

Smith Center Constructs New Water Treatment Plant

What does a city of 1,600 people do with a water treatment plant that was constructed in 1923 and in need of major rehabilitation? In the case of Smith Center, Kansas, the city obtained a loan and constructed a new plant.

Smith Center is located in Smith County, in north-central Kansas. It boasts of being the geographical center of the U.S. The site is located about twelve miles east and three miles north of Smith Center.

Smith Center was founded in 1871. The first post office in Smith Center was established in January 1873. Like Smith County, Smith Center was named for Maj. J. Nelson Smith, a casualty of the Civil War. Smith Center is also the boyhood home of Mitch Holthus, the play-by-play sports caster for the Kansas City Chiefs. It was during his high school years that he began his first steps toward a radio career by announcing at school games.

Iron, manganese removal

Smith Center's new water treatment plant is an iron and manganese removal plant. The \$3.3 million project was designed by Wilson & Company, Inc., Salina, Kan. The general contractor was Apac-Kansas, Inc. The project was

funded with a loan from the Kansas Public Water Supply Loan Fund administered by the Kansas Department of Health & Environment. Water rates were increased as a result of the new debt. For example, the monthly minimum was increased from \$15 per month to \$29. The city also allocates approximately \$10,000 per month of the city's 1/2 percent sales tax to the water fund.

Operations of the plant consist of aeration followed by pre-chlorination to oxidize the iron and manganese prior to filtration. Chlorination oxidizes the iron and manganese causing them to precipitate for easier removal in the pressure filter vessels. After the filtration process the water is then chlorinated again to provide a maintenance residual in the distribution system. After filtration, water is held in a 220,000-gallon clearwell. From the clearwell, three high service pumps move the water to the distribution system and a 500,000-gallon elevated storage tank located at the opposite side of town from the treatment plant. A Hach CL 17 chlorine monitor, located ahead of the clear well



This is a photo of a water level meter used to measure static and pumping levels in the wells. Measuring these levels is needed for calculating drawdown. Maintaining these records when a well is new and operating at optimum conditions provides valuable background information for later when the well is no longer operating at peak performance.



This photo in Smith Center's new treatment plant shows the high service pumps, the LayneOx filters on the left, and the backwash holding tank in the background.

monitors chlorine residuals. The city monitors daily chlorine residuals leaving the plant at the Point of Entry (POE) site.

The treatment process also includes a provision to add ammonia after the post chlorination. Ammonia is typically added to convert free chlorine to combined chlorine for control of disinfection byproducts. The addition of this equipment will allow the city to add ammonia if and when needed in the future. Information about monitoring combined and free chlorine

and the proper use of the Hach colorimeter can be found in a previous article by KRWA Consultant Jeff Lamfers. See page 26 of the July 2015 issue, "Common Mistakes Made Using the Hach Pocket Colorimeter Control Residual Text Kit." The link is <http://krwa.net/lifeline/1507/026.pdf>.

The plant processes between 200,000 to 250,000 gallons of water per day in the winter months and up to 500,000 gallons a day in the summer months.

Smith Center's new plant also utilizes a 20,300-gallon Tank Connection tank located inside the building to reclaim and reuse backwash water from the filters. The backwash from the filters is stored in the tank to allow iron and manganese to settle. Then, the largest portion of water is pumped back through the treatment process. This reduces the amount of wasted water during backwash. The remaining portion of the water is discharged to the sanitary sewer system.

Smith Center's water supply is provided from five wells located about 12 miles south of the city, in and near the small town of Gaylord. All the wells can be monitored and controlled remotely from the plant.

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Free versus Combined Chlorine

Free chlorine is routinely used as the primary disinfectant in Kansas public water supplies. Most groundwater supplies do not have the organics (precursors) to cause disinfection byproducts to form. In surface water supplies, organics present in the raw water will combine with free chlorine forming elevated disinfection byproducts. In these systems, free chlorine is used for a limited contact time, after which ammonia is added to form combined chlorine. This process halts the formation of disinfection byproducts allowing the use of combined chlorine as a maintenance residual in the distribution system.

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