

Replacement of Raw Water Meters – Groundwater Well or Surface Intakes

Most water right owners, city officials, engineers, consultants, and others, are aware that when a new or expanded water supply project is planned, they must consider whether the project will require the filing for new appropriations of water under the Kansas Water Appropriation Act (KWAA). If they anticipate diverting or pumping more raw water than their current water rights allow, or diversions at a higher rate, for example, if pump capacity will increase, additional permits are probably necessary. They usually are aware that they will likely need to file change applications for all of their existing water rights if they are going to serve new customers or are planning new service connections between public water supply groups. But, many may not be aware that projects involving the replacement of meters that measure raw water must also consider requirements under the KWAA and any new meter installations for raw water must meet the most recent requirements of the KWAA.

Most, if not all, public water supply systems have water flowmeters installed that measure the raw water diverted. Many public water suppliers installed water flowmeters before the Division of Water Resources (the Division) required specific metering. Although some diversions were required to be metered before metering requirements were specified by the Division, the Division first developed and the Chief Engineer adopted specific water flowmeter requirements in February of 1985. At that time, there was a list of water flowmeters the Division recognized and the



The location of this meter installation would likely contribute to accuracy problems if it was not a positive displacement or multi-jet model. The elbow, pipe size reductions and injection ports could cause inaccurate measurements of water quantity diversions.

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specifications required installation of water flowmeters with the five pipe diameters upstream and two pipe diameters downstream of straight-run pipe. Additionally, the specifications required all meters to be installed per the manufacturers' requirements. While most existing systems had already metered their diversion points, approvals of new permits and some change application approvals required the owner to install a water flowmeter per the February 1985 specifications adopted by the Chief Engineer.

On September 22, 2000, the Chief

Engineer of the Division of Water Resources adopted specific regulations, K.A.R. 5-1-4 through 5-1-12, regarding water flowmeter installations. After that time, all new permit approvals and many change approvals required the owner to meet these new metering requirements. These regulations also required that raw water replacement meters and voluntarily-installed meters be in compliance with the regulations adopted on September 22, 2000, for meter acceptability, performance and installation. Additionally, the Division issues basin-wide meter orders requiring owners of water rights to install meters in compliance with these most recent regulations. A Kansas Water Plan goal of state-wide metering by 2015 is in place.

Division staff performing routine compliance investigations are finding numerous water flowmeter installations that have occurred post-September 22, 2000. Many of these installations do not meet these regulations. When this



The presumably easy meter replacement shown in the left photo did not meet the “two pipe diameter downstream spacing requirement” of the state meter regulations. Moving the meter upstream, as shown on the right, was a costly modification of a preventable oversight.

happens, the Division sends the owner a standard letter that we call the Not-In-Compliance-Letter (NICL). This letter identifies that Division staff inspected the diversion works and found that the requirements not met, and provides information to achieve compliance with the requirements. The letter provides a deadline to complete the work and allows for extensions to the deadline for good cause.

Rules and regulations that are in place under the KWAA include Kansas Administrative Regulations (K.A.R.) 5-1-4 through 5-1-12. These regulations provide specifics about meter installations, including minimum requirements for certification, installation specifications, maintenance requirements, criteria to determine when a water flowmeter is out of compliance, duties of a water right owner when the water flowmeter is out of compliance, water flowmeter testing, provisions under very specific circumstances for variances or waivers of water flowmeter regulations, and, finally, identifies the list of certified water flowmeters.

The meter regulations require the following:

- 1) Installation of a water flowmeter that is listed on the list of water flowmeters certified by the manufacturer to meet the specifications of the Chief Engineer.
- 2) Except for positive displacement, full-bore electromagnetic, and multi-jet flowmeters, the water flowmeter must have an approved

measuring chamber and flow-straightening vanes. Some manufacturer models have measuring chambers and vanes, flow conditioners, or strainers, which are integral to the unit.

- 3) Except for multi-jet and positive displacement type meters, the meter must be installed in a manner that allows for five unobstructed straight-pipe diameters upstream of the sensor portion of the meter and two unobstructed straight-pipe diameters downstream of the sensor portion of the meter, regardless of the manufacturer’s installation recommendations. The

Division defines “straight pipe” as a straight length of pipe free of all internal obstructions, including size changes, valves, cooling coils, injection ports, sand or foreign material, and any other condition that would cause a disturbance of the internal velocity profile in the pipe.

- 4) All manufacturer installation requirements must be met, as well as any addition requirements specified for any individual meter by the Division. Most manufacturers recommend seven to ten pipe diameters of unobstructed, straight pipe upstream, for example.

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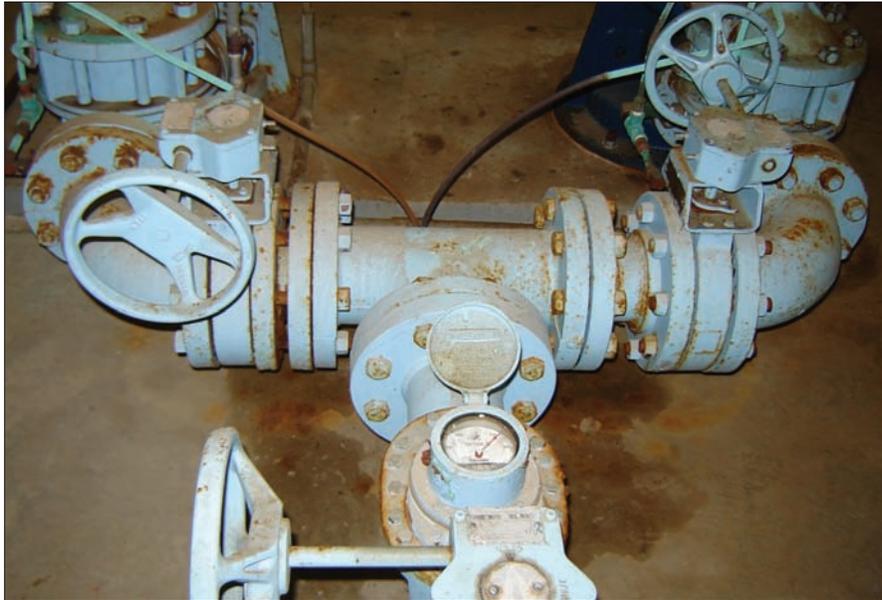
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Replacement of Raw Water Meters

Public water supply systems are regulated by several different agencies, each of whom is often focused on different aspects of the system. The Kansas Department of Agriculture, Division of Water Resources has regulatory authority over the water rights that authorize the diversion of raw water and the components of the system that account for the diversion under the KWAA. The Kansas Department of Health and Environment is focused on regulatory oversight of public water systems and safety of those systems, which includes the wells being designed as municipal supply wells and treatment of pumped water. The Division's regulations regarding water flowmeters are in place in order for the owner to accurately determine and report water use within a +/- six percent tolerance to the Division and for the Division to certify water rights, determine compliance, and to properly administer water under individual water rights.

While most of the water rights in the western two-thirds of the state of Kansas have had a meter order issued



Replacement of this meter, when the time comes, will entail significant changes of piping and valving to comply with the September 22, 2000, regulations, unless the replacement meter is classified as positive displacement or multi-jet meter.

or have had new or change approvals specifying these recent requirements, many older rights in the eastern-third of Kansas have not been required by order to meet the requirements and the owners may not be aware of them. The Division anticipated issuing meter orders by January 1, 2011 for surface water diversions in the Stafford and

Garden City Field Offices territory, for the Big Blue River basin, and the Black Vermillion River basin in the Topeka Field Office territory. Additionally, it is likely the Division will issue a meter order for the water rights in the Marmaton River basin by summer 2011.

As mentioned earlier, recent investigations by Division staff have identified a significant number of projects where water flowmeters have been installed after the September 22, 2000 date, which do not meet these regulations. In these cases, the Division has no choice but to declare the water flowmeter installation out of compliance, to issue the NICL letter, and require the owner to properly meter the diversion. This can occur at a considerable cost to public water systems, particularly if the original work contract with all contractors and sub-contractors did not specify that all state requirements be met in the completion of the project. The most common problems the Division sees are:

- New meters installed that are not on the list of certified water flowmeters.
- Meter installations that do not have the required five upstream and two downstream pipe



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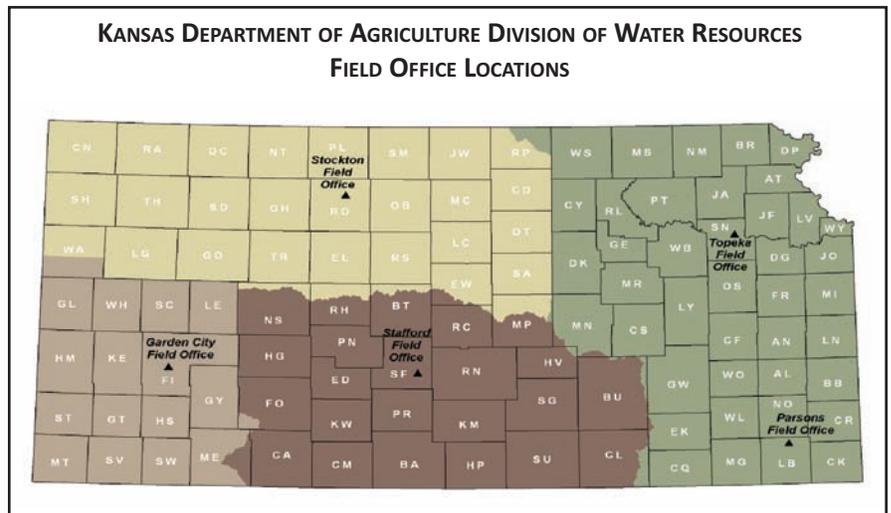
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diameters of unobstructed straight pipe from the sensor portion of the meter. Mostly we hear that the water flowmeter manufacturer installation requirements indicated that the water flowmeter can operate properly with less than the five and two spacing, however the Division's spacing requirements are the minimum. The other problem we see a lot here is valves, injection ports, and particularly reducers that are located within the required spacing, which do not meet the definition for straight run pipe.

- Water flowmeter installations of meters that have additional requirements by the Division that are not met. These requirements are identified in the column on the far right of the list of certified water flowmeters. For example, the certified list identifies that a Neptune model HP Turbine must be installed with the optional upstream strainer and SB 44 bolts to be considered in compliance. We often run into installations where the required optional strainer was not installed.
- A new water flowmeter or water flowmeters are installed but the public water system fails to notify the Division by form titled "Notice of Completion of Diversion Works and/or Report of Flowmeter Installation," form DWR 1 203.11, as is required by regulation.

While there are provisions that allow a previously installed water flowmeter that is tested to be operating within the +/- six percent tolerance to be exempted from enforcement action related to non-compliance of the water flowmeter regulations, essentially allowing the owner to use an accurate previously-installed meter until it breaks, no longer functions within the +/- six percent tolerance, or piping changes are made, the provisions do not allow for exemptions of meters that were installed after September 22, 2000.



In times of reduced revenue and belt-tightening, when every public water system stretches every dollar as far as possible, the Division understands the concern by board members, directors, city representatives, etc., when problems are discovered.

In times of reduced revenue and belt-tightening, when every public water system stretches every dollar as far as possible, the Division understands the concern by board members, directors, city representatives, etc., when problems are discovered. When the Division inspects a water flowmeter installations, finds a problem, sends a NICL letter, and requires significant changes to the installation, or in some cases, complete rebuilds, we understand the frustration and anger that can result. Our hope is that this article will make water right owners, city officials, engineers, consultants, and others aware of this very serious and potentially costly issue in order to

properly install new water flowmeters per the regulations of the KWAA at the time of installation and therefore avoid compliance problems after the fact.

The Division operates four Field Offices. They are located at Garden City, Stafford, Stockton, and Topeka, with a satellite Topeka Field Office in Parsons, Kansas. If you have any questions on water flowmeter installations, contact the field office for your area according to the map above. We'll be happy to answer your questions about water flowmeter installations.

You can also find additional information regarding this topic at the metering section of the Kansas Department of Agriculture Division of Water Resources web site at: <http://www.ksda.gov/appropriation/content/274>, including copies of the list of certified meters, the specific meter regulations, and other information about metering.

Katie Tietsort holds a B.S. in Geology and in Natural Resources and Environmental Science and an M.S. in Geology from Kansas State University. She has been with the Kansas Department of



Agriculture – Division of Water Resources for nine years and has been Water Commissioner in the Topeka Field Office for the past six years.