



Agricultural Water Use Reporting for 2006

MICHIGAN STATE
UNIVERSITY
EXTENSION

Changes in Water Use Regulation

Irrigation Fact Sheet #1

Lyndon Kelley
MSU Extension District
Groundwater Agent

Reviewers
Dr. Steven Miller
Visiting Specialist

Dr. Theodore Loudon
Biosystems Ag Eng

Inside this fact sheet

Water use reporting history

2006 Changes in water use reporting

- No "Adverse resource impact"
- Baseline capacity
- Registration of new withdrawal
- GPS location of groundwater withdrawal

Estimating water use

Bringing Knowledge to Life!

Water use reporting history

Two water use laws went into effect in 2004 in Michigan (PA 177 and PA 148). State water use reports are required by many farm operations by PA 148. Complaints from small well owners against large well owners will be investigated by the state (PA 177). These public acts reflect changes to the Natural Resource and Environmental Protection Act (NREPA) and fall under the enforcement provisions contained therein. A copy of the complete acts can be found at <http://www.michiganlegislature.org/mileg.asp?page=getObject&objName=mcl-451-1994-III-1-THE-GREAT-LAKES-327>

Both acts use the same definition for a "large capacity well." Large capacity wells are those with the **capacity** to withdraw 100,000 gallons per day (70 gal/min) on average in any consecutive 30-day period. The combined capacity of more than one well at a site that is 100,000 gallons or greater capacity/day (70 gal/min), also meets the large capacity well definition. Water use reporting also includes surface water withdrawals with single or combined capacity at a site of 100,000 gal/day (70 gal/min) on average, in any consecutive 30-day period. All agricultural water uses (irrigation, cooling, animal watering, etc.) will apply to these laws. Well pumping capacity is included in the well log that should have been filed if the well was drilled after 1968 and are generally available at the local health department, from well drillers or at the MDEQ website (<http://www.deq.state.mi.us/well-logs>).

Act PA 148 established state-wide groundwater mapping and water use reporting. This law created a groundwater resource map of the state and establishes a groundwater advisory committee to direct groundwater protection efforts in the future (see <http://gwmap.rsgis.msu.edu>). The MDA will assemble township-based reports annually and forward them to the MDEQ.

If a producer has a site that exceeds the 70 gal/min threshold capacity, then they are responsible for collecting monthly water use data to file the annual water use reporting forms from 2004 and after. Reports are due April 1st from the previous year. Paper copies of water use reporting forms (when available from the State) will be available from most MSU Extension and USDA Farm Service Centers. Forms may be acquired from the internet at http://www.michigan.gov/mda/0,1607,7-125-1567_1599_29980---,00.html. Forms and useful information on the method of estimating water use are available at <http://web1.msue.msu.edu/stjoseph/anr/irrigat.htm>.

Large capacity water users are required to report the following:

- (a) The amount and rate of water withdrawn on a monthly basis in either gallons or acre inches.
- (b) The type of crop irrigated if applicable.
- (c) The acreage of each irrigated crop if applicable.
- (d) The source/s of the water supply.
- (e) If the water withdrawn is not used entirely for irrigation, the use/s of the water being withdrawn.
- (f) If the source of water withdrawn is groundwater, the static water level of the aquifer/s need to be determined and reported.
- (g) Applicable water conservation practices and an implementation plan for those practices.

2006 change in water use reporting through part 327 of 451

P.A. 33 of 2006 amended Michigan's Natural Resources Protection Act as part 327 of 451. Changes included:

No "Adverse resource impact" Part 327 of 451 establishes "adverse resource impact" as the standard that all large capacity water users must meet for withdrawals constructed after February 2006. Through February 2008 this applies specifically to a restriction on wells constructed within 1,320 ft. of designated trout streams unless the well is over 150 ft. deep or potential need for proof of "no adverse resource impact." Locations of Michigan's designated trout streams can be found at http://www.michigan.gov/documents/Fisheriesrdrs_136765_7.htm#FO210 or through the mapping tool at <http://gwmap.rsgis.msu.edu>. Many of the Michigan groundwater stewardship technicians or MSU Extension agriculture educators can guide you in the use of these tools.

Michigan's Natural Resources Protection Act, 451 includes a section that may make large capacity water users established prior to February 2006 liable for environmental damage due to reduction flow from large scale water usage.

Adverse resource impact as defined by P.A. 33: "Decreasing the flow of a stream flow such that the stream's ability to support characteristic fish populations is functionally impaired, or decreasing the level of a body of surface water such that the body of surface water's ability to support characteristic fish populations is functionally impaired."

By February 2008 a modeling tool will be developed to provide insight as to where withdrawals may be made that have a high likelihood of not having an adverse resource impact.

Baseline Capacity (Rated Capacity): Producers have a one-time option to report, as part of their 2006 water use report, the available capacity of a system to withdrawal water to establish a "Baseline Capacity". The baseline capacity of the system should be reported as pump capacity in gal/min. along with a pump and system description which is compatible with the well log. Baseline capacity applies to both wells and surface water withdrawals. Please note: You should report this baseline capacity value on the water use reporting form on the line listed as "**Rated Capacity**".

From the legal perspective, the Baseline Capacity is the reported system capacity used or developed to make a withdrawal on or before Feb. 28, 2006. If a large capacity water user does not report a "Baseline Capacity", MDA will use the highest annual amount of water withdrawn as reported for 2004 or 2005 and calculate one. Note: Since few producers run pumps continuously, most water users have available system capacities which will greatly exceed the amount of water that has been reported in 2004 or 2005.

Establishing a baseline capacity is important since P.A. 33 provides a statement that existing water users are granted a rebuttable presumption of no "adverse resource impact." No adverse resource impact is the standard that all large capacity water users must meet within P.A. 33 structure. The reputable presumption of no adverse resource impact puts the burden of proof on those challenging a registered large capacity water user's water use. Expanding system capacity by more than 70 gallons/min beyond the baseline capacity, constitutes a new water withdrawal.

Requirement for new agricultural withdrawals: Both new wells and surface water withdrawal capable of 100,000 gallon per day (70 gpm) are now required to register with Michigan Department of Agriculture prior to beginning to pump. Forms are available at same locations as the reporting forms. You will need to provide the latitude and longitude for the location, an estimate of expected water use by the month and an estimate of the volume of consumptive use of the water pumped. Since most water pumped for irrigation ultimately goes to the evapotranspiration of the crop the consumptive use is estimated to be high or about 90%. Water use for harvest cooling is mostly returned back to surface or groundwater so the consumptive use is estimated to be low about 5 to 10%.

Agriculture water use reporting to MDA only: The rarely used option of reporting to MDEQ was removed in P.A. 33 leaving Michigan Department of Agriculture as the only reporting option for agricultural producers.

Groundwater withdraw location by latitude/longitude: Starting with the 2006 report, large scale water users will need to provide the latitude/longitude for the groundwater withdrawal location. This information may be provided by handheld GPS units or the groundwater mapping website (<http://gwmap.rsgis.msu.edu>). Providing the latitude/longitude location of withdrawal will allow mapping and analysis of effect on groundwater and stream base flow by withdrawals in the watershed basin.

Reporting of static water level is no longer required: Static water level reporting was moved from a requirement to report.

Estimating Water Use

Estimating water use can be accomplished by several methods:

- Water application multiplied by number of applications, plus estimate of additional water use.
- Pump capacity multiplied by run time or fuel/power use per hour.
- Flow meters actual flow, note maintenance and calibration concerns.
- Industry average numbers (Mid West Plan Service or ASAE) with appropriate adjustments (not appropriate for high variable water uses such as irrigation).

Conducted correctly, any combination of these systems could produce estimates that meet the requirements of the law. Producers need to evaluate their water use and devise a simple, low-cost, low-time input method to accomplish the goal of the legislation that may improve the management of the operation. Many farm supply houses, greenhouse supply houses and irrigation supply houses carry flow meters and run time timers.

Water application multiplied by number of applications

This system requires no additional equipment irrigators and maximizes the use of irrigation application records most irrigators already keep. Calendar records of applications to field are kept along with rate of application. The numbers of actual irrigated acres in the field are multiplied by the number of applications and rate.

Example: Joe Farmer has a 160-acre field with 142 actual irrigated acres. He applied .75 inches of water at each application. One application was made in June and three during July and three in August.

Month	Number of applications	Rate in inches	Irrigated acres	Water use
June	1	.75	142	106.5 Acre inches
July	3	.75	142	319.5 Acre inches
August	3	.75	142	319.5 Acre inches
Total				745.5 Acre inches

1 acre inch = 27,154 gallons (745.5 acre inches) 27,154 gallons = 20,243,307 gallons

Pump capacity multiplied by run time or fuel/power use/hr

Many pumping systems are equipped with hour meters or run time timers. With an accurate estimate of pumping a producer can calculate water use.

Example: Larry has a pumping plant on the river. He monitors the hour meter to track maintenance needs and now water use. In Larry's pump owner's manual he found that the pump should produce 550 gal/min (33,000 gal/hr) at 80 psi (his standard operating pressure). Larry checked this pumping capacity multiplied by his average run-time to irrigate one inch of water on a field (1 inch on 72 acres in 60 hrs) against the total irrigated gallons needed to apply an inch of water to that field and found it to be very close to (543 gal/min). During June Larry recorded 70 hours of run time, in July 210 hours and in August 200 hours.

Month	Hours of run time	Pumping rate*	Water use
June	70	33,000 gal /hour	2,310,000 gallons
July	210	33,000 gal /hour	6,930,000 gallons
August	200	33,000 gal /hour	6,600,000 gallons
Total			15,840,000 gallons

*550 gal/min x 60 min/hr = 33,000 gal/hr.

Flow meters are mechanisms installed in or on the main distribution pipe of the water supply. The actual flow is measured by impeller or sonar. Flow meters have the advantage of simplicity as meters and can be read monthly and recorded. The disadvantage to flow meters is cost and maintenance. To maintain accuracy meters need to be calibrated at least annually. Meters need to be installed in a straight section of pipe at a point in the transport pipe where all of the water used must pass.

Industry average numbers Industry average numbers are not appropriate for high variable water uses such as irrigation. Although it is very common for people to say corn needs about seven inches of irrigation water/year, actual usage varies greatly depending on the weather (heat units and rain fall), soil water holding capacity and management.

Updated December 2006 (revisions made March 2, 2007)