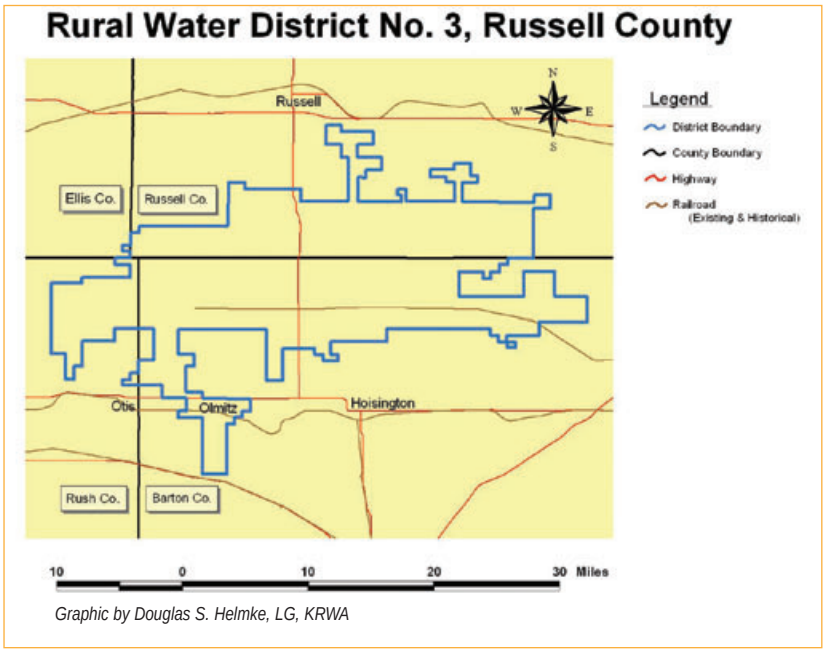
by Doug Guenther

Data loggers are efficient troubleshooting tools

Rural water districts, more so than smaller cities, have always been caught in the Catch 22 situation of being able to afford only so much of a project, or facing having no funding at all – to then only 10 or so years later, find that many of the system's pipelines are not adequate to meet demand. Certainly demands for service change, as do prospects for funding. This past winter, I have used a new tool to help several cities and RWDs try to better understand the operating conditions in their systems where pressure or capacities were problems. The tool is the revolutionary new data logger.

Doug Guenther
Tech Assistant

For many years, KRWA has provided and used chart recorders in both rural water districts and cities to monitor pressures at various locations in those systems. The chart recorder was a device that monitored and recorded pressures in pipelines, generally on a circular type chart. KRWA has often conducted such monitoring at the request of the utility. In numerous cases, KRWA has provided support services to engineering firms, or to KDHE, as they wanted verification of system conditions to ensure that the utility was providing adequate service. KRWA provided the resulting monitoring data in chart form so the utility could then incorporate it into their analysis or hydraulic model. A hydraulic model is a valuable design tool to simulate operational changes, emergencies and any additional loads on the system. The real goal of the model is to determine the most cost-effective sizing and/or location of additional facilities.



Graphic by Douglas S. Helmke, LG, KRWA

Russell RWD 3 serves nearly 500 customers along 400 miles of distribution system. Water is purchased from the City of Otis. The District's rates are $18.20 for the monthly minimum and then $3.90 per thousand for all water used.

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This past winter, I've had the pleasure of working with Russell RWD 3. We are in the early stages of trying to help the operators and the district's board of directors to better understand the effects of flow and pressure, etc., on their system. Russell RWD 3 was constructed in the 1970's with solvent-weld PVC. The district has seven standpipes; some are only four feet in diameter. No, they wouldn't build it that way today – or so we'd like to think – but the original developers of the project built the system that was designed and that funding supported. The operators and board members have worked since to make that system work and they continue to do so. Sometimes it appears to have been unnecessarily complicated – but that is second-guessing an engineer and that's the last place I want to take this article. The

district is plagued by oil field activity, sustaining many cut waterlines by all the oil field work.

Reviewing Russell RWD 3

Russell RWD purchases water from the city of Otis. Otis is at nearly the highest point in the rural water district's service territory. The district has a booster station near Otis that pumps water to a standpipe just north of the station. This lead tank is at an elevation above all the other standpipes in the district; however, subsequent booster stations are used to fill the storage tanks at the lower elevations. That design originally was followed so that pipeline sizes could be reduced and that there would be some 'control' of an expansive pipeline network. Russell RWD 3 serves nearly 500 customers, including the city of Susank. The district has 400 miles of pipeline. The district is accustomed to having many leaks in the north and east sections of the district. Some leaks are blamed on having high operating pressures necessary to push volumes of water through small diameter pipelines.

A distribution system of this magnitude requires a lot of attention. The district has the benefit of a computer display (SCADA system), showing pump operation and the water levels in the tanks. The SCADA system provides alerts to problems. Pump failure or unexpected high usage both have the same effect – declining water in small capacity storage tanks. If not addressed in rapid order, users can be without water service.

New data loggers help

At Russell RWD 3 and elsewhere, KRWA has begun to use new "data loggers" in place of chart recorders. The data loggers provide greater benefits. Data loggers are much more sensitive. They provide more information.

When used in combination with flow metering, data logging can create useful charts that help explain demand patterns. Pump "on/off" (cycling) and pressure fluctuations at a particular location, and not generally reflected across the distribution system, can signify a possible loss of water through leakage. That's the sort of information that the data logger can collect.

Another benefit of a data logger vs. a chart recorder is that the data logger is more accurate. It looks like a hockey puck – and downloads its information to a computer. Charts are then generated and viewed on screen or printed for archiving. The information can be viewed in 'real time' or downloaded when needed. Battery life is five years, typically at one-minute sample intervals. The units KRWA has purchased store 7,936 points and can be adjusted to collect a reading from 10 seconds to 24 hours in 10-second increments. It measures just over one inch by a little less than two inches and is encased in 316 stainless steel. Data loggers eliminate the often troublesome chart paper and ink pens in the field!

The big advantage of a data logger over a chart recorder, in my opinion, is that I can now store the data as I would any document on

Ron Nuss, Manager/Operator for Russell RWD 3, reviews maps and determines where to place data loggers to monitor system pressure.

my laptop. I can open it, save it, copy it – even email it directly to the engineer. The data can be imported into spreadsheet and word-processing software. It's also possible to import data from multiple data loggers into a single graph. The data loggers are remarkably portable, meaning that they can be moved and installed at various points in the system. The data collected can then be compared to the booster pumping and tower level graphs stored on the district's SCADA system. By placing several loggers in the system at the same time can help demonstrate the effects of what happens when a pump turns on or tower valve opens or closes.

Russell RWD 3 has changed the valves and plumbing at two of their standpipes so that they fill from one direction and supply demand to the other side. This has helped with pressure problems. These plumbing changes were made by removing the altitude valve type controls and installing a positive open and close (solenoid control) with check valve.

I do not suggest that I'm any expert on use of data loggers to monitor system operations. I had a lot of trouble in just getting them to work with my laptop computer in that the download cable was a nine-pin female serial port from the logger to the computer and this computer has no nine-pin male serial port on it. I purchased a cable from Radio Shack that converts nine-pin male to USB; that didn't work until the computer was configured along with software installed to work together. Regardless of the technical hassles, I think data loggers will prove to be useful tools for operators to troubleshoot problems in their systems. I'd be pleased to show anyone the units I use and how I use them. To my way of thinking, the data loggers can help identify conditions that indicate problems. When board and councils and operators see and better understand the data collected, then the next step will be to begin the process of developing a full hydraulic model, again with the goal being that appropriate and cost effective remedies can be developed.

The 2005 KRWA conference will be here in a few weeks. I hope you will plan to attend. I hope you will mark the sessions listed below so someone from your city or RWD attends them. I look forward to seeing you there.

KRWA Annual Conference & Exhibition March 29-31, Wichita, Kansas

Wednesday, March 30

- *Getting The Right Help From The Right Service Providers,* presented by Carl Brown, Missouri Dept. of Natural Resources
- *Territorial Agreements and 1926(b) Issues*, presented by Elizabeth Dietzmann, Attorney, Rolla, Mo.
- *Water Rate Checkup: Kansas' New Software Program For Systems*, presented by Cathy Tucker-Vogel, KDHE
- *Handy Dandy Window Tips And Tricks*, presented by Merle and Linda Windler, Thoroughbred Systems, Inc.
- *Water Main Extension Policies And Working With Developers*, presented by Dennis Schwartz, Shawnee RWD 8.