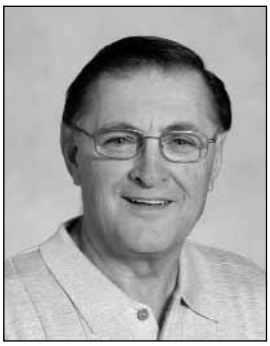
Geary County Rural Water District 4 gets the red out!

Geary County RWD 4 is a public water system located approximately three miles northwest of Junction City, on the east side of Milford Reservoir. The system is supplied with water from two wells located in the Rolling Meadows Golf Course at the south end of the district. The district currently has about 320 meters and produces approximately 70,000 gallons per day during colder months and about 200,000 gallons per day during warmer months. The district has seen about a 10% growth during the past year and there is continuing pressure from developers to add more units. The district expects this trend to continue due largely to the anticipated growth at Fort Riley.



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District history

The district started out a number of years ago as a small subdivision called Rockwood Subdivision and while growing to its current size as a rural water district, was plagued with discolored water conditions resulting in consumer complaints. One of the common customer questions was, "Why doesn't someone do something about this rusty water?" How many of you have been asked this question?

Red and black water problems at this rural water district were the result of high levels of iron (Fe) and manganese (Mn). Test results of samples collected in November 2005 were as follows: Well No. 1 had iron at 4.85 mg/l and manganese at 3.18 mg/l; Well No. 2 had iron at 3.30 mg/l and manganese at 2.01 mg/l. These levels greatly exceed the Environmental Protection Agency (EPA) secondary drinking water standards of 0.3 mg/l for iron and 0.05 mg/l for manganese.

Guidelines, not standards

What are secondary standards? The EPA established National Secondary Drinking Water Regulations that set non-mandatory water quality standards for 15 contaminants. Iron and manganese are two of these. The EPA and the Kansas Department of Health and Environment (KDHE) do not enforce these "Secondary Maximum Contaminant Levels" or "SMCLs". They are established only as guidelines to assist public water systems in managing their drinking

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Geary RWD 4 chose the Filtronix, Inc., Dual Filter Vessel skid mounted unit. The unit seen above has two reaction tanks followed by two filter tanks.

water for aesthetic considerations, such as taste, color, and odor. These contaminants are not considered to present a risk to human health at the SMCL.

New high service pumps deliver water to the system

Red and black water; what is it?

Iron and manganese are common metallic elements found in the earth's crust. Rain water that moves or percolates through the soil and underlying geologic formations dissolves minerals containing iron and manganese. Iron in the water in the aquifer, where the oxygen level is low, will be found in the soluble ferrous state. Water containing ferrous iron is clear and colorless as the iron is dissolved. As the well water is pumped and treated with chlorine (a very active oxidant) adding oxygen, the water will become cloudy and will take on a reddish brown color as the iron precipitates and changes to the insoluble ferric state. Manganese is responsible for the black staining that occurs and manganese precipitates may eventually cause clogging of water lines. Another common problem associated with iron and manganese in water is the growth of iron and manganese bacteria. These bacteria, while not health threatening, feed on iron and manganese and will cause a reddish brown or yellow (iron) or black (manganese) slime on toilet tanks and can clog plumbing.

The fix

Because of the problems associated with the very high levels of iron and manganese, the rural water district board held meetings to discuss various options for improving the water quality. Basically there were two options being considered. One option was to abandon the district wells and install a line to the city of Junction City, thereby purchasing water from another source. The other option was to construct a treatment plant to

Plant operator Cliff White at the control panel is checking the display to determine the status of filter operation.

remove the iron and manganese. Two feasible treatment techniques that were considered for removal of iron and manganese at these levels were the conventional treatment process consisting of

Storage tank for backwash water. After a time period to allow for settling, the cleaner water is recycled.

coagulation/flocculation and filtration or oxidizing filter. Eventually the board made the decision to utilize an oxidizing filter. The treatment system that was chosen is a Filtronics, Inc., Dual Filter Vessel skid mounted unit. The unit has two reaction tanks followed by two filter tanks. The reaction vessels allow for the addition of chemicals, chlorine which is added to the first vessel and sodium bisulfite (for taste and odor control) which is added to the second vessel. The two filter tanks are filled with Filtronics Electromedia I, a proprietary media consisting of six layers designed for a flow rate of 5 gpm per square foot. Filter run time is about seven hours, after which the filter is backwashed at a rate of 560 gpm. Backwash water flows into a holding tank from which the clearer water is returned for treatment after a 30-minute settling period. Eventually the settled iron and manganese in the bottom of the holding tank are removed and hauled off for disposal. Treated water at the rate of 200 gpm then flows into a 50,000 gallon clearwell. Water is transferred from the clearwell to the distribution system via two high service pumps.

A fix for a secondary problem

In addition to adding a treatment plant, the district initiated a program to shock treat the wells with chlorine solution to control iron and manganese bacteria. Super chlorination of each well is done at six-month intervals. District staff performs this task utilizing a 250 gallon tank mounted on a trailer. The provisions of a treatment plant, a well disinfection program, and a regular distribution system flushing program have resulted in a very much improved (clear) water quality.

Trailer mounted storage tank used in the process for super chlorinating system wells.

The cost

Projects of this type do not come without a cost to the customer. The District obtained a loan through the Kansas Public Water Supply Loan Fund for the $550,000 project. As a result of this project, average customer water bills increased about $10.00 per month. Customer water bills prior to this project averaged about $37.00 per month. The current average water bill is now about $47.00 per month.

The KRWA Annual Conference & Exhibition is just around the corner. There's a wide selection of quality technical sessions available. From water quality to rate setting, from watershed protection to mediation techniques, there's something for everyone on the program. I encourage you to take advantage by attending the sessions and visiting the 275 exhibit spaces in EXPO Hall.