

Florence and Rock Springs Center – two groundwater systems required to meet surface water requirements

The city of Florence, located in Marion county at the crossroads of US highways 50 and 77, with a population of about 821, is nestled in the middle of what is proudly called the Flint Hills of Kansas, known as the best grazing land in the world. At least 95 percent of North America's 142 million acres of tallgrass prairie is gone and about 80 percent of what remains is in the Flint Hills. Since 1920, Crystal Spring, which is located north of town, has been the principal source of water for the city of Florence. Crystal Spring is reported to be one of the largest springs in Marion County. During times of heavy precipitation, the spring produces 3,000 to 4,000 gallons of water per minute.

During normal times however, flows are about 1,000 gpm. The city utilizes 200 gpm with the excess water flowing to a nearby stream. In general, during times other than the spring season with its heavy rainfall periods, the water from the

spring would be relatively clear. In fact, no additional treatment was provided until 1950 when chlorination was added. Local residents were accustomed to the periodic turbid conditions and had basically learned to tolerate them. However, when the drinking water regulations required treatment to continue using this source, the city was faced with some decisions; 1)

either locate another source, or 2) install treatment. The only other possible source was a proposed rural water district but it never developed leaving the city with only the option of treating the spring water.

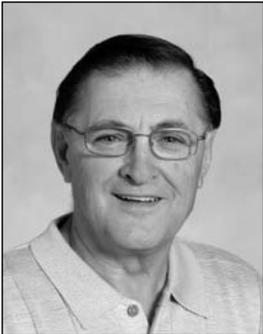
Because of the turbidity of the spring water, the system was

turbidity and after a period of use, it was discovered that the rather expensive filters would plug with a very short run time. Other less expensive cartridge filters were tested as a possible prefilter arrangement but all those tested allowed the fine turbidity particles to pass through to the bag filters.

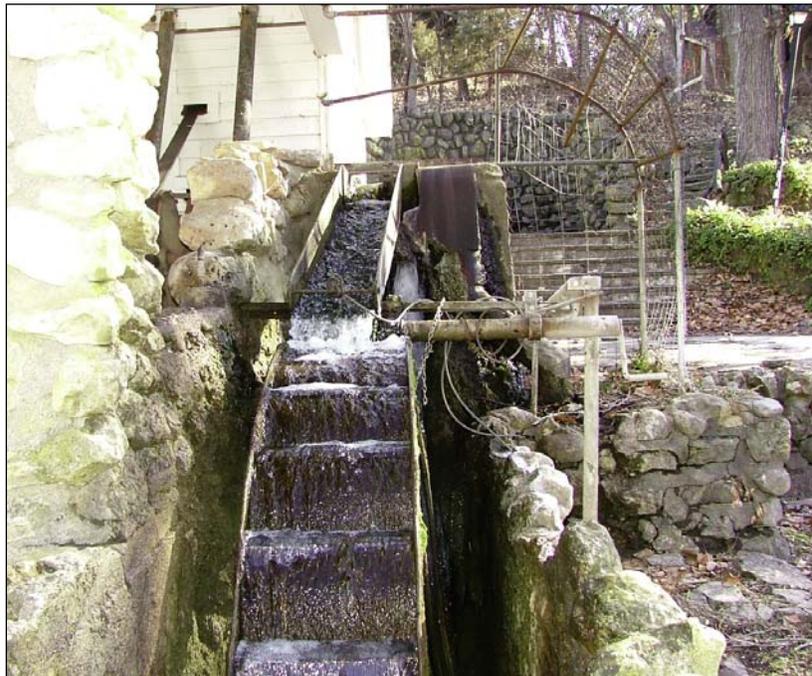
Crystal Spring is reported to be one of the largest springs in Marion County. During times of heavy precipitation, the spring produces 3,000 to 4,000 gallons of water per minute.

considered 'groundwater under the direct influence of surface water' (GWUDI). As a result, in 1993, the city installed a bag filter plant to remove turbidity. Bag filters with the proper micron size will remove

After the failed treatment option of a bag filter plant, the city hired the engineering firm of Schwab-Eaton, PA, Manhattan, Kan. to explore other treatment options. After reviewing the results of a pilot



*Bert Zerr
Consultant*



Excess spring water is bypassing the plant at the old Rock Springs mill. This is one of the Rock Springs 4-H Center's sights that 33,000 people a year come to enjoy.



Left: Florence Water Plant Operator Larry Scriven uses the computer that controls plant operation. It sits at the end of the Microfiltration skid built by U.S. Filter for the Florence treatment plant.

Below: Water surface in the slow sand filter building shows a mirror image of the building's ceiling. It is located at Rock Springs.



study conducted on site, the city made the decision to replace the bag filter plant with a microfiltration plant manufactured by U.S Filter. This plant was placed into service in 2003. It has performed satisfactorily to date.

City Clerk Janet Robinson recently commented on Florence residents' feelings about the water. "Local residents really like the water and many describe it as tasting great," she said.

Current monthly water rates are \$18.00 for the first 2,000 gallons plus \$5.00 for each thousand gallons thereafter.

Rock Springs 4-H Center

The Rock Springs 4-H Center is a camp, conference, and retreat center owned and operated by Kansas 4-H Foundation, Inc. It is located about eight miles south of Junction City and about three miles west of Highway 77. As with the Florence system, the water supply source is a rather large spring flowing out of the side of a hill at a rate of about 1,000 to 1,200 gpm during wet periods and about 350 gpm during drought periods. Also, as experienced with the Florence system, the water from this spring would become turbid during rainfall periods causing it to be designated GWUDI. Because of

the turbid water conditions, the center, in 1996, installed the first of two slow sand filters. This filter has a capacity of about 80,000 gallons per day. However, with the implementation of more stringent drinking water regulations, the one sand filter with its labor intensive cleaning procedure and limited

capacity during heavy usage at the ranch, resulted in considering additional or other treatment options. The Foundation hired the firm of Schwab-Eaton, PA to explore treatment options.



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After conducting pilot testing with results similar to those experienced at Florence, they chose to continue with the slow sand filter treatment process. An additional slow sand filter plant

Right: The limestone building shown here is used for water chlorination at Rock Springs.



Left: The system has individual online turbidity meters for each skid of filters. They are located at Florence.

Below: The Florence clearwell was installed with two submersible high service pumps.

was constructed providing increased capacity and redundancy to the treatment process. Operations Manager Jamie Farr noted that improvements of this type are funded with donations to the foundation. The center has 24 permanent employees; however, the number of employees increases significantly to about 93 during the busy summer months. About 33,000 people utilize the center for such activities as youth camps, family reunions, banquets, parties, retreats, and conferences. More information about this facility can be obtained by checking out their Web site at www.rocksprings.net or calling 785/ 257-3221.

What constitutes GWUDI?

The EPA definition of "Groundwater Under the Influence of Surface Water" as noted in the federal regulations (40 CFR 141.2) is as follows:

Any water beneath the surface of the ground with significant occurrence of: insects, other macroorganisms, algae, or large diameter pathogens such as



Giardia lamblia. Any water beneath the surface of the ground with significant and relatively rapid shifts in water characteristics such as: turbidity, temperature, conductivity, or pH that closely correlates to climatological or surface water conditions. Direct influence must be determined for individual sources in accordance with criteria established by the State. Direct influence may be based on site specific measurements or water quality

and/or documentation of well construction characteristics and geology with field evaluation. Systems found to be GWUDI are required to comply with either the Interim Enhanced Surface Water Treatment Rule, which applies to systems over 10,000 people or the Long Term Enhanced Surface Water Treatment Rule which applies to systems less than 10,000 people. Both surface water rules added Cryptosporidium to the definition.

In Kansas, wells were considered to be GWUDI by the Kansas Department of Health & Environment if the well or the top of the well screen was less than 50 feet deep and less than 200 feet from surface water. Systems with a well or wells meeting this criteria could either do additional testing to confirm or not if the wells were GWUDI or provide additional treatment, such as filtration, to comply with surface water treatment requirements. The additional testing consists of the Microscopic Particulate Analysis (MPA). Since the KDHE laboratory does not perform the analysis for the MPA test, it is necessary to contract with a private laboratory. The procedure for sample collection, which can be somewhat burdensome due to the specialized equipment needed and the recommended sample volume of 1,000 gallons collected over an eight to 24 hour period, will be furnished by the contract laboratory. A list of laboratories



Compressors and pressure tank are used to control pneumatic valves in the plant at Florence

can be obtained by contacting the KDHE. Systems with a spring as the source generally are designated GWUDI, especially if the raw water from the spring becomes turbid after a rainfall event. Spring water becoming turbid

after rainfall events was the issue pertaining to the city of Florence and Rock Springs 4-H Ranch.

Advanced Membrane Technology

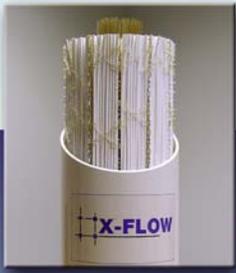
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- Pre-treatment

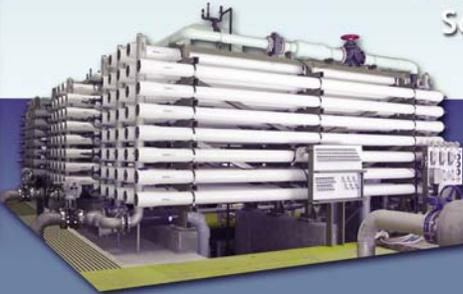
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