference between monthly readings is the amount of water pumped that month. For wells that are not regulated by Chapter PSC 185, Wis. Adm. Code, meters should be tested and calibrated for accuracy every ten years for accuracy for meters with a pipe size of one inch or less, and every four years for larger meters. Chapter PSC 185, Wis. Adm. Code specifies more frequent testing and calibration for well systems that are regulated by the Public Service Commission.</li> <li>• If a variable speed pump is not used, pumpage can be estimated based on the pump rating in gallons per minute and an hour meter that measures cumulative hours of pump operation. Record the hour meter reading on the first or last day of each month. To estimate the pumpage for each month, calculate the number of hours the pump operated that month, multiply that by the pump capacity in gallons per minute and multiply that by 60 to estimate the gallons pumped during that month. If a variable speed pump is used, only a totalizing flow meter may be used. The hour meter should only measure hours of pump operation.</li> </ul>									

- Notes:
1. For water uses that are not specifically listed above, such as irrigation, food processing, washing of agricultural products, motels, restaurants, golf course clubhouses, offices, taverns, etc., use a meter as described above in the category of “measurement options for all situations.”
  2. Meters shall be installed, operated, maintained and repaired in accordance with manufacturer’s standards, instructions, or recommendations, and shall ensure an error of less than 10 percent. Most meter manufacturers specify a minimum length of unobstructed straight piping, both upstream and downstream of the meter for accurate readings. Owners, pump installers and plumbers should use the criteria in this guidance to select an appropriate metering method and meter.
  3. To contact the department for assistance in developing a site specific estimate based on unusual circumstances, call (608) 267-7553 or e-mail at [Lawrence.Lynch@Wisconsin.gov](mailto:Lawrence.Lynch@Wisconsin.gov).

**Table 2**

**Pumping or Flowing Capacity of 70 or More Gallons per Minute**

<p>Constant Rate Pumps – Electric Powered</p>	<p><u>Totalizing Flow Meter.</u> Record the pumpage on the first or last day of each month and calculate the gallons that were pumped between meter readings. See notes 1 and 2, below.</p> <p><u>Pump Fitted with an Hour Meter.</u> This method may be used only if the actual pumping rate is known within a tolerance of plus or minus 10 percent and the pump is equipped with an hour meter. Record the hour meter readings on the first or last day of each month. Calculate the number of hours that the pump operates each month and multiply that by the number of gallons pumped per hour. Constant rate pumps do not pump at a constant rate when the pressure of the water system varies, therefore, when measuring the actual pumpage rate with a device that measures the flow velocity through a pipe (ultrasonic meters, etc.), the person performing the measurement must measure the rate under all anticipated conditions and calculate an average. Examples include a pressure tank and switch with a wide pressure range (e.g. 40 to 60 psig), a center pivot irrigation system that includes additional nozzles that cover corners when those nozzles are only operated during part of the cycle, etc. See note 3 below.</p>
<p>All Pumps Powered by Internal Combustion Engines</p>	<p><u>Totalizing Flow Meter.</u> Totalizing flow meters are the only option because engine rpms may vary over time, thus an hour meter will not provide sufficient accuracy. Record the pumpage on the first or last day of each month and calculate the gallons that were pumped between meter readings. See notes 1 and 2, below.</p>
<p>Variable Speed (Variable Frequency Drive) Pumps</p>	<p><u>Totalizing Flow Meter.</u> A totalizing flow meter is the only option. Record the pumpage on the first or last day of each month and calculate the gallons that were pumped between meter readings. See notes 1 and 2, below.</p>
<p>Flowing Wells   (“Pumpage” includes water that flows from a flowing well, including wells without a pump installed.)</p>	<p><u>Totalizing Flow Meter.</u> Record the pumpage on the first or last day of each month and calculate the gallons that were pumped between meter readings. See notes 1 and 2, below.</p> <p><u>Estimate.</u> Equipment to estimate the flow rate using a method described in Appendix 16 of <i>Groundwater and Wells</i>, 1986, F.G. Driscoll, Johnson Division can be installed. The equipment should be specified by a licensed well driller, pump installer or someone who holds an applicable credential under Chapters 443 or 470, Wis. Stats. Flow rate should be estimated on a monthly basis to account for seasonal variation.</p>

- Notes:
1. Flow meters shall be installed, operated, maintained and repaired in accordance with manufacturer’s standards, instructions, or recommendations, and shall ensure an error of not greater than plus or minus 10 percent. This includes following the manufacturer’s specification for upstream and downstream unobstructed straight piping lengths. Owners, pump installers and plumbers should use the criteria in this guidance to select an appropriate metering method and meter. Flow meters that are installed outside should be protected from frost and a means to drain the meter.
  2. At a minimum, flow meters should be tested for accuracy every four years for meters with a pipe larger than one inch, every ten years for meters that are one inch or less, unless Chapter PSC 185, Wis. Adm. Code specifies more frequent testing. Chapter PSC 185 is only applicable to water systems that are regulated by the Public Service Commission.
  3. When an hour meter is used to calculate pumpage, determine actual pumping rate every four years to account for pump impeller wear. The hour meter should be dedicated to pump operation and should not record times when other equipment is operated, such as center pivot rotation without pumping. A licensed pump installer or licensed well driller should determine the actual pumping rate with an approved method of measurement to an accuracy of plus or minus 10 percent. A person who holds an applicable credential under Chapters 443 or 470, Wis. Stats. may also determine the actual pumping rate. Approved methods of measurement include the following:
    - Ultrasonic flow meter, temporarily installed.
    - Orifice plate meter or venturi meter, permanently installed.
    - Other flow or velocity measurement methods may be approved on an individual basis, submit the specifications and proposed procedures for the alternative method to seek approval before use.
  4. To contact the department for assistance, call (608) 267-7553 or e-mail at [Lawrence.Lynch@Wisconsin.gov](mailto:Lawrence.Lynch@Wisconsin.gov).

## Frequently Asked Questions and Answers

### • I did not need to collect pumpage data in the past. Why do I need to do this now?

Prior to 2007, reporting was only required for a small number of high capacity well systems. The requirement that all high capacity well owners report pumpage is new for 2007.

### • I did not know that I would have to take monthly readings until I received this in the mail. What do I do about the first several months of this year?

Make the best estimate that you can based on your the well usage after you start measuring your pumpage. The department recognizes that the reports submitted by each well owner during the first year of reporting may include estimation errors.

### • I lease out my property with the irrigation well to someone else. I have no way of knowing how much water was pumped. Am I exempt from reporting requirements?

Owners that lease their property to others are not exempt. The owner is responsible for reporting. Ideally, the owner and the lessee can work cooperatively to 1) get the necessary metering devices installed; 2) measure or estimate pumpage; and 3) submit the data to the department. As a more formal alternative, an owner could put a requirement in the lease agreement that the holder of the lease must collect the pumpage data and report that to the high capacity well owner or to the department. If the department is aware that operators will perform the reporting, the department can mail the reporting forms to the operator instead of the owner, upon request by the owner. But, if the operator does not carry out the reporting, the owner is ultimately responsible.

### • I bought the property with the high capacity well mid-year. The previous owner did not give me any meter readings for the first part of the year. What do I do?

Make the best estimate that you can based on the well usage after you bought the property and any estimates you can make about the usage by the prior owner.

### • If I report more water usage than I actually used, does that mean that I will have more water allocated to me next year?

The department does not allocate water based on prior use. You may use as much water as your high capacity well approval allows. You should report the amount that you actually used.

### • I have not used that old well for at least eight years. Do I need to fill out the pumpage form?

According to the well code (Chapter NR 812, Wisconsin Administrative Code), a well that has been taken out of service must be sealed (abandoned in accordance with the well code) within three years. In the near future, there will be a new requirement that this must be performed by a licensed well driller or pump installer. If you have a reasonable expectation that you will use the well within two additional years, you can request approval for up to two years for temporary abandonment. Thus, if you have not used the well for more than three years (five years if temporary abandonment was approved), you should have had the well sealed (abandoned) several years ago. Once the well is abandoned according to code requirements and department records are updated, you do not need to fill out pumpage forms, submittal of the pumpage forms is required until then. Thus, at this time you should report zero pumpage and make arrangements to seal (abandon) the well.

### • What happens if I refuse to report pumpage?

Section 281.98(1), Wisconsin Statutes, provides financial penalties for each violation.