

Lake Sinclair Drinking Water Treatment Plant

Application: ZeeWeed 1000 packaged plant with enhanced coagulation for the treatment of surface water

Capacity: 4 MGD (15,142 m³/d)

Location: Eatonton, Georgia, United States

Commissioned: April 2008

The Problem

Baldwin County, located approximately 70 miles south of Atlanta, Georgia, has a land area of approximately 164,800 acres (667 km²). Baldwin County currently supports roughly 7,500 water customers with supply from the City of Milledgeville. Although smaller in landmass than Putnam County, Baldwin County has a much larger population with a strong industrial and commercial base. Historically, the population centers have been the City of Milledgeville and Lake Sinclair (north and east Baldwin County). In the last 10 years, development has been extensive throughout south and west Baldwin County.

Putnam County is a relatively large county with a vast majority of the population congregated in three areas of the County, Lake Oconee, Lake Sinclair and the City of Eatonton. Currently there are over 4000 residences in the Lake Sinclair Area within Putnam County. Most of the commercial and industrial activity within Putnam County is restricted to the area in and around the City of Eatonton and the two major transportation corridors of US 441 and GA Hwy 44.

Since neither Baldwin nor Putnam counties have a water treatment facility, the citizens in these areas are currently serviced primarily by individually owned residential wells.

However, the projected growth trends in the multi-county region surrounding Lake Sinclair are putting a strain on the existing water utilities.

In April 2001, the State of Georgia enacted legislation to create the Sinclair Water Authority (SWA). The purpose of the SWA is to provide safe drinking water on a regional basis to both Baldwin and Putnam Counties. It was decided that a regional surface water treatment facility was in the best interest of both counties. Lake Sinclair, which is geographically the dividing line between Northern Baldwin County and Southern Putnam County, will be the source of water for the new treatment facility providing adequate potable water for the citizens of the region.

The SWA was particularly concerned with the microbial contamination possibilities in the area. All of the wastewater from Putnam County, which is known as the "Dairy Capital of Georgia", drains into Lake Sinclair. Since dairy cattle waste was the source of the 1993 *Cryptosporidiosis* outbreak in Milwaukee, conventional technology was viewed as an inadequate application. Also, from the perspective of microbial protection, Lake Sinclair has a tremendous number of older dwelling units with aging septic tanks around the lake.

The SWA hired Carter & Sloope to select a new water treatment technology and they recognized membrane filtration as the technology which could provide the best possible protection against microbial contamination and therefore the safest possible drinking water for the region's residents.



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The Solution

A pilot study was conducted to select the best membrane system that could produce treated water meeting or exceeding state and federal drinking water guidelines with minimal operator attention.

Several membrane manufacturers systems were piloted. ZENON Membrane Solutions, part of GE Water & Process Technologies, Z-BOX* packaged water treatment plant was selected based on pilot study results which showed excellent treated water quality in terms of pathogen and virus removal, turbidity, manganese and iron removal, TOC removal and THM and HAA formation potential. In addition, the system was able to run with less than two hours of operator attention per day.

Process Overview

The SWA had decided on a multiple barrier approach for both microbial and chemical contaminant concerns. The primary barrier for microbial concerns is the membrane filtration process.

The Lake Sinclair Z-BOX packaged plant incorporates ZeeWeed* 1000 ultrafiltration membranes. With a nominal pore size of 0.02µm, ZeeWeed 1000 membranes act as a physical barrier to virtually all suspended particles, and can consistently provide 4-log removal (99.99%) of *Giardia*, *Cryptosporidium*, bacteria and viruses. These removal rates ensure that the water from the treatment plant will meet state and federal drinking water guidelines, and protect residents from microbial contamination.

The initial capacity of the water treatment plant is to produce 4 million gallons (15,142 m³) over 16 hours, in one day. The build-out capacity is to produce 6 million gallons (22,712 m³) over 18 hours, in one day. The ultimate capacity of the water treatment plant is to produce 8 million gallons (30,283 m³) over 21 hours, in one day.

The proposed raw water intake will draw water from the Oconee River arm of Lake Sinclair. There will be chlorine dioxide injection at the raw water pump station to provide the first barrier against waterborne pathogens. On a seasonal basis, potassium permanganate will also be dosed at the raw water pump station to oxidize iron and manganese. The raw water will then flow through a conventional coagulation/flocculation process, which will help flocculate organic particles. Alum will be used as the coagulant and powdered activated carbon (PAC) may be used seasonally to help in the removal of smaller organic material not easily removed by conventional coagulation process.

After membrane filtration, the treated water will be treated with MIOX (Mixed Oxidant) as a second source of disinfection, lime for the adjustment of pH, a polyphosphate for corrosion control, and fluoride for health benefits. Process waste from all processes at the water treatment plant will be directed to one of two alum lagoons. The settled water from the lagoons will be discharged back to Lake Sinclair.

Upon completion, the Lake Sinclair Drinking Water Treatment system is the first package ZeeWeed 1000 plant in the state of Georgia.

Typical Treated Water Results		
	Raw Water	Treated Water
Turbidity (NTU)	< 2	< 0.1
<i>Giardia</i> (per 100L)	N/A	> 4 log removal
<i>Cryptosporidium</i> (per 100L)	N/A	> 4 log removal
Viruses	N/A	> 3.5 log removal