By Bret Beye, KRWA Technical Assistant

The City of Wakefield Finds Energy Savings by Reducing Inflow and Infiltration

This photo shows city of Wakefield, Kansas Operator Jeff Ochs checking the electrical use hours on the city's single lift station with KRWA Wastewater Tech Charlie Schwindamann, (on the right). Schwindamann instructed Ochs on the need to check the lift station hours regularly and how to use that information to troubleshoot the lift station and use the same for operational cost evaluations.

Kansas Rural Water Association implemented a program in July 2019 to assist water and wastewater utility systems with evaluation and lowering their energy consumption costs. This energy efficiency assessment evaluates current and past energy use, classifies primary energy-consuming components, and identifies methods to reduce energy use and costs. This program is funded through a contract administered by the National Rural Water Association with funding as a benefit of USDA Rural Development.

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The concept of the Energy Assessment is to outline energy efficiency projects or operational changes to identify potential electrical savings. The savings can then be utilized to pay for improvements over a period of years that are typically shown as "payback years."

Example of energy reduction potential

Reducing inflow and infiltration provides the optimal return on investment for wastewater system. Often, the corrections can be performed by city personnel. The assistance of the Kansas Rural Water Association staff members is also available to the city at no charge. In this case highlighted in this article, the assistance that was further provided included smoke testing of the sanitary sewer system.

The city of Wakefield is located in Clay County in north-central Kansas. The wastewater system serves a population of 980. In addition, there are three restaurants, an elementary school, a retirement village, one convenience store, and a bar are additional users of the wastewater system beyond the typical residential users. The city purchases electricity from Evergy.

The city of Wakefield's wastewater system consists of a four-cell discharging wastewater stabilization pond system. A lift station collects the wastewater from an all-gravity sanitary sewer collection system pumps to the city's wastewater lagoons.

The city has two full-time employees. They are City Clerk Julie Murphy and Operator Jeff Ochs.

Inflow and Infiltration to the sanitary collection system in 2019 during the Milford Lake flooding of the old town/Clay County RV Park area caused Wakefield's lift station to operate continually from mid-May until mid-

Wakefield Main Lift Station Acct. 6998466556								
Billing Date	Total Charges (Energy and Service Fee)	Total KWH	Cost KWH	Pump 1 Reading	Pump 1 Hours	Pump 2 Reading	Pump 2 Hours	Total Hours
03/21 - 04/19/19	227.88	1846	0.12345	10575.1	80	20092.29	83.44	163
04/19 - 05/20/19	323.65	2489	0.13003	10665.2	90	20197.12	104.83	195
05/20 - 06/19/19	887.99	8685	0.10224	11166.3	501	20562.45	365.33	866
06/19 - 07/19/19	1070.05	10493	0.10198	11655.5	489	21176.47	614.02	1103
07/19 - 08/19/19	218.58	1434	0.15243	11722.8	67	21244.80	68.33	136
08/19 - 09/18/19	283.48	1392	0.20365	11780.4	58	21303.91	59.11	117
Average	**501.94**	**4389.8**	0.11434	**67565**	**1285**	**103332.24**	**1295.06**	**2580**

This chart for the Main Life Station provides a record of the months of energy use at the lift station from two months before the flooding event to two months after the flooding of the old town/Clay County RV This period was from March 21, 2019 to September 18, 2019.

July. This was a major concern to the city council and staff. A lift station pump had to be replaced at a cost of $22,840 due to excessive operation.

The total electrical cost for pump operation from May 20, 2019 to July 19, 2019 was $1,958. 04. The price was $887.99 for May 20 to June 19, 2019 and $1,070.05 for June 16 to July 19, 2019. Using the information provided, KRWA calculated the cost of the previous two months and the following two months from the above time period. The average cost for those months was $263.39. The cost to operate the lift station during normal operations due to extra inflow and infiltration was $715.63 per month for this time period.

With the issues identified, KRWA Wastewater Tech Charlie Schwindamann, recommended that the city contact the sewer maintenance contractor that cleans and televises the collection system to televise the lines in question to pinpoint the issues and correct those problems. The contractor found several issues while televising the sanitary sewer collection system. The contractor was able to seal the unused collection pipes from inside the manholes at a cost of $725. This was significantly less expensive than excavating outside the manholes to cap the pipes. KRWA recommended to smoke test this area again to ensure the inflow and infiltration from the old town/Clay County RV Park has been eliminated. As noted, the repairs' costs were about the same as the cost of the extra energy used to pump the extra influent, not to mention the costs of replacing the pump.

KRWA now working in partnership with Energy Solutions Professionals

KRWA will provide an "energy assessment" free of charge to any system that would like to take advantage of the program. KRWA has recently partnered with Energy Solutions Professionals of Overland Park, Kansas, to conduct these assessments. Some of the recent assessments by Energy Solution Professionals that have been conducted have been for the city of Sabetha water and wastewater departments, city of Baxter Springs water and wastewater, city of Rose Hill water and wastewater, city of Hesston wastewater, city of Mankato water and wastewater, among others. Bob Blume has also conducted assessments, including water systems at Onaga, Scammon, Weir, Burns, Florence, Bennington and others. This program can assess any water or wastewater systems serving 10,000 or fewer populations to assess if energy savings can be realized. It is interesting how some low-cost items being updated can pay back in a short number of years.

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Bret Beye joined the KRWA staff in March 2017. He previously worked for 30 years at the city of Herington where he was Water Distribution and Sewer Collection Foreman. A Class III water operator and certified as a backflow device technician, Bret also served on the USD 487 Board of Education from 2003 to April 2017 where he was board president and vice-president.