

FGUA REVAMPS STRUGGLING SEVEN SPRINGS WATER SYSTEM IN RECORD TIME



Mitchell Water Treatment Plant with completed improvements (left). Seven Springs drinking water at the time of FGUA purchase (center) and after improvements (right).

By Holly Kremers, PE, Wade Trim Inc.

Nearly two decades of black water problems finally clear up

When the Florida Governmental Utility Authority (FGUA) purchased the Seven Springs utility system in March of 2009, they also purchased the utility's checkered history of poor water quality and broken promises. Since the '90s, Seven Springs has had highly publicized issues with black, corrosive drinking water with a rotten egg odor. More than 12,000 residents living in southwestern Pasco County—including the Trinity community and a portion of New Port Richey—were suffering. Enraged customers were guaranteed water quality improvements that were never realized.

“When we came in, the residents had endured over 17 years of poor water quality issues in that system,” said Rob Dickson, FGUA Capital Program Manager. “The former owner of the utility simply had not been addressing the complaints of the customers.”

The FGUA, with the help of engineers and operations staff from Wade Trim Inc. and US Water Services Corporation, developed an aggressive improvements program shortly after purchase of the system. In addition to the team of professionals, the FGUA used a group of residents who had formed the Committee for Better Water Now (CBWN) as an advisory panel. The design team met with the CBWN monthly, and provided design and construction updates that the residents took back to share with their homeowner associations and neighbors. The residents received a **REAL** promise of clean, odor-free water by the end of August 2011.

Evaluating the Situation

Before the FGUA team could tackle the problem, they had to evaluate the utility system's design and unique challenges. The Seven Springs system receives its water from eight raw water supply wells, and six of the wells were functioning as individual water treatment plants with the addition of liquid chlorine prior to distribution to the customers. The remaining two wells pumped raw water to the Mitchell Water Treatment Plant (WTP), where it was treated with chlorine and stored in a 500,000-gallon ground storage tank prior to distribution through a high service pump station. The challenges started to become clear. While this configuration would be acceptable for a high quality ground water source, the level of treatment was not adequate for the poor quality source water. Additionally, water from each of the wells had a unique chemistry, with some having higher levels of hydrogen sulfide and others having higher levels of iron and organics.

They found that hydrogen sulfide was the main source of the “black water” and “offensive odor.” Indeed, water quality testing of the wells showed raw water sulfide levels ranging from non-detectable values to 12 mg/L. According to the Florida Department of Environmental Protection (Chapter 62-555.315 FAC), direct chlorination should not be used for treatment of water with total sulfide levels greater than 0.3 mg/L. In addition to the water quality issues, the system was also under a consent order by the Southwest Florida Water Management District (SWFWMD), for nearly 15 years of pumping water from the groundwater wells at quantities that greatly exceeded the permitted amount.

“To remedy this, the FGUA quickly entered into a settlement agreement with SWFWMD, which mandated the overpumping cease on August 25, 2011,” said Dickson. “But, this was just the beginning of addressing the significant water quality issues.”



Construction tour for community members.

Finding and Implementing Solutions

An alternatives analysis was conducted to determine the best way to achieve high quality drinking water with the lowest cost to customers. Because the water supply well withdrawal needed to be reduced, the FGUA entered into an agreement with Pasco County for bulk water purchase of county water to make up the difference between the 2.0 million gallons per day (MGD) permitted by SWFWMD and the 3.7 MGD average day water use. Initial options—such as constructing individual water treatment systems at each well, bringing all of the raw water to a centralized treatment facility, or shutting down the wells and purchasing 100 percent of the water supply from Pasco County—were carefully evaluated. The eight water supply wells are geographically grouped in pairs, with two wells located in general proximity to each other. This added a fourth option of constructing a treatment system for each pair of wells.

For the alternatives analysis, the capital costs of each project were considered in addition to operations and maintenance costs. The bottom line was that a centralized facility at the existing Mitchell WTP proved to be the most cost-effective option, due to the existing land ownership and infrastructure. We had our work cut out for us.

In the fall of 2009, Wade Trim embarked on an aggressive design schedule to begin four construction projects concurrently, including:

- five interconnections with the Pasco County water system,
- 3.7 miles of raw water main from wells 1, 2, 8, and 9 to the Mitchell WTP,
- 2.7 miles of raw water main from wells 6 and 7 to the Mitchell WTP, and
- the Mitchell WTP improvements.

Water from wells 3 and 4 was already transmitted to the Mitchell WTP, so additional construction was not necessary.

One of the most difficult components of this project was managing all four of the projects in order for them to be completed at the same time. We really wanted to avoid having a treatment plant that was ready to be put into service, but not have any raw water piping that came up and connected to it.

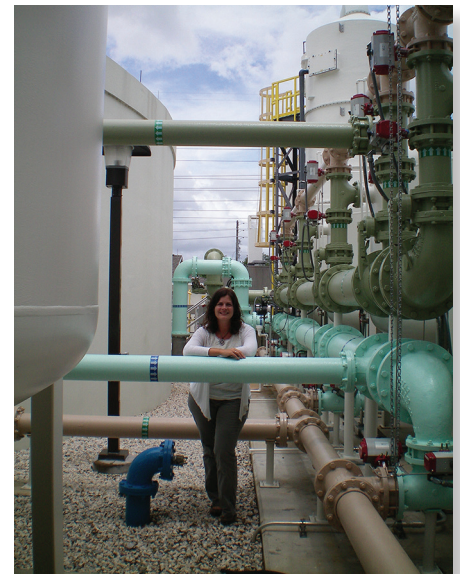
The Mitchell WTP improvements included treatment techniques to handle various water quality challenges posed by the different raw water wells. Forced draft aeration with dual-stage chemical odor control was selected to remove the hydrogen sulfide from the raw water. Due to the high levels of hydrogen sulfide in the raw water, a pH reduction was necessary prior to aeration for full sulfide removal. Sulfuric acid was selected to achieve the pH reduction. Chlorine is added to the water after aeration and prior to entering the baffled dosing tank. Transfer pumps then transmit the water through pressure filters to remove iron, organics, and any particulate matter that may have formed during the aeration process. The design included provisions for adding polymer, alum, or potassium permanganate prior to filtration if necessary. Because the water chemistry would vary based on which raw water supply wells were used, it was difficult to make a design determination of how the water would behave during treatment.

In addition to aeration and filtration, the disinfection method was changed from free chlorine to chloramines for compatibility with Pasco County water and to reduce the formation of disinfection byproducts in the distribution system.

Making Clear Water Flow

Between May 2010 and August 2011, the four water system improvement projects were successfully constructed. On August 25, the interconnections with Pasco County were opened, the individual water treatment plants were decommissioned and turned into raw water pumping wells, and the upgraded Mitchell WTP was placed into service.

After more than 17 years of poor water quality and an unresponsive private owner, Seven Springs customers now



Filters and piping at the improved Mitchell WTP.

have clean water. Resident and CBWN President John Andrews said, “It’s like day and night. The water is wonderful, drinkable, and very clear. I’m glad my community’s struggle is over.”

The construction projects were delivered on time and the total improvements cost of \$7.8 million is within the budget developed by Wade Trim, US Water and FGUA to minimize rate impacts to the customers. Furthermore, the groundwater withdrawal wells have been restored to pumping levels permitted by the water management district to minimize impacts to sensitive area waters.

Our collaborative team—made up of people from Wade Trim, US Water and FGUA—set out to make sure residents receive the clean, odor-free water they deserve for well into the future. We achieved our goal, and couldn’t have done it without the steadfast, strong support of the community. We accomplished real change and it feels good. ■

About the Author:



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