Bowen Power Plant
FGD Wastewater Treatment

CASE STUDY

Location: **Cartersville, Georgia**
Owner: **Georgia Power**

Water Research Center

The Water Research Center (WRC) is a research facility established in 2012 at Georgia Power's Plant Bowen. The WRC facilitates the development and demonstration of water treatment and conservation technologies. The facility, which is the first research center of its kind in the U.S., is a collaborative effort between the Electric Power Research Institute (EPRI), Southern Research (SR), Southern Company, its subsidiary Georgia Power, and 14 other utilities.

More than 40 test programs have been completed or started at the WRC. These programs encompass seven distinct focus areas: overall plant water management, cooling tower and advanced cooling systems, zero liquid discharge (ZLD) options, solid landfill water management, carbon capture and storage (CCS) technology water issues, moisture recovery, and flue gas desulfurization (FGD) process wastewater treatment. The WRC shares the information gathered from the test programs with a consortium of research organizations and utility companies to further the common goal of conserving water and minimizing the amount of wastewater produced.

Two-Part FGD Wastewater Treatment Pilot

In 2014, Southern Company and WesTech began discussing how they could work together to enable additional testing of FGD wastewater treatment. The EPA was revising its Coal Combustion Residual (CCR) rules to include new requirements for coal ash surface impoundments as well as proposing revisions to its Effluent Limit Guidelines (ELGs) for steam electric power plants, which set federal limits on the levels of certain constituents (arsenic, mercury, selenium, chromium, etc.) in wastewater that can be discharged from power plants.

Because of the EPA's increased scrutiny in these areas, Southern Company wanted to build a two-part FGD wastewater treatment pilot that would allow testing of specific biological processes for selenium removal. The requirements were smaller-than-normal equipment sizes and the capability to test a variety of factors such as flux rates, retention times, chemical dosages, and different feedwater types.

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Because Southern Company was already running some tests using WesTech's mobile RapiSand™ unit, WesTech was a natural choice for this new FGD project.

"The customer wanted the ability to easily change process configuration and have two to three different testing options," said Steve Goldsmith, WesTech's Lead Project Manager on the project. "The aim was flexibility – test, test, test."

First Half of Treatment Train Removes Solids and Metals, Controls pH

It was a challenging request, but WesTech brought years of expertise to the table and presented a solution: a modular configuration of a physical/chemical treatment system to maximize flexibility for testing purposes.

The system WesTech designed was used as the first half of a two-part pilot treatment train, the overall goal of which was to meet the limits set forth in the ELGs. The first half of the treatment train was used to remove solids and metals from the influent wastewater and to control pH. To achieve those goals, WesTech provided primary and secondary clarifiers, reaction tanks, process tanks, pumps, chemical feed skids, and instrument and control systems.

Water from a holding pond was fed into an equalization tank and then shifted into the physical/chemical treatment system. Once optimized, the influent water was fed into

reaction tank 1 where lime addition was used to adjust pH. Water flowed via gravity through two more reaction tanks where ferric chloride and organosulfide were added to precipitate the metal hydroxides. In addition, polymer was added for flocculation. From there, the water was sent to a clarifier to settle and remove solids.

The water was then fed into the second half of the treatment train, which consisted of a sand filter followed by a biological treatment system for selenium reduction.

"It was a pleasure working with WesTech on this project," said Rebecca Osteen, Research Engineer with Southern Company Services.

"Throughout the design and construction of the system, the WesTech team quickly responded to issues and questions and adjusted to both major and minor changes. Their flexibility and expertise were essential to the successful startup of this project."

For WesTech engineers, it's rewarding to work on research projects like this.

"We're glad that our expertise could help Southern Company determine how to better recover water used in the processes of generating electricity," said Goldsmith.

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