

# New Treatment Technology Targets TOC/DOC Removal at Florida Utility

Turn on any tap in Palm Springs, FL, and you will get crystal clear water. It has no odor, no metallic taste and compares favorably with most bottled waters. The residents are, quite naturally, very happy with it.

Getting clean, refreshing water in Palm Springs was not an easy task. The ground water supply in South Florida typically contains large amounts of total organic carbon (TOC) in the predominant form of dissolved organic carbon (DOC). Organic compounds result from the degradation of vegetation that occurs naturally in the local environment. Extensive treatment methods are required to remove the organic material (humic acid) and decolorize the water. Most water utilities disinfect such water with chlorination, a treatment that in the presence of DOC produces such byproducts as trihalomethanes (THM).

Most communities have developed water treatment systems to handle these issues, but in recent years the U.S. Environmental Protection Agency has developed new standards with tighter tolerances on disinfection byproducts. As a result, public works directors are seeking new treatment options that will effectively remove DOC and thus prevent the creation of harmful byproducts.

“There are new regulations coming down that require us to do something about TTHMs and HAA5s, and we’ve always had to battle to stay within the color limits on our water,” said Bill Davis, Director of Public Services in the Village of Palm Springs. “To meet the color requirements we had to use a lot of chlorine, then strip it back out again. It was getting more and more costly.”

In an effort to meet the new EPA regulations and keep treatment costs in check, the village began looking for new ways to pre-treat water coming into the system. Their objective was to reduce the DOC and lessen the need for chlorine treatment. The first step in the process



Palm Springs, FL, is the first to use the Orica MIEX® DOC technology in the U.S. Pictured are the contactor tank (foreground), resin recovery settler (center) one of the two batch resin regeneration tanks (white elevated tank) and the resin handling building.

was hiring Eckler Engineering, Inc., of Coral Springs, Florida, to research the problem.

“The two water treatment plants in Palm Springs were having a tough time

meeting the EPA Stage One disinfection by-product standards, and they were not going to meet the new Stage Two standards,” said Doug Hammann, P.E., of Eckler Engineering. “The plants were not very old, so they didn’t want to scrap them, and it was too expensive to install membrane filtration, so they had us investigate other treatment techniques.”

After exploring a number of pre-treatment options, the consultants recommended a technology new to the United States – MIEX® DOC Resin by Orica Watercare, an Australian company. The technology is marketed in the U.S. by Orica Watercare of Denver, CO, and WesTech Engineering of Salt Lake City, which is licensed to manufacture the equipment needed for the process. At the time of the Palm Spring’s project, which went on line in January 2005, no community in the U.S. had used the MIEX® process for DOC removal.

The MIEX process is not a new science, but rather an improved application of an existing technology – ion exchange. Positively charged resin particles are mixed with untreated water containing negatively charged organic matter. The negatively charged organic matter is removed by attaching to the resin particles. The resin particles settle out, allowing the pre-treated water to proceed to the downstream treatment processes and filtration.

“DOC by itself is not really the problem,” said Michael Bourke, vice president



Don Ray, water treatment superintendent, with MIEX treated water (left), raw water (right) and water with TOC/DOC removed (front).

## CASE STUDY

for marketing at Orica. “The real problem in water treatment is chlorinated by-products like trihalomethanes (THMs) that form when chlorine reacts with the DOC during disinfection. This is a common problem for communities that have high DOC levels in their water supply. The MIEX treatment process removes DOC before disinfectants are added.”

Because the process had not been used in the U.S. prior to the Palm Springs project, the Florida engineers were a bit skeptical of the technology when it was first presented to them in 2002. To put aside their concerns, Orica and Eckler Engineering collaborated on bench scale tests using untreated water from Palm Springs. The results were impressive. The process removed 90 percent of the color and 80 percent of the DOC from untreated water.

Pilot scale testing of the technology began in January 2003. The tests were conducted to simulate the pre-treatment necessary in Palm Springs; 10-20 milliliters of resin per liter of water with a

20-minute contact time. Once again, the results were outstanding, far better than pilot test results achieved from other pre-treatment processes. Designs were soon completed and permitting began in March 2003. The job was a turn-key operation by WesTech with MKI Services coordinating the on-site erection of the equipment. John J. Kirilin Inc., Florida Division, was the general contractor. Construction was completed in November 2004.

The impact of the technology was immediate and better than expected. Palm Springs public works officials have been extremely pleased thus far with the process.

“Basically, it has done everything we expected it to do,” said Don Ray, Palm Springs’ water treatment superintendent. “The system is very user friendly and the results have been excellent. Before we put the system on line, our raw water was running 26-36 color units and the finished water was at 13-15. Our finished water is now at 0-2 color units. Our water is virtually crystal clear. And it also improved the

taste and smell of the water. Most importantly, we don’t have a problem meeting the new EPA regulations.”

Tests show the TTHMs in the treated water are now at 20-31 ppb and HAA5s (haloacetic acids) are in the 17-22 ppb range. The regulatory limits are 80 ppb for TTHMs and 60 ppb for HAA5s.

As side benefit, the village drastically reduced its chlorine usage in final-stage treatment.

“As of right now, our chlorine usage is down 30 percent, and I think we have the potential to cut chlorine use by 50 percent,” Ray said. “The price of chlorine had doubled or more in recent years, so this is a significant savings for us.”

The total cost of installing the MIEX system at both Palm Springs’ treatment plants was approximately \$4.8 million. The plants have a combined capacity of 10 mgd.

“We’ve met or exceeded every design parameter,” said Hammann. “I’d say the results so far are good approaching excellent.” **WW**

**ORICA WATERCARE INC.** engineers, designs and manufactures MIEX® Systems for the removal of Dissolved Organic Carbon from drinking water sources. Its head office is based in Colorado with additional offices located in Kentucky and North Carolina.

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