ORICA WATERCARE

MIEX® PRESS

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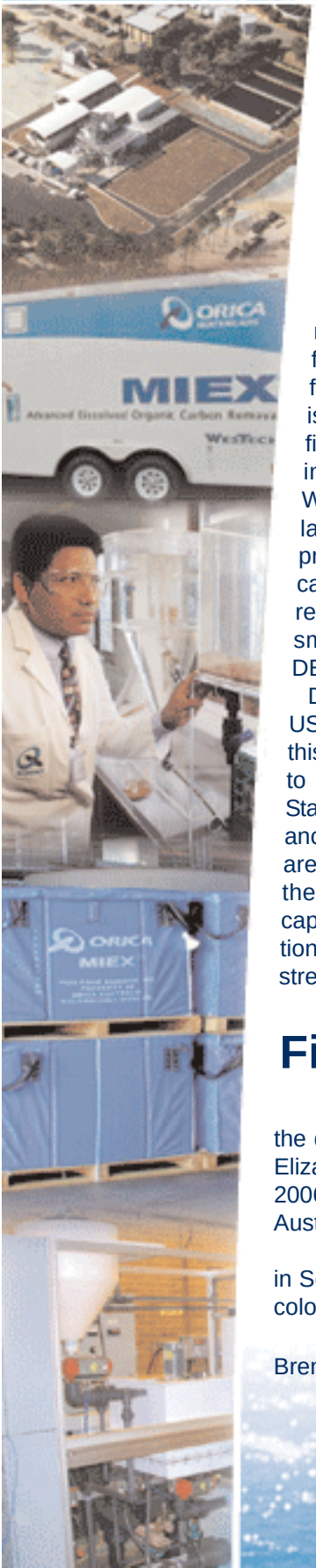

A Message from the President

Welcome to the August Edition of MIEX®PRESS. There have been many exciting developments in the global adoption of the MIEX® technology in the past few months. Following last month's story about the first installation in Belgium, featured in this newsletter is the announcement of the first system to be installed in South Africa. Orica Watercare Inc. has also launched the MAGNAPAK™ product line for MIEX® applications up to 700 gpm, in response to the need for small systems to reduce DBP levels.

Demand for piloting in the US has been particularly high this summer as utilities come to grips with the first year of Stage 1 DBP Rule compliance monitoring. MIEX® pilots are not only demonstrating the technology's significant capability to reduce disinfection by-products, but downstream treatment benefits are now being measured as well in clarification and filtration technologies. A recent trial in picturesque Santa Fe, NM, for example, demonstrated that MIEX® pre-treatment ahead of DAF clarification allowed greater throughput along with reduced filter solids loading.

It is very exciting to see the MIEX® technology gain the momentum it has over recent months. Our full-scale MIEX® plants continue to produce exceptional water all over the world, the first MIEX® System in California should be ready to start-up in the fall, and another 9 mgd MIEX® plant will go into construction shortly in Florida. MAGNAPAK™ Systems are available, economical, and can be delivered quickly to our customers. And last but not least, the MIEX® technology is going to be featured on a CNBC program coming up in September.

Combine all these activities and developments and you have a very energized Orica Watercare organization!

We hope you find this issue of MIEX®PRESS to be both informative and insightful, and as always, thank you for your interest. If you would like further information on the articles, please feel free to contact me at chris.keever@orica.com.

Chris Keever
President, Orica Watercare

What's Inside

First MIEX® Plant in South Africa

Port Elizabeth, SOUTH AFRICA: Nelson Mandela Metropolitan Municipality (NMMM) has approved the design of a 10MLD MIEX® plant for installation at its Linton Water Treatment Works in the heart of Port Elizabeth. The design work is due to commence in July 2005 with construction of the plant to proceed in 2006. Upon completion, this will be the first MIEX® plant in operation in the Southern Hemisphere outside of Australia.

Orica is confident that this represents the first of several MIEX® plants to be secured in South Africa over the next few years as the technology is ideally suited to the highly colored waters characteristic of the southern and western capes of the Republic.

Brendan Poots, ANZSA Commercial Manager - MIEX®

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MIEX® System Improves Performance of Downstream Treatment in Santa Fe, NM

The City of Santa Fe has appointed Greeley and Hansen and EE&T to investigate treatment options to upgrade the 8 MGD Canyon Road WTP. The Canyon Road WTP treatment process includes thirty-three year old sludge blanket clarifiers. The performance of the sludge blanket clarifiers is unreliable, particularly during late spring/early summer when the snowmelt increases river flows and raises TOC levels in the local reservoirs from around 5 mg/L to over 15 mg/L. During this period the WTP often struggles to treat more than 6 MGD due to high coagulant doses and challenges in keeping up with changing raw water chemistry, resulting in unstable performance with respect to settled water turbidity.

Fig 1: The Canyon Road WTP built to blend in with the local adobe architecture

Trials of a number of treatment options were conducted from May to June 2005 when raw water TOC levels peaked and treatment conditions were most challenging. Clarification technologies investigated included adsorption clarification, DAF and conventional clarification with plate settlers. The MIEX® process was assessed as a pre-treatment process in front of each of these technologies to improve TOC removal. Initially the 25 gpm MIEX® pilot plant was operated independently to optimize process operating conditions to maximize TOC removal.

Fig 2: 25gpm MIEX® Pilot Plant at the Canyon Rd Trial

The optimized conditions determined were 30mL/L contactor concentration, 20 minutes contact time and a resin regeneration rate of 1 gal/1000 gal treated. At these conditions, MIEX® treatment was able to consistently remove 65-70% of the raw water TOC.

At the time of the trial, the existing WTP was operating at an alum dose of 40-55 mg/L and 1-2 mg/L of polymer, and achieving an approximate 50-60% TOC reduction, with the assistance of a pre-oxidant. MIEX® pre-treatment was able to reduce coagulant demand to 10-15mg/L of alum and eliminate the need for polymer and pre-oxidant to achieve desired turbidity targets in WTP simulated jar tests.

The combination of MIEX® pre-treatment with either DAF, conventional coagulation or plant simulated jar tests enabled a consistent TOC reduction in excess of 70 - 80%, demonstrating a strong synergistic relationship for treatment of the Santa Fe water source. The overall results are summarized in Figure 3.

MIEX® pretreatment also allowed much more stable operation and performance of downstream DAF and conventional clarification processes. With MIEX® pretreatment, higher throughputs through the DAF pilot plant were possible through reduced coagulation times and lower volumes of foam produced. Additional benefits of MIEX® pretreatment on downstream treatment that were identified in the trial included less sludge production, reduction of pH correction chemicals, lower solids loading on the filters and possibly elimination of NaMnO4 dosing. Reduced solids loading on the filters may therefore allow more reliable operation and production capacity during the peak run-off period.

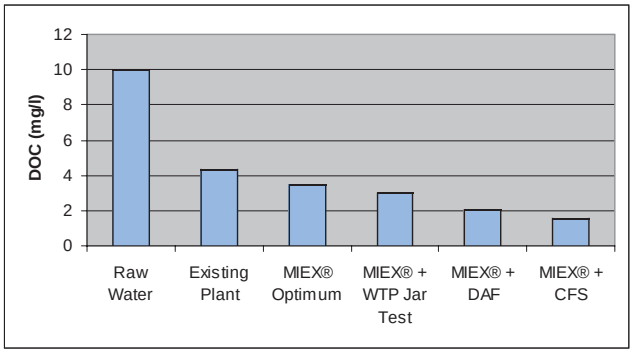

Fig 3: Summary of DOC reduction performance. Note: MIEX® + CFS (coagulation, flocculation and sedimentation) performance when raw water TOC declined to ~8 mg/L). DOC levels were equivalent to TOC levels.

The Canyon Road WTP trial was therefore a great example of how MIEX® pre-treatment may significantly reduce coagulant doses and improve the final treated water quality. There also exists a potential to increase the capacity and reliability of downstream treatment processes.

Orica Watercare wishes to acknowledge the great support provided by Gary Martinez, Mike Gonzales and the staff of the City of Santa Fe's Canyon Rd WTP during this trial.

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2005 Annual Conference: San Francisco

The Annual AWWA Conference & Exhibit was held June 12-15th in San Francisco, CA. The conference is always a fun setting to meet up with old colleagues, new clients and those interested in learning more about the MIEX® Technology. Orica Watercare shared a booth with WesTech Engineering and showcased the new U.S. installations in operation and under construction, as well as recent process enhancements. In addition to the exhibit hall, the MIEX® Process had a very strong presence in the presentations that were given throughout the conference. Some of the papers presented include:

Orica Watercare's Shane Jones explains MIEX® Process to AWWA attendees.

Evaluation and Design of an Ion Exchange Facility for Disinfection Byproduct Precursor Removal
Thomas Friedrich, Todd Swingle

Disinfection By-products Reduction Using Magnetic Ion Exchange Resin: Performance Under Uniform Formation Conditions
Richard Lin, Kenneth Mercer, William Taplin, James Borchardt, David Okita

Testing Bromide and DBP Precursors Removal in California State Project Water Using a Magnetized Ion Exchange Resin
A. Fonseca, James Kennon, Stephen Booth, Bo Labisi, Jim Meyerhofer, Patrick White

Removing Hexavalent Chromium by Ion Exchange: A Suite of Pilot-Scale Results
Nicole Blute, Michael McGuire, Chad Seidel, Gang (Danny) Qin, Leighton Fong

Collaborative Efforts to Investigate Advanced Water Treatment of Delta Supplies
David A. Briggs, Gil F. Crozes, Helene Baribeau, Scott C. Weddle, Andrea J. Flores

SNWA Evaluates DBP Control Strategies
Mark Janay, Charles O. Bromley, Steve Hirai, Peter H. Kreft, Ronald E. Zegers, Rodney G. Brauer, William Bellamy

MIEX® Process to be showcased on CNBC television show

CNBC TV program, World Business Review with Alexander Haig, will be doing a feature on Orica Watercare and the MIEX® Process, set to air in mid-September. The 30-minute segment, covering "Innovations in Water Treatment Technologies," will feature several water treatment technologies including the MIEX® process. The MIEX® portion will consist of a panel discussion with industry experts including Dr. Phil Singer of UNC, the show's host Alexander Haig, and Orica Watercare President Chris Keever. In addition, field footage of the Village of Palm Springs Water Treatment Plant in Florida will supplement the discussion to showcase the MIEX® Process in action.

We are very excited to have the MIEX® technology featured on this program and hope that you are able to tune in and hear what the experts have to say. We will send out notice when the date and time are finalized.

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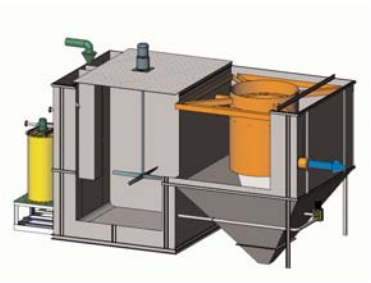
Introducing MAGNAPAK™ DOC Removal Systems for small water treatment systems



700 gpm Skid-Mounted MAGNAPAK™ System

The MAGNAPAK™ system has been developed to allow small systems to cost-effectively utilize the MIEX® Process to meet EPA disinfection by-product (DBP) standards. Designed specifically for throughputs of less than 700 gpm, these preassembled, skid-mounted systems allow for quick and cost-effective installation at small water treatment plants.

Benefits of MAGNAPAK™

- Low installation costs
- Low operating costs
- Simple and reliable operation
- Low waste volumes (< 0.05% of throughput)

MIEX® gets global recognition with award at 2005 World Expo in Japan

Orica, with its exhibit of the MIEX® Technology, was awarded a Global 100 Eco -Tech Award at the 2005 World Expo in Aichi Japan. The award recognizes technologies with the potential to help resolve the world's environmental problems and create a sustainable future.

"It's always a boost to receive independent recognition and the timing of this award in Japan is perfect. MIEX® has just successfully completed Japan's water technology trialling process and we are working with Japanese partners to introduce the technology there," says David Day, MIEX® Commercial Manager, Asia.

"This award, along with the strong interest in MIEX® at the recent International Water Association's leading edge technology meeting in Japan, is further evidence that MIEX® will be adopted globally by the water industry," says David.

Upcoming Conferences

Ohio AWWA
September 19-22 in Columbus, OH

Alabama / Mississippi AWWA
October 2-4 in Choctaw, MS

Upcoming Papers

International Water Conference
October 9-13 in Orlando, FL
"MIEX® Advanced DOC Removal Process: Full Scale Plant Design and Performance"

ASDWA
October 17-19 in St. Louis, MO
"Use of Magnetic Ion Exchange Resin for Removal of Total Organic Carbon and Other Problematic Anions"

CA/NV AWWA
October 10-14 in Reno, NV
"Installation of a Magnetic Ion Exchange Resin Treatment Process to Improve TOC Removal and Meet EPA Stage 1 DBP Standards at the Green Valley WTP"

WQTC
November 6-10 in Quebec City, Quebec, CA
"Evaluation of Existing Models for Predicting DBP Formation Potential of California State Project Water Treated with a Magnetic Ion Exchange Resin" (poster)

MIEX® PRESS

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The Advantages of using Ion Exchange for Pre-treatment

- Reduced coagulant, alkali, chlorine doses; sludge reductions; no NDMA

Using the MIEX® process as the first treatment stage of a water treatment plant can provide many downstream benefits in terms of both treatment economics and final treated water quality.

Conventional Coagulation Plants

Conventional coagulation plants use a coagulant such as alum (aluminium sulphate) or ferric chloride to neutralize the negative surface charge on turbidity (particles) and organic species. The concentration and nature of natural organics in the water has an impact on the dose of coagulant required. Some raw waters have a component of DOC (or all of the DOC) that cannot be coagulated. These are non-UV absorbing DOC species that have a low molecular weight. These DOC fractions pass through the treatment process.

The MIEX® resin is selective for DOC across the entire range of molecular weights with a preference for smaller fractions. Conversely, coagulants are very effective at removing the larger UV absorbing DOC fractions. These two features makes the use of MIEX® resin upstream of a coagulation process very effective at removing DOC to levels that the coagulation process alone could not achieve.

With the bulk of the raw water DOC removed prior to coagulation the dose required for additional DOC removal is dramatically reduced. This has a positive impact on sludge production since sludge is made up of turbidity and the DOC/coagulant precipitate. The flocculation characteristics of a MIEX® treated water are very different to that of the same raw water dosed with a coagulant only. The flocs from MIEX® treated water are larger and settle more readily due to less interference from smaller DOC fractions being coagulated.

For waters low in alkalinity, a reduced coagulant dose results in less alkalinity being consumed (in the case of plants that use acidic coagulants such as alum or ferric salts), the result being that pH depression is not as pronounced. This enables the coagulation process to be maintained at the ideal pH conditions with less lime or caustic being added to raise pH.

Lime Softening Plants

The MIEX® process has been successfully applied as a pre-treatment step on lime softening plants in Florida. Raw water DOC is reduced from 13mg/L to 3mg/L in the MIEX® step. This has resulted in a reduction of chlorine demand of up to 50% with a marked improvement in finished water THM and HAA concentrations. THMs in the product water from these plants were in the range of 67 to 75 ppb with HAAs between 46 and 55 ppb. With MIEX® pre-treatment, the concentrations in the distribution system have been reduced to 21 to 22 ppb for THMs and 13 to 17 ppb for HAAs.

The lime softening process has also benefited with improved filter run times and filter performance (in terms of outlet turbidity).

With MIEX® pre-treatment, the concentrations in the distribution system have been reduced to 21 to 22 ppb for THMs and 13 to 17 ppb for HAAs.

Pre-treatment Prevents NDMA

Many lime softening plants in Florida that treat colored groundwater supplies are currently considering installing ion exchange systems and have the option of using a MIEX® system at the head of the plant or a conventional packed column system as the last treatment step after filtration. Most of these plants disinfect with chloramine and there is evidence that applying ion exchange treatment to chloraminated water results in the formation of another disinfection by product, *N*-Nitrosodimethlyamine (NDMA). While NDMA is not currently an EPA regulated contaminant, the California Department of Health Services (DHS) has adopted an action level of 2 ng/L and the AWWA has recommended to the EPA that NDMA be added to the Contaminant Candidate List (CCL) so that it will be considered for possible future regulation[1]. The advantage of a MIEX® pre-treatment step is that the ion exchange occurs prior to chloramination, and downstream disinfection conditions do not need to be altered. Where many lime softening plants apply chloramination prior to filtration, the input to ion exchange columns will have to be dechlorinated to prevent NDMA formation and then chloramine reapplied after the ion exchange process to provide a distribution system residual. Both water treatment plants in Florida apply MIEX® treatment prior to chloramine disinfection and no NDMA has been detected in the treated water up to the detection limit of 2 ng/L.

[1] **"USEPA finalizes second Contaminant Candidate List", AWWA Journal, March 2005, pages 12-21.**