

FLOWMETER MAINTENANCE AND ISSUES

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INTRODUCTION

In 1945 the Water Appropriation Act was passed by the Kansas Legislature that set forth a number of provisions, including: "All water within the state of Kansas is hereby dedicated to the use of the people of the state, subject to the control and regulation of the state...". In the late 1960's people in the rapidly developing groundwater areas of the state became concerned over declining water levels and the lack of state policy to address the resource concerns. There was strong interest in more local control of the water issues and implementation of water law. This led to the establishment of the Groundwater Management Act in 1972, which set forth the state policy recognizing local management as the best approach. In 1976 the Southwest Kansas Groundwater Management District No. 3(GMD3) was established. Today, GMD3 covers all or parts of the 12 counties in southwest Kansas. GMD3 is the largest district in Kansas covering 8425 square miles that include over 10,000 active non-domestic wells with an average of just under 2 million acre feet of water use reported annually.

IMPLEMENTATION OF FLOWMETERS IN GMD3

Information is the key to good management. In 1992, GMD3 started a flowmeter program which required that all active, non-domestic wells be equipped with an approved water flowmeter. This was done on a four year rotational basis with all wells located in the SE quarter of each section required to have a flowmeter installed in 1992. That was then followed by the NE quarter in 1993, NW quarter in 1994 and the SW quarter in 1995. Flowmeters are required on all non-domestic wells that are active. If the well/land is in a conservation program, it is not required to have a flowmeter installed, but the flowmeter is required prior to the well being put back into service.

The flowmeters must be on the State's list of acceptable flowmeters. In the beginning, it was required that the flowmeter either have sufficient spacing from pipe obstructions or have straightening vanes. But spacing could be waived if the flowmeter installation was verified to be accurate. A main issue on the installation was measurement of all the water pumped from a point of diversion. It remains to this day the responsibility of the well owner to insure the flowmeter continues to operate satisfactorily. The operator was required to report the meter readings on the annual water use reports submitted to the state that are required by statute.

EARLY MONITORING AND COMPLIANCE

In the early stages of the metering program, we would do random inspection or a full inspection of a particular instillation if there was a compliance issue. We tried a self monitoring method with the producers. If they found their meter was not working correctly they were to notify our office and we would issue a "Safety" tag that would be placed at the location while the meter was removed. This allowed us to track the flowmeters and gave inspectors a visual sign that the meter had permission to be taken off for service. The tags were good for 15 working days. We would schedule follow up visits to ensure that the service had corrected any problems and the meter was now working correctly.

In 2003 GMD3 implemented a seasonal meter inspection program. Our office would hire three to four seasonal employees and assign them hundreds of wells to inspect. The program was to visit two thousand or more wells a year. The information they collected was submitted to our office bi-monthly. This type of program has continued to today. If a problem or a noncompliant meter is found, our office is notified within 24 hours. This starts the process to have the noncompliance corrected in a timely manner. The data taken from these inspections also allows us to monitor the pumping rates and supply changes across the District.

CURRENT ISSUES

The flowmeter is a mechanical device that can be prone to malfunctions and be cause for unreliability if they are not properly installed and maintained, or have faulty parts or instillation. Through the years of the GMD3 metering program we have seen a lot of different issues, but we will discuss the most common.

The most common issue we see is that the flowmeter is just not working which could be due to a variety of reasons. There could be something lodged in the propeller preventing it to spin. It could also, for example, have impeller bearings that locked up or any of several other mechanical failures. The operators do not always catch these failures, because the instantaneous reading could still be working, but the totalizer, which is the accurate part of the mechanics, may fail. These two functions, on certain flowmeters, sometimes work independently of each other. Since it is the totalizer that must be reported every year, it is critical to make sure that mechanism is always functioning. Meters that are found not working, must be repaired right away and the operator must then submit a flowmeter repair/replacement report to our office or the State. We have also recently begun to ask for a copy of the invoice as documentation of the repairs .

We do see quite a few cases in the field where the meter register is not readable. The biggest reason for this is moisture inside the lens. We have talked to most of the manufacturers and have been told that if there is moisture inside the meter, it is not reliable and could fail at any time. This is another case where the operator will need to send the meter in for repair and report to us when it is fixed and installed.

A requirement of the State is that all flowmeters must have a manufacturer's seal on it. The seal indicates the manufacturer's warranted reliability. And, the lack of a seal can sometimes indicate that the meter was tampered with. Unfortunately, over time, the seal can just fall off from exposure. In this case the operator has two alternatives. If they believe that the meter is working properly and it is just missing the seal, our office can perform a flow verification test. If the installed meter is within +/- 6%, we will put our seal on the meter, and that is acceptable. If the operator has any concern about how the flowmeter is operating, the meter must be sent to a certified repair person and they will put a seal on it after confirming accuracy.

We also see cases when the flowmeter is not installed properly in the pipe. This can mean it is on backwards, not installed where it will measure all of the water being diverted or does not meet current meter installation requirements. Today, if a well is redrilled or if the operator installs a new flowmeter, it must have at least 5 pipe diameters upstream and 2 diameters downstream of unobstructed straight run from the meter sensor. This rule applies unless the manufacturer has more stringent requirements. The meter must also have straightening vanes and be installed in a manufacturer approved measuring chamber. If spacing is not met the operator will have to make adjustments to the installation to make

sure it meets current regulations. These regulations are intended to assure that in most cases, the flowmeter will function properly and an accurate measurement will likely occur.

In many areas within the District, the wells can no longer pump at the rate they were originally certified as producing. This can lead to a flowmeter not having a full flow of pipe across the measuring device. The operator will again need to make the proper corrections to ensure that there is a full flow of pipe across the meter or the meter performance will be compromised.

SERVICES PROVIDED

Our office continues to work with operators to achieve the best records are maintained in order to managing the water in our District. We can't manage the resource without good information. There are several services that we provide to assist water users.

In order to give the operators the best information on flowmeters, our office is constantly in contact with meter manufacturers. We try to keep up to date with the new technology in flowmeters and have a good understanding of how the meters work. This allows us to help operators determine what the problems might be for their installed meters and provide the best solution to the operator.

We continue to stress the importance of maintaining a properly working flowmeter. A good way to look at it is that the flowmeter needs to be treated just like any other equipment the operator uses. It is always good to do routine inspections and maintenance on the flowmeter. A well maintained meter will be more able function properly and most of the time, require less costly repairs.

GMD3 has staff that is certified by the State to perform flow verification tests on installed flowmeters to determine accuracy. We are also required to have our non-intrusive meters certified every year for accuracy traceable to NIST standards. We also perform random tests across the District throughout the year and at the request of the operators.

The best and sometimes most difficult thing to do is education of the operators on how to maintain the flowmeters and use them to their full potential. We are constantly encouraging people to time their meters and do simple, easy inspections on the flowmeters. If the operators would do self-inspections on the meters they could avoid the more expensive repairs. We also try to let people

see the advantage of taking ten minutes to calculate what the meters are actually registering. This is a good way to keep track of how much they have pumped and can give the operator the ability to determine if the meter is not totalizing correctly

If you have a properly working meter, it can help you monitor your water usage, which could prevent water right enforcement actions later on. The best example we can give the operators is to look at their water rights as a checking account. They can start the year out with a full allocation in their account. As they pump the well, they are withdrawing from the account. The flowmeters can indicate how much is withdrawn and how much is left. It is also a good comparison to say that if you overdraw your checking account, there can be severe penalty. This is the case if you overpump your water right.

In this day and age, it is easy to get information out to a lot of people by using the internet. We offer a lot of different types of assistance from our webpage, and soon will offer even more. If the operator has to repair their flowmeter they can get the report that they will need to turn into our office. There are instructions of how to time your meters, perform quick inspections, and spreadsheets that will help them keep track of their water account.

TEMPERATURE LOGGERS

A new program we are working with is the installation of temperature loggers used in the shipping industry to track groundwater well operations. We have done some testing in the last couple of years with installing inexpensive temperature loggers on the discharge pipe to record the temperature of the pipe every 15 to 30 minutes. When the well is pumping, the discharge pipe will maintain a fairly constant 60-65 degrees. This allows us to calculate how many hours the well operates. If we know the flow rate, we can estimate the amount of water pumped and when. This is a relatively easy way to back up the flowmeter data and gives our office valuable information about the timing of water applications. Currently we have the loggers installed on all of the wells that we are required to monitor by contract each year, as well as on some wells that have had noncompliance issues and need added supervision regarding well operations.

Give us a call if you have questions or would like to discuss this information further.