By Jon Steele, KRWA Tech Assistant

City of Bentley Develops a New Water Supply

Inside view of new Bentley pump station.

The city of Bentley, located just northwest of Wichita, began a long journey for a new water source after receiving a letter from the city of Wichita their water supplier, in reference to their new Aquifer Recharge Project. That June 2006 letter stated that the 48-inch transmission line that Bentley receives water from could at some future time possibly contain surface water from the little Arkansas River as a part of the redesign of the system. The transmission line from the Equus Beds southwest of Newton that the city of Bentley was connected to had previously carried only ground water. Bentley chlorinated the water and pumped it into its system.

After receiving that letter, the city's operator called me with great concern. I have worked with the city for many years on their water system. Together, we contacted the city of Wichita and the Kansas Department of Health and Environment (KDHE) and requested a meeting. We met in the Bentley City Hall to discuss the changes Wichita was making to their system and how those might impact Bentley. It was apparent that Bentley needed to develop a new source of water or build a surface water treatment plant.

Bentley contracted with Schwab-Eaton, P. A., Manhattan, KS for the development and design. Several options were considered, including developing their own wells. With one small leg of the Wichita well field within a mile north of town it made sense to connect to these four wells if an agreement could be reached with the city of Wichita and a control system could be devised. One of the four wells is always running and this leg of the well field would never have surface water from the river in it. This made it the obvious choice. Details were worked out with the Wichita city personnel and engineers; the selection was made.

Let's get it done!

After many hurdles including time consuming bureaucratic annoyances by Sedgwick County, Bentley's new system is finally in place. Whoever would have thought that an engineered public project approved by KDHE would come under such scrutiny with a local branch of government like the county? Some of the delays were due to the county requiring the project to have a building permit, and before that could be obtained, Bentley had to produce a site plan which meant surveying and approval from the county planning commission. Later, the planning commission decided it wasn't really necessary anyway since the new pump house was on less than two acres. Or how about this? The contractor, APAC Construction, Hutchinson, KS, wasn't licensed in Sedgwick County. As a result, that firm had to subcontract the work out,

requiring extra time. Another problem was the floor drain line in the new pump house could not be extended to the county ditch and a special drain or lateral field had to be constructed.

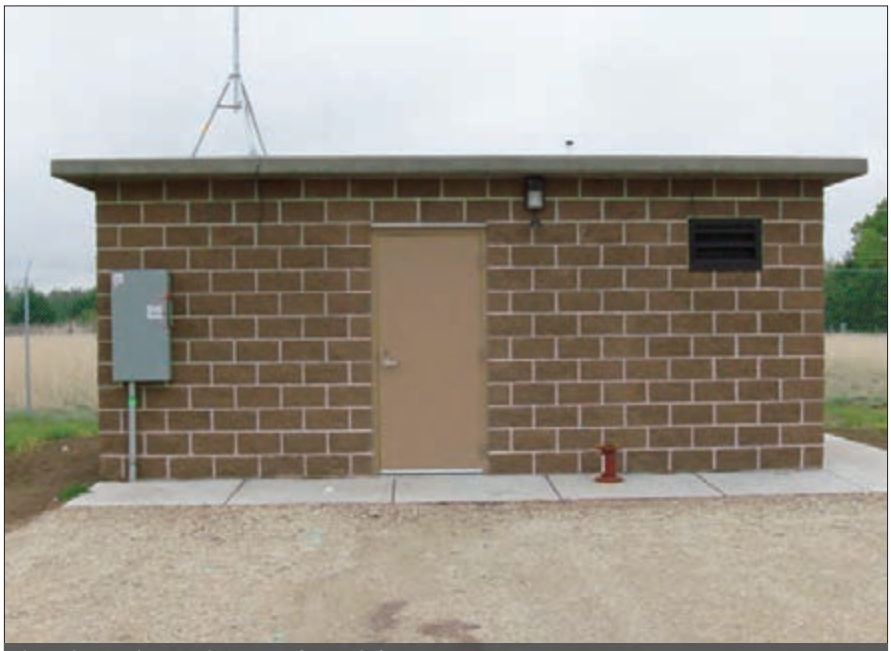
Project engineer Mike Butler reports that the city of Wichita, the city of Bentley and the contractor were all excellent to work with. The city of Wichita was very accommodating and agreeable to provide a small town with water and the water purchase agreement with Bentley was expiring anyway.

The system consists of an attractive, custom-built pumping station which includes a Grundfoss pumping system, three-quarters of a mile of 6-inch PVC line with three new fire hydrants and valves and a new radio telemetry and SCADA system. The pump station features two 150-gpm pumps. These are controlled by a radio/telemetry system supplied by CommTronix; a new SCADA system located in the city shop provides monitoring. The system has the usual alarms and dialer to alert operator(s) of pressure, temperature, gpm, and tower levels. The pumps are also equipped with low suction overrides and high pressure shut off switches to prevent extended pumping against a closed valve. The water is chlorinated as it leaves the building with a Regal gas chlorination system. This is important with the new Ground Water Rule as the chlorine residual has to be maintained at a minimum of 1.1 mg/l in order to meet the drinking water standards and to comply with the four log removal rule. Bentley had to do the four log removal since not doing so meant that if they ever collected a bad sample, then all of the city of Wichita's wells would have to be checked for bacteriological contamination. That would have been excessive because there are sixty-seven wells in the Equus Beds alone.

Water quality is always a concern when dealing with Equus Bed water. Primarily, iron and manganese are the contaminants that are most prevalent. With the right maintenance and the addition of a sequestering agent the water can be used with minimal

Manager Dan Bliss demonstrates the operation of the new radio telemetry and SCADA system.

problems. If the wells aren't maintained, then systems can anticipate a loss of production or be inundated with customer complaints of odor or having an oily film. In cases, it can discolor white laundry. The city of Wichita has a good program of well maintenance. Their program was originally designed to prevent loss of production and not so much for water quality issues since all of their water is blended with surface water from Cheney Lake and is treated at a treatment plant anyway. Bentley will definitely benefit from Wichita's good well maintenance program. The recommended limit for iron is 0.3 mg/l and for manganese it is .05 mg/l. The water from the four wells serving Bentley ranges from less than 0.10 to



This photo shows the city of Bently's new pump station.

0.12 mg/l for iron and from .094 to.266 mg/l for manganese; Total Hardness ranges from 130 to 335 mg/l. The level of hardness is high, but tolerable.

Challenges met

No new system comes without challenges; the Bentley system is no exception. At startup, there were complaints about air in the lines. The flushing had been thorough, so where could air be coming from? The operator called me and we scheduled a visit. I could find nothing on the new system that would be causing the air. So we set up a hose from the incoming line, connected to the Wichita well line. After operating for a time, we began to see very tiny air bubbles beginning to appear. We conducted the test numerous times; all indicated the air was coming from the supply line. What I was unaware of at the time is that Wichita had installed new 16- and 24-inch transmission line on that branch of line that the Bentley supply line was connected to. As it turned out this line was full of air and had never been flushed thoroughly enough to get all the air out since it was such a large line. Every time the Bentley pump station would operate a small amount of air was being pumped into their system. After conversations with Bentley's engineer, he contacted the city of Wichita and a flushing procedure on the Wichita transmission line was developed; that corrected the problem and the system is now air free. The air was not a problem for Wichita because of how their system operates but it sure was for Bentley; the city of Wichita made it a high priority to correct the problem.

The project at Bentley was funded through the Kansas Public Water Supply Loan Fund. The total loan was $587,000 with a forgiveness of $107,000 because of American Reinvestment and Recovery Act funding. The city's water rates were increased to a $19.44 minimum, with 1,000 gallons allowed. The cost is $4.50 per thousand thereafter. The prior rate was $18 minimum and $3.75 per thousand.

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 twenty-five years experience in public works, construction and industrial arts.