

## CASE STUDY

# Lower Republican NRD Standardizes On Propeller Flow Meters

*Author: Ken Quandt, Sr. Member Technical Staff, McCrometer, Inc.*

Water resources in the Republican River Basin are apportioned based on a 1941 U.S. Supreme Court mandate. This tri-state water usage compact between Nebraska, Colorado, and Kansas, requires periodic reporting to verify that each state's agreed upon water use limits are being met. In addition to other responsibilities, the Lower Republican Natural Resources District (LRNRD) was created in 1972 by the Nebraska Legislature to manage groundwater resources subject to the constraints of the Republican River Compact.

Located within the lower reaches of the Republican River watershed in Nebraska, the LRNRD encompasses approximately 1.5 million acres within five counties.

The district is funded primarily by property tax assessments but also receives federal cost-sharing funds, state grants, and special assessments.

In 2000, the LRNRD implemented its irrigation metering program for local farmers to comply with the requirements of the tri-state water compact. There were approximately 3,500 wells in use by district farmers on about 325,000 acres of irrigated land, which is primarily dedicated to corn production for livestock feed. The initial flow meter requirement was phased in over several years, and included different brands and technologies. McCrometer provided mechanical propeller meters and there were various suppliers of electronic meters. The first installation phase was completed in 2004.

Bryan Lubeck, LRNRD Assistant Manager, says, "We quickly found, however, that we had a problem with the reliability and accuracy of the electronic meters from the other suppliers, which is now being solved by what I believe is the best flow meter in the agricultural irrigation industry. The McCrometer Mc® Propeller Flow Meter with its integral FS100 Flow Straightener is the right product at the right time for us."

In 2012, based upon the success of the mechanical meter, the board of directors and management team at the LRNRD decided to standardize the type of flow meter required of local farmers to ensure accurate irrigation water flow measurement.

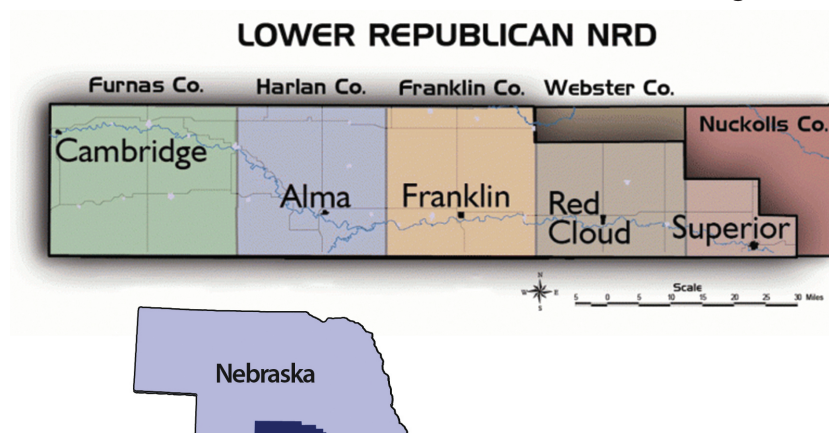


Figure 1: Lower Republican NRD Map

## The Problem

All irrigators in the LRNRD have had flow meters on their wells for almost a decade for water allocation purposes. Once a year at the end of the irrigation season, the staff of the LRNRD visit each metered well site to document usage, recording total volume for compliance with water allocations.

Each farmer is allowed an allotment of no more than 45 inches of water per irrigated acre over a 5 year period, averaging 9 inches per year. There are penalties in terms of future allocations if farmers exceed the 5 year limit. The reliable operation and accuracy of each flow meter is therefore critical to each farmer's operations. In addition, accurate measurement ensures the district complies with the tri-state compact and avoids non-compliance penalties that could hurt all farmers in the LRNRD.

2013 is a particularly important year for the LRNRD because it faces two challenges. First, it is a Compact Call Year requiring a state audit of water usage, which makes meter accuracy a vital issue. Second, the region has been experiencing a prolonged drought which could reduce the annual average irrigation water allocation to farmers to less than 9 inches per year if surface water resources in the basin are significantly impacted. With these critical issues to address, the board agreed that it was time to require the replacement of the electronic flow meters to a more completely reliable, accurate and foolproof metering solution.

The staff of the LRNRD had experienced many issues with the accuracy and dependability of electronic flow

meters. This was due in large part to inherent design features common to many of the other electronic meter brands. One major issue was that batteries would frequently fail from an inability to withstand the harsh Midwest summer and winter climates. Unstable electrical connections such as alligator clamps were prone to electrical failure. In addition, manual on-off switches were subject to human error. These issues often caused the electronic meters to shut down and not properly record water use.

Bryan Lubeck, LRNRD Assistant Manager, says, "We initially accepted the installation of the 150 electronic technology flow meters because of the straight run requirement for mechanical meters, but we knew that we needed a better solution going forward. That's where McCrometer really helped us out with their reliable and durable Mc Propeller Flow Meter that incorporates the flow straightener technology."

## A New Solution

Lubeck and his staff at the LRNRD contacted McCrometer about a new solution after the LRNRD board decision. A world leader in flow measurement for agricultural irrigation since 1955, the applications team at McCrometer suggested the McCrometer Mc Propeller Flow Meter with an integral FS100 Flow Straightener. The integral flow straightener eliminated the previous straight-run installation problem, and the Mc Propeller meter's mechanical register operates



Figure 2: Mc Propeller Flow Meter With Integral FS100 Flow Straightener



Figure 3: The Mc Propeller Flow Meter's Mechanical Register

whenever water passes through the meter's propeller assembly . . . it's always on and measuring flow.

Lubeck is enthusiastic about the ease of installing the solution provided by McCrometer and said, "Installing the new Mc Propeller Flow Meter with the built-in flow straightener as a system simplifies the process. All you need to do is remove a section of the pipe and install the new sleeve. It doesn't take all that long to finish up. Now you don't really need to worry too much anymore about the straight-run requirements upstream and downstream from the meter."

The new Mc Propeller Flow Meter system with integral flow straightener comes preconfigured from the factory with an in-line sleeve tube that is installed directly into the pipe with minimal effort. The flow straightener installed with the flow meter virtually eliminates the need for straight run pipe, making it the ideal solution where accurate flow measurement is needed in a tight space. The LRNRD is assisting farmers with a unique \$500.00 cost-sharing program for each meter installed to help lessen the impact on farmers switching to the more reliable Mc Propeller meter, which delivers accurate data dependably over a long life.

Unlike traditional propeller meters, the rugged Mc Propeller Flow Meter features a flexible drive-train assembly that includes built-in UltraShield™ technology. The optional durable Marathon™ bearing assembly provides accurate flow measurement for higher than average flow rates and added protection against sand, grit and debris. Without the need for

external power, batteries, wiring or switches, the Mc Propeller meter is designed for accurate, problem-free service and is capable of reliably withstanding even the most severe conditions.

Standard features include a six-digit totalizer and instantaneous flow rate indicator. Its unique design makes it easy to install and service in the field. The McCrometer flow meter is a water management tool that helps to reduce overall water usage, allowing for improved management of water resources in areas such as the Republican River Basin where conflicts have arisen between various water users.

The Mc Propeller Flow Meter with FS100 Flow Straightener provides a total system solution for both retrofitting existing well sites and new installations. Unlike traditional straightening vanes, the conical design of the flow straightener flattens the velocity profile, while the entire vane's welded-to-cone design corrects for swirl at the same time.

## Results

The Lower Republican NRD staff has been very pleased with the results from the Mc Propeller Flow Meter with integral FS100 Flow Straightener installations, which have provided them with multiple benefits in terms of measurement accuracy, cost, durability and reliability. The NRD staff knows that they can rely upon McCrometer meters to accurately measure all of the water being pumped, helping them to meet Compact Call requirements in 2013 and address local drought conditions.



Figure 4: Mc Propeller Flow Meter With Integral Flow Straightener Installed At A Pump Station