



# Krüger

# FLUENT LINES



Keeping You Updated on Kruger's Pioneering Solutions

## Innovative Water Reuse Applications

With less than 1% of the world's water source being of freshwater quality, there is a constant need to find ways to replenish and reuse our water supply. Many states set lofty goals for reuse by 2010. Both Florida and California expect to be reusing over 1 billion gallons per day within the next 4 years.

Wastewater can be reused for various direct and in-direct applications. Treated effluent is often returned to aquifers in coastal areas to eliminate or retard saltwater intrusion. In other applications, effluent is returned directly to the surface water supply. More commonly, effluent is used in non-potable, such as irrigation, and industrial applications to alleviate the stress on the freshwater supply. This is becoming more and more necessary as operating cost escalate with increased energy prices.

Krüger Inc. provides numerous proven technologies to assist in reuse applications including ACTIFLO®, Hydrotech Discfilter, Oxidation Ditches, BIOSTYR®, and NEOSEP™. ACTIFLO® is a high-rate clarification process which utilizes microsand as a ballast to increase sludge settling rates, thus reducing the overall footprint of the plant. The Hydrotech Discfilter is a California DHS Title 22 approved filtration technology. With its small footprint and simple O&M requirements, the Hydrotech Discfilter is a perfect fit for today's tertiary/reuse applications. The BIOSTYR® (Biological Aerated Filter) combines biological treatment, clarification, and filtration into one compact system.

Furthermore, Kruger's Oxidation Ditch technologies provide energy efficient and simple to operate system configurations producing exceptional effluent quality. The NEOSEP™ technology is a membrane bioreactor that eliminates the need for final clarification and tertiary filtration. Post disinfection, the effluent from Kruger's processes can be reused for various non-potable applications, such as cooling tower make-up and turf irrigation.



Hydrotech Discfilter Installation Mesquite, NV



BIOSTYR Pipe Gallery Syracuse, NY

Krüger is a water and wastewater solutions provider, specializing in advanced and differentiating technologies. Kruger provides complete processes and systems ranging from biological nutrient removal to mobile surface water treatment. The ACTIFLO® clarifier, BioCon® dryer, BIOSTYR® Biological Aerated Filter (BAF), Oxidation Ditch and Hydrotech Discfilter are just a few of the innovative technologies offered by Kruger.

With 90 years of experience designing and developing a wide variety of technologies that protect our most precious resources, Kruger serves both the municipal and industrial markets. Kruger is a Veolia Water Solutions & Technologies company.

For More Information about Kruger Visit:  
[www.krugerusa.com](http://www.krugerusa.com)

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Solutions & Technologies

# CREATIVE SOLUTIONS

## HYDROTECH DISCFILTERS PRODUCES HIGH QUALITY EFFLUENT

Wastewater treatment plants (WWTPs) in Nevada, Missouri and Illinois have discovered the benefits of the Hydrotech Discfilter. Not only are the plants producing high-quality effluent, they are doing so reliably and cost effectively with low life-cycle costs.

The WWTP in Mesquite, NV, produces Title 22-compliant effluent in a wastewater reuse application. Effluent at the WWTP in House Springs, MO, meets the plant's tertiary filtration requirements at a turbidity level less than 2 NTU. The WWTP in Marissa, IL consistently produces a final effluent of less than 1 mg/L.

Facility managers also name the Hydrotech Discfilter's low cost, superior process performance capability and small footprint as additional benefits. All three WWTPs (Mesquite, House Springs and Marissa) report that the filter's process performance has met or exceeded their requirements.

William Yates, facility manager at the Marissa WWTP, attests that the Hydrotech Discfilter equipment used at the plant is more cost-effective than alternative technologies. Yates has been especially pleased with how his three filters are performing stating, "I like the design, reliability and low maintenance of these systems."

For more information on how Kruger can help solve your water reuse needs please contact: [krugerincmarketing@veoliawater.com](mailto:krugerincmarketing@veoliawater.com)

## Hydrotech Discfilter



The Hydrotech Discfilter is Title 22 Approved, compact, and features simplified controls and O&M. With its innovative, space-saving design, Hydrotech Discfilters provide an ideal filtration system for fine solids removal and product recovery. By employing woven cloth filter elements installed on multiple discs, and utilizing an inside-out flow pattern, this versatile filter is appropriate for a variety of applications. The Hydrotech Discfilter is the solution for tertiary treatment, water reuse and process water filtration.

## NEOSEP™ MBR

The NEOSEP process is a Membrane Bioreactor Process (MBR) combining flat sheet membranes with Kruger's strong biological process expertise. The NEOSEP system is appropriate for greenfield, retrofit, and sewer mining plants. This system eliminates the need for final clarification and tertiary filtration. The effluent from a NEOSEP plant is of exceptionally high quality, with a turbidity of less than 0.1 NTU typically, and can be reused in various applications. Reuse applications include irrigation, toilet recycle, cooling tower make-up, and as pretreatment to Revers Osmosis for boiler feed.

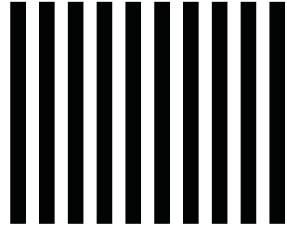


## ACTIFLO® Microsand Ballasted Clarification Process



The ACTIFLO process is a proven, compact, clarification system that utilizes microsand enhanced flocculation and settling to produce a high quality, filterable effluent. The process includes a coagulation step where coagulant is added to the gray water for destabilization of the colloids, a flocculation step where microsand and polymer are added and a settling stage where lamellar tubes polish the effluent. The microsand ballasted floc particles are continuously scraped to a center sump and subsequently pumped to hydrocyclones, which separate the microsand from the residuals. The residuals are then discharged and the microsand is re-injected into the system. When compared to conventional tertiary treatment devices the ACTIFLO process is advantageous in that it has a high efficiency treatment, smaller footprint, flexibility in operation, stable treatment (especially with fluctuating inlet conditions) and experience in worldwide installations.

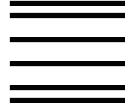
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# BIOSTYR® - Biological Aerated Filter (BAF)



The BIOSTYR process is a Biological Aerated Filter (BAF) combining biological treatment, clarification, and filtration into one compact system. BIOSTYR is an ideal process for plants where footprint is limited, close proximity to neighborhoods is a concern, and expansion is desired. With its proven ability to meet today's stringent effluent limits, BIOSTYR is an exceptional technology for secondary nitrification, tertiary denitrification, and post-denitrification applications. Kruger's BIOSTYR process is a high performance wastewater treatment solution utilized in water reuse applications, such as non-potable water purposes for cooling towers and turf irrigation.



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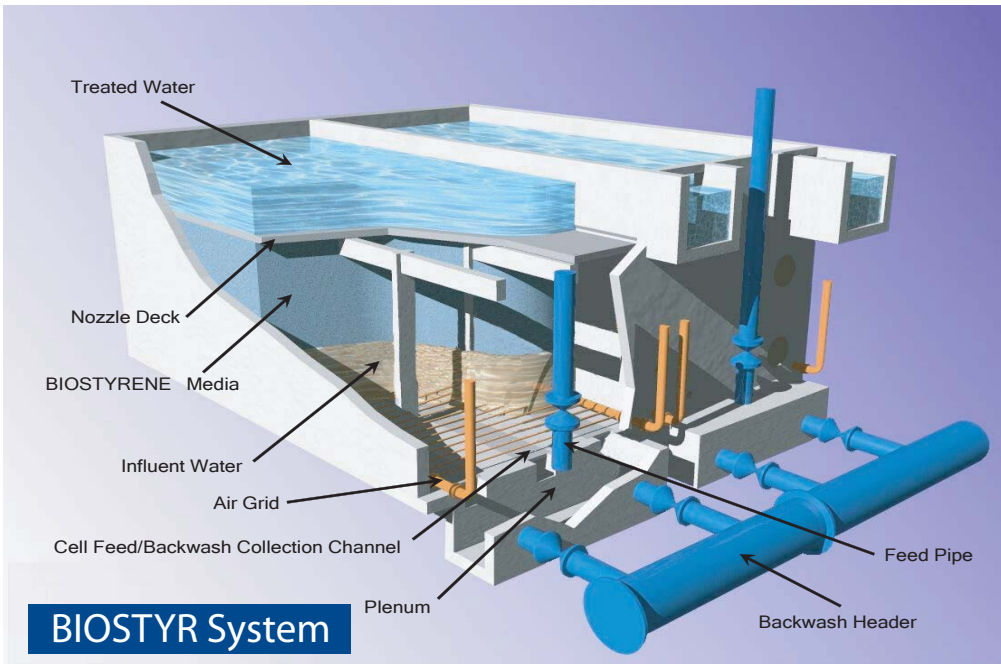


# DENVER WATER REUSE BIOSTYR® PLANT

Kruger's BIOSTYR process has proven to be an exceptional technology for Denver Water. The BIOSTYR is utilized at the Denver Water Reuse plant located in Commerce City, Colorado. Within a limited footprint, the BIOSTYR provides a process continually meeting the required stringent effluent limits.

The BIOSTYR is designed for tertiary nitrification required to meet an ammonia limit of 1.0 mg/L (30-day average). In addition, the system is designed for an average daily flow rate from 5.1-11.9 MGD, depending on the season, with a peak of 30 MGD. The Denver Water Reuse plant started up in Spring 2004. The plant serves several industrial and irrigation users, such as parks and golf courses.

Kruger's BIOSTYR process supplies Denver Water with the ease of expansion for the future. As the Denver Water Reuse plant adds customers to its service, the BIOSTYR will be expanded to a capacity of 45 MGD peak flow.



# Delta Diablo Sanitation District Recycled Water Facility

The Delta Diablo Sanitation District (DDSD) is the largest industrial recycled water facility in the state of California with a maximum daily demand of 12.44 MGD and an average daily use of 6.34 MGD. The Recycled Water Facility (RWF) was designed and built to supply up to 8,600 acre-feet per year of tertiary treated recycled water to two separate power facilities and approximately 20 acres of parks and landscaped areas for an estimated term of 30 years. Plans for expansion of the facility up to 12.8 MGD on an average daily basis are being investigated.

The RWF processes secondary treated wastewater from the cities of Antioch and Pittsburg through the ACTIFLO® process and automatic-backwash filters prior to a disinfection step. Treated/disinfected water is sent to a storage tank prior to being used at the 550 MW Los Medanos Energy Center (LMEC) for Cooling Tower Make-up (CTMU) and process water make-up, at the 880 MW Delta Energy Center (DEC) for CTMU, and by the City of Pittsburg, CA and the DDSD for irrigation purposes.

The treated water meets stringent California Title 22 standards for disinfected tertiary water, as required for cooling water and irrigation use. The RWF project was recognized by the Association of Metropolitan Sewerage Agencies (presently the National Association of Clean Water Agencies) and awarded the 2001 National Environmental Achievement (NEA) Award for Research and Technology and the 2001 NEA Award for Public Service.

The ACTIFLO process is the key component to making the RWF a success and has operated without incident since its inception in 2001. While other components of the wastewater treatment plant are being evaluated for expansion, the ACTIFLO process installed in 2001 can easily handle an increase of flow up to 21 MGD.

I am interested in receiving more information on:

- ACTIFLO®
- BIOSTYR®
- Hydrotech Discfilter
- NEOSEPT™ MBR
- Oxidation Ditches

Name \_\_\_\_\_ Title \_\_\_\_\_  
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Please tell us about your special needs and/or challenges  
for water reuse



Delta Diablo Sanitation District



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