by Jon Steele, Circuit Rider, KRWA

Four years of work brings Arlington, Kansas a new water source

The city of Arlington, KS, population 440, is located in Reno County, approximately 20 miles southwest of Hutchinson on K-61. Public water supply systems in the area are challenged to maintain water quality as the surrounding area has irrigated corn and some wheat. Crop production uses lots of water-soluble nitrogen. It's safe to say that a portion of that fertilizer ends up in the groundwater especially for the shallow aquifers and sandy soil conditions around Arlington.

Since the early 90's, nitrate levels in Arlington's wells would vary from 9 to10 mg/l, and at times, would exceed the drinking water contaminant level of 10 mg/l. Former operator Todd Powers told me that the city mailed public notices when required by the Kansas Department of Health and Environment (KDHE), and the city would also provide bottled water for all citizens who wanted it. Other than the nitrate level, Arlington's wells produced good quality water. Although never fully determined, the source of increased nitrate in the groundwater was attributed to fertilization of irrigated corn grown in the area. There were also old septic systems close enough to the wells to be contributors to the problem. Whatever the cause the results are the same – the city would either need to install and operate a treatment system or find a new source.

Three mayors, four city clerks and three operators ago, I began work with Arlington to help them achieve better drinking water.

Brad Vincent, Ground Water Associates, Wichita, KS, examines cuttings from a test hole being drilled for Arlington by Clarke Well & Equipment, Great Bend, KS.

Three mayors, four city clerks and three operators ago, I began work with Arlington to help them achieve better drinking water. I attended several council meetings and made many on-site visits to discuss every phase of planning for the improvements that would be needed.

We started with finances and water rates. KRWA's quick rate study showed that the rates were insufficient. Any time a city or RWD is going to incur debt, the entity needs to be prepared to increase rates to make principal and interest payments and cover costs of operation. I demonstrated to the city council that the water at the time was costing the city $1.96/1000 gallons to produce, however the city was only charging $1.00/1000 gallons. The minimum charge was $4.50; at the time, the city had no debt service. The rates were adjusted in 2002 to $1.50/1000 gallons and a $7 minimum. I knew the new rate was not going to generate enough revenue fast enough to pay for the preliminary work for the new water project – but it was a step in the right direction. After several meetings with the mayor I was able to convince him that the city needed to increase the rate again. In July 2003 the rates were adjusted to a $10 minimum with 1000 gallons included and $2/1000 thereafter. This rate change was made in an effort to generate enough revenue to pay for the preliminary engineering report and services of a groundwater geologist, test drilling and purchase of a well site. My suggestion to the council was to increase revenues to have funds sufficient to pay for all the preliminary work and have water rights when applying for financing.

I recall many discussions about a treatment plant or a new source. The treatment option was not the best

This photo shows one of two new wells installed for the city of Arlington. The city obtained a $400,000 Kansas Public Water Supply Loan; the program is administered by the Kansas Department of Health and Environment.

option. The existing wells were installed in the 1930's and one of the two had a failure with a casing. I suggested that a new source be developed instead of installing and operating a treatment system.

In an initial effort to try to locate better quality water, City Superintendent Al Cressler and I took 16 samples of water from surrounding existing wells including domestic wells and irrigation wells. The samples were analyzed for five basic water quality parameters including nitrate, total hardness, iron, manganese and chloride. We hoped to find good quality water upstream of the town, distant from livestock or human activity – perhaps in permanent grassland and an electric power supply close by.

During our search and study we found nitrates ranging from as low as 1 mg/l and as high as 16 mg/l. Sites were up to five miles west of town. I believe some of the home sites we tested were contaminated from their own septic systems. The irrigation sites were also high in several locations. With the help of Robert Vincent of Ground Water Associates, Wichita, KS, we developed a map of potential test sites considering the sampling Al and I did. A site was located east of the city that appeared to be best. There were no known or potential contamination sources. Nitrates were very low at the site and surrounding area. The land had easy access; it was not subject to flooding. There was three-phase power available. The city was able to negotiate a fair purchase price with the landowner. Also, the city would eventually pick up five more paying customers along the .75-mile of new 8-inch transmission line.

A couple of things I think are worth mentioning here. When negotiating for the land I think it's important to make a generous offer to begin with for the ground. Since there were water rights available the city was paying for ground only, which made the deal a whole lot easier on their budget as water rights are becoming more valuable and expensive all the time. Arlington also practiced good public relations; thank you letters and a small gift were sent to all landowners who allowed test drilling.

The construction of the project actually went pretty smoothly with only some minor glitches. But a real scare hit once the production wells were drilled and they began to pump water into the system. The nitrates shot up to just over 9 mg/l. This was to the amazement of everyone as all proper precautions had been taken to ensure a "nitrate free" site had been selected. All surrounding testing had low nitrate; the test well at the site was low and the area up gradient was pastureland. Yet, the nitrates increased overnight! With the nitrate still below the drinking water limit, the city continued to pump the new well. The nitrate level began to lower, down to 6.5 mg/l. It is expected to eventually decrease to 2 mg/l as originally tested. There was a small place where drainage water stood on the well site. That drainage may have contained some irrigation runoff. The nitrate didn't show up during the test pumping which was conducted at a relatively low rate compared to the production rate of 400 gpm. The higher pumping apparently drew the nitrate in. It's expected that the nitrate will simply pump out to be comparable with the level in the surrounding area.

As part of the project, the city reconditioned and retained one of the original wells for a standby; the other well was plugged and the pump house was removed. New water rights had to be obtained on the new wells instead of being transferred since they were nearly two miles away. The city pumps

This sign posted on the door of the pump house is a reminder for the efforts of former Mayor James Prickett for his work in helping Arlington develop a new water source.

an average of just under 20,000,000 gallons annually.

Construction on Arlington's project began in November 2007; two 400-gpm wells were drilled; a meter and chlorination building was constructed.

Arlington Superintendent Al Cressler turns on the ventilation system in the new chlorination building. The project consultant was Schwab-Eaton, PA., Manhattan, KS.

The pumps are operated at 200 gpm and controlled by Square D Flex Drive motor controllers. Telemetry controls are provided by Comm-tronix/Wichita Communications, Wichita, KS.

The system uses an automated chlorine adjustment based on flow rate from a Regal Smart Valve System. An extra transducer was installed to control the system in an emergency situation without the tower. The motor drives automatically adjust the flow based on demand and the chlorinator will also adjust the output to the desired amount of chlorine. Included in the project was 5,600 feet of new 6-inch PVC main; .75 mile of 8-inch transmission line, 4 new fire hydrants and 18 new valves. After the project was completed the water rates were again adjusted to $20 for the monthly minimum with 1000 gallons included and the cost per thousand remains the same at $2.00/1000.

The project consultant was Schwab-Eaton, PA, Manhattan, KS. The contractor was Rod's Ditching. Funding for the project was provided through a Kansas Public Water Supply Loan in the amount of $400,000. The project was completed in April 2008 and has provided reliable service.

I want to also take this opportunity to encourage readers to attend the 2009 KRWA conference, March 24 – 26. There are numerous sessions that will discuss water wells, water rights, water conservation, project planning and funding. Attending is a good investment for any city or RWD.

Jon Steele has been employed by KRWA as a Circuit Rider since 1995. Jon is certified as a water and wastewater operator. He has more than 25 years experience in public works, construction and industrial arts.