By Delbert Zerr, KRWA Consultant

City of Herington Has New Water Treatment Plant

This is Herington's largest elevated storage tank at 250,000 gallons. The city also has two 75,000 gallon elevated tanks, one located in town and one at the airport/industrial park east of town.

Herington, Kansas has a population of 2,109 and is located in the southeast corner of Dickinson County at the intersection of highways 77 and 56. Since the early 1900's, when Mr. Herington successfully got the Chicago, Kansas, and Nebraska Railroad to build through town, the railroad has been significant to the city. Herington became a railroad division point with maintenance and repair shops, two road houses, freight houses, bridge yards, a telegraph office and many other buildings.

During World War II, Herington Army Air Field was one of only two fields that processed heavy bombardment crews and equipment staging to the coasts for overseas duty. The field was later turned over to the City of Herington and is currently used as a municipal airport and industrial site.

Water Source and Treatment Plant

Herington Reservoir was constructed in the early 1980s and is the primary water source for Herington along with the cities of Hope, Woodbine and Latimer that purchase water from Herington. The reservoir is located about two miles west of town and was constructed under the Watershed

This is a view of the new water plant building containing the two package plants along with the ozone generator, high service and backwash pumps, and an office. The old power plant building that still contains the clearwell can be seen on the right side of the photo. The contractor is still on site to finish cleanup.

This sign identifying the funding source is located at the entrance of the plant grounds.

Protection and Flood Prevention Act with the assistance of the Soil Conservation Service, U.S. Department of Agriculture.

The original water plant was built as an extension of the city-owned power plant. The filters, clearwell, and high service pumps were located inside the power plant building. The other parts of the water plant, including some modifications and additions made over the years, were located to the south of the power plant building and consisted of two upflow clarifiers, a chemical storage building, chlorine contact basin, and chlorine and ammonia storage building.

Both the water and power plants provided adequate service to residents of the city. However, after many years of operation, the facilities needed improvement. After reviewing the overall situation, the city decided to contact a consulting engineer to look into possible improvements.

Plant Improvement Needs

Driggs Design Group of Manhattan, Kan., was hired to evaluate the existing facilities and prepare an improvement plan. The result was a plan that identified many areas that needed improvement, including replacing the main office and laboratory facilities, replacing the gravity sand filters, and pumps located in the power plant building. Another area of concern was the issue of compliance with the Environmental Protection Agency (EPA) standard for trihalomethanes (THMs). The city had been experiencing problems with high THMs and was required to address that problem.

Plant Operator Mitch Gehrke reviews filter backwash settings.

The proposed improvements included a new building to be located just to the south of the existing power plant building that would consist of a package water treatment plant basically abandoning the two upflow clarifiers, the gravity sand filters, and pumps located within the power plant building. A pilot study was needed to evaluate the feasibility of utilizing this type of plant to move forward with this proposal.

First Stage: Chemical Conditioning with Tube Settling

With the pilot study showing satisfactory results, the decision was made to move forward with a package plant. The plant chosen is a WesTech Trident HS Package Water Treatment System. In reviewing the company's literature, the multi-barrier design of the Trident HS package consists of high-rate settling, adsorption clarification, and mixed media filtration, all contained in a single stainless steel tank. Two tanks were provided for redundancy. Raw water

These photos show the oxygen tanks and the Primozone ozone generator that will allow the city to comply with the EPA standard for THMs of 80 ppm.

treated with a coagulant (ferric chloride) and an anionic polymer enters the first stage or high-rate settling compartment. Tube settlers were installed in this compartment to help reduce influent solids concentration before the next stage.

Second Stage: Enhanced Clarification

Effluent from stage one is injected with a cationic polymer prior to entering the second stage or adsorption clarifier. The adsorption clarifier contains a combined bed of both compressible and buoyant bed adsorption media to further reduce solids prior to filtration. Captured solids are periodically flushed from the clarifier using an air/water combination.

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Third Stage: Mixed Media Filtration

Effluent from stage two moves to the third stage which is mixed media filtration. The media consists of anthracite, sand, and high-density garnet supported by a direct retention underdrain. An air/water backwash is utilized to clean the filter media. Some backwash water will be returned to the head of the plant and be reused. Filter effluent flows to an existing clearwell and is pumped to town by two new high service pumps. These pumps and new backwash pumps were installed inside the new building.

Control of Trihalomethanes (THMs)

Like most surface water systems in Kansas, Herington has used free chlorine to comply with chlorine contact time requirements, followed with the addition of ammonia to convert to combined chlorine for a maintenance residual in the distribution system. This procedure for controlling THMs has been and continues to be a common method of complying with the THM standard of 80 ppm. Mitch Gehrke, Water Plant Operator, noted however that the city had experienced

elevated THMs. With water system upgrades being planned, the city wanted to take a look at methods to further reduce THMs in the distribution system. The process chosen was to change to ozonation as the primary disinfectant for effective control of bacteria, viruses, Giardia, and Cryptosporidium. Ozone is very effective in oxidizing harmful chemicals in the water and has successfully reduced THMs in other Kansas systems using ozone as the primary disinfectant. Ozone treatment has the added advantage of removing compounds that cause earthy and musty tastes and odors due to algae that grow in lakes. Customers will likely notice a reduction of these tastes and odors.

Ozone is not stable and has a short life meaning it cannot be stored or transported. Ozone must be generated on-site. Primozone supplied the ozone generators selected for this system. The process consists of producing oxygen from ambient air followed by the production of ozone via the ozone generators. Ozone generators produce ozone by breaking apart oxygen (O_2) molecules into single atoms which then attach to other oxygen molecules to form ozone (O_3).

The complete surface water treatment process is contained in these tanks; they replaced the original upflow clarifiers and gravity sand filters.

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The cost of this project was $4,500,000. Funding was arranged by financing $3,500,000 with the U.S Department of Agriculture, Rural Development with a 40-year loan. The city was allowed $1,000,000 as loan forgiveness from the Kansas Department of Health and Environment.

Shown here are the compressors used to produce oxygen for the production of ozone. Ozone is replacing free chlorine as the primary disinfection procedure.

This photo shows the filter being backwashed. Baffled wash troughs are provided in both filters to prevent media loss during the washing process.

Water users will notice an increase in rates as a result of this project. Rates prior to the project were $23.50 for a minimum plus $6.08 per 1,000 gallons. The current rate is $26.07 plus $7.18 per thousand. In addition, 3.5 percent increases are scheduled each year for the next five years.

Buck Driggs with Driggs Design Group noted this may be the first water treatment plant of this type, or at least, one of very few in Kansas. He also stated that there are several of these plants in Oklahoma. Chad Lawson, with Lochner in Salina, Kan. was also involved in the design of the project and APAC Construction, Hutchinson, Kan. was the contractor.

March 29 – 31, 2022; attend the 53rd Annual Conference & Exhibition

The KRWA Conference, which will be held March 29 – 31, is the largest and frankly the best in the Midwest. The conference has 48 informative sessions, 8 preconference full-day sessions, and forums for both attorneys and engineers. EXPO Hall will be filled with interesting and informative exhibits showcasing hardware, software and services. The program is being reprinted in this issue and is also online at www.krwa.net/conference . Attending is a very worthwhile investment. I hope you plan to attend.

Bert Zerr is currently a consultant with KRWA. He has been with KRWA since 2005. Prior to that, Bert was a District Engineer with the KDHE in the Salina District Office for 32 years.

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