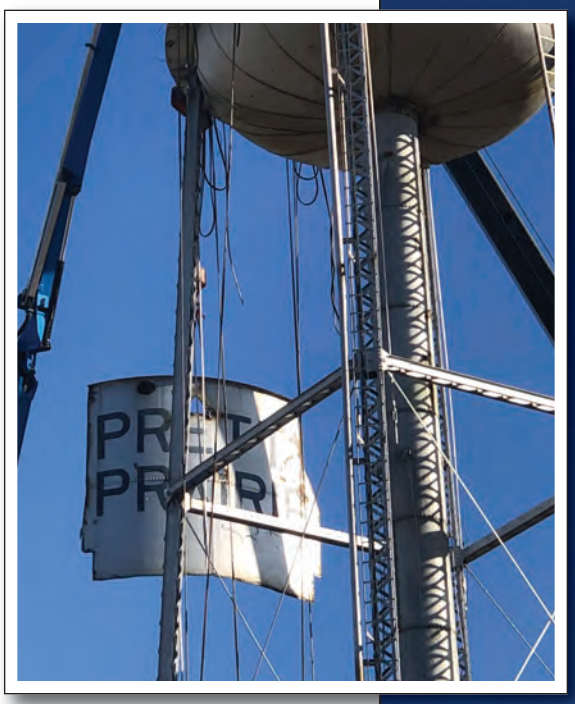
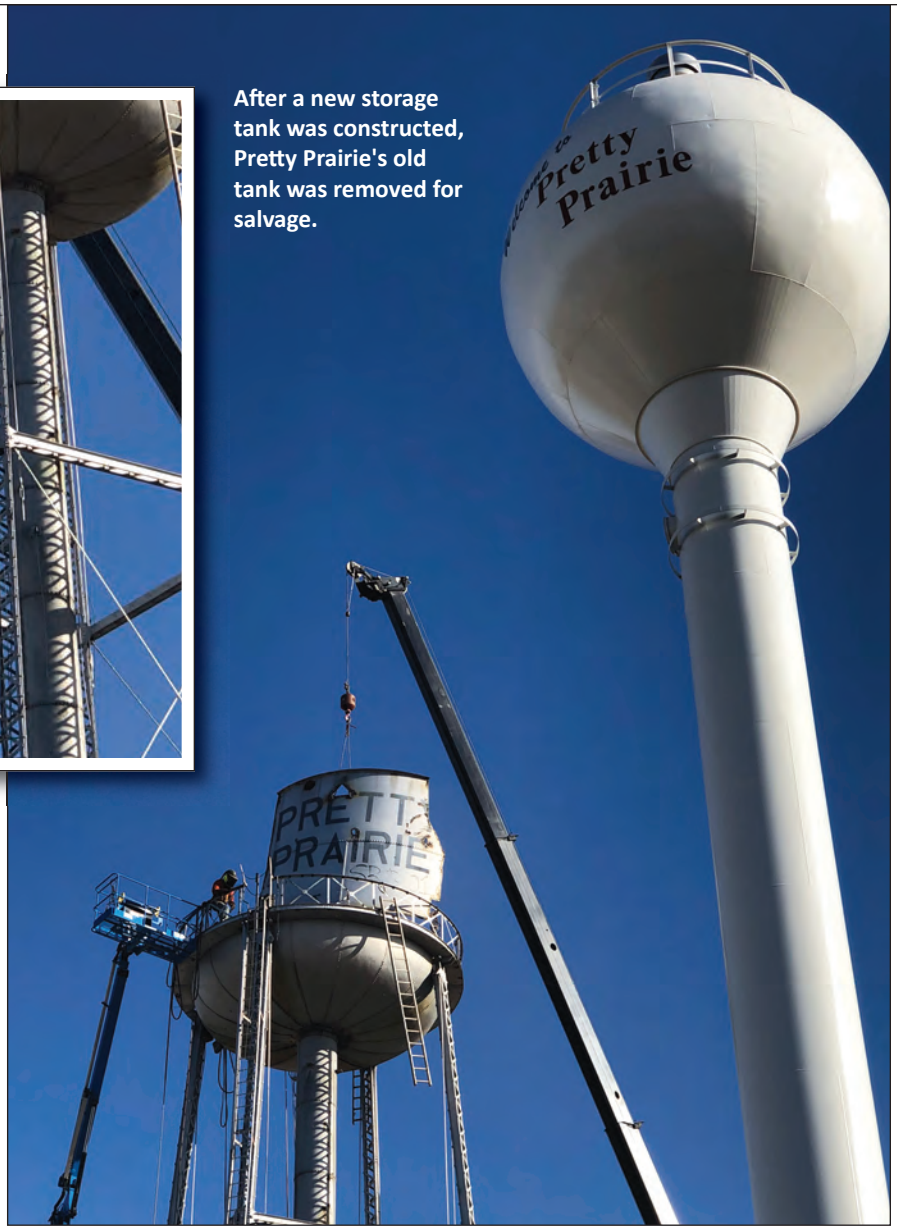
By Jon Steele, KRWA Circuit Rider





After a new storage tank was constructed, Pretty Prairie's old tank was removed for salvage.

After Decades, Pretty Prairie Addresses Nitrate Compliance with the Safe Drinking Water Act

The city of Pretty Prairie is just that – a very nice, quiet and small community tucked away on the Kansas Prairie. The quiet, small community comes to life in a big way every summer when the famous Pretty Prairie Rodeo takes place for four days each July. My wife and I have attended it many times over the years and always look forward to it. It is known as Kansas' Largest Night Rodeo and is attended by thousands of fans.

Pretty Prairie's issues with their water supply due to increased nitrate levels go as far back as the early 90s. The operator at that time and I would collect three nitrate samples. One sample was sent to the Kansas Department of Health and Environment (KDHE) lab, another was taken a local, certified lab and we would run a sample using a Hach test kit. The results would vary. One thing remained the same. The state lab's results were always higher and sometimes the difference would exceed the Maximum Contaminate Level (MCL) for nitrate of 10 mg/L. The results would vary as much a 2 mg/L to 3 mg/L.

Interestingly, in 1958 the World Health Organization (WHO) international standards for drinking water stated that the ingestion of water containing nitrates in excess of 50 to 100 mg/L (as nitrate) might cause methemoglobinemia in infants under the age of one (1). In the early 1960s, the standard was lowered to 45 mg/L. The U.S. Public Health Service Standards, the forerunner to the Safe Drinking

Operator Tyler Epp checks instrumentation readout on one of the RO skids.

Water Act, also adopted the 45 mg/L standard. In 1984, WHO issued a "guideline value" of to 10 mg/L (as nitrate-nitrogen). The 1974 Safe Drinking Water Act set the MCL for nitrate that we know today of 10 mg/L. To convert nitrate to nitrate-nitrogen, multiply by 4.42. A very common mistake is to use the values interchangeably. To clarify, the 10 mg/L MCL for nitrate-nitrogen is equal to 44.2 mg/L of nitrate ion.

Nitrates are the most common problem with Kansas ground water. As most are aware, with Kansas primarily being an agricultural state, ammonia-nitrogen fertilizer is used on crop land in large quantities to boost production in crops such as corn and wheat. Nitrate contamination can also be due to human and animal waste, especially in large animal confinement operations. When over-applied to cropland, excess nitrogen can leach down into the soil past the root zone into the groundwater. Trees and grass strips strategically placed can be effective buffer zones to prevent unwanted runoff into lakes and streams or in aquifer recharge areas.

Pretty Prairie struggled with nitrate levels exceeding the nitrate contamination in its groundwater above the MCL for decades. In 1994 a new well was constructed. I recall the water samples from the test holes all tested with acceptable water quality, less than the 10 mg/L standard. However, after installing the production pump and pumping at the production design rate, the quality changed and soon the nitrate was in excess of the limit set by the Safe Drinking Water Act. Subsequent to the reduced standard for nitrate in drinking water, the city provided bottled water and sent out the required notices of the nitrate MCL violation. The city was eventually required by EPA to provide a permanent solution for the problem. Several options were explored such as purchasing water from a neighboring system, but that idea was dropped due to the long-term cost of purchasing water plus the cost and maintenance of a 14-mile pipeline. A new well field was briefly explored but there was not a source readily available and it would have taken at least five to six miles of transmission line to reach an area of high-quality useable water and that area was closed by DWR to development. Home treatment devices were not considered to be feasible.

That left only one option which was nitrate removal. Point of use removal, ion exchange and reverse osmosis (RO) were considered. The reverse osmosis system was chosen due to lower operation and maintenance cost. The project consisted of the RO plant capable of processing 230 gpm, a 150,000-gallon concrete ground storage tank and a 50,000-gallon elevated, single pedestal (pedosphere) storage tank. The wastewater generated by the plant is being discharged into the sanitary sewer system. That was allowed only after an impact study demonstrated no detrimental effects to the plant or the effluent discharge. The project engineering and design was performed by Schwab Eaton of Manhattan, Kansas and which has offices in Beloit and Wichita. The storage tank was constructed by Caldwell Tank of Louisville, Kentucky. Iseler Demolition, Inc., Port Hope, Michigan, dismantled the old tank.

The city actually applied for Community Development Block Grant funding and was turned down three times, eventually going to the Kansas Public Water Supply Loan Fund. The grant was disallowed due to technical issues with the application.

The cost of the water treatment plant was $1,641,985. Because of addressing a compliance issue, the city received a 30 percent loan forgiveness on the plant, amounting to $492,595. The cost of the new water storage tank was $633,522. The city's loan amount from the Kansas Public Water Supply Loan Fund is $1,782,911 at a rate of 1.8 percent. To amortize the debt, rates were increased for the 300 ratepayers, from a base rate of $24.00 with 750 gallons included to $32.50 with 750 gallons included and $2.50 for each unit of 750 gallons thereafter.

Another article in this issue by Daryn Martin gives additional information as the Kansas Rural Water Association has named the city of Pretty Prairie as the Most Improved Water System in Kansas in 2019.

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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.