

## BioChem Contracted to Assist with Poinciana WWTP Project in Kissimmee, Florida

*Project follows 300% capacity increase at South Bermuda*

George Lee, BioChem Technology Inc. President, announced that the company will work with Florida's TOHO Water Authority and an other consulting engineers on the Poinciana WWTP #2 .

Poinciana uses the SBR process handling 3 MGD. Growth in the area combined with more stringent permit levels require an upgrade.

BioChem Technology Inc. is working with the TOHO Water Authority in Kissimmee, Florida and another consulting engineering firm to double the capacity to 6 MGD with no new tanks or increases in the size of existing tanks. This will be done by converting the plant to the MLE process. BioChem will provide bioreactor and aeration system design along with their BIOS control system.

BioChem Technology has

worked with the TOHO Water Authority since 1997 on improvements to the secondary treatment processes in several of their Water Reuse Facilities.

The first was South Bermuda, Phase I, where an additional 5 MGD of capacity was added by converting the no longer needed equalization tanks to a Bardenpho 4-stage bioreactor. BioChem provided the concept, process design and the BIOS control system.

Later, BioChem provided concept, design, process review and the BIOS for TOHO's Sand Hill WRF. Sand Hill needed an entirely new bioreactor.

South Bermuda, Phase 2A involved converting half of an existing carrousel to a Bardenpho 4-stage bioreactor; increasing the overall capacity from 3.5 to 8 MGD. BioChem provided overall design review,

process design and the BIOS controls.

With the completion of this most recent phase at South Bermuda TOHO has achieved a 300% capacity increase without the need to build a new bioreactor.

"TOHO offers unique challenges", said George Lee. "The authority provides its effluent for re-use to a local power plant. Florida has very strict standards for re-use water quality."



## Repeat Sales in Pennsylvania & Connecticut indicate the value of variable DO set-points.

The addition of BioChem Technology's BIOS process controls have been included in the design for upgrades to the Abington Township, PA, 4 MGD plant in suburban Philadelphia, as well as the 5 MGD Enfield, Connecticut WWTP. Both plants have em-

ployed the BIOS operating system to control DO set-points through the diurnal cycle. BioChem Technology has worked with both authorities and their consulting engineers to create bioreactors that suit the needs of each community.



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### FACTOIDS:

- Say hello to BioChem at Booth 5420 - WEFTEC, San Diego, CA
- BioChem Technology completes ISO9001 Certification application in August.

## Matthew Gray, P.E. joins BioChem Technology

Matt comes to BioChem from BCM Engineers in Plymouth Meeting, PA. Originally a native of Concord, New Hampshire, Matt studied Civil Engineering at Drexel University, in Philadelphia, PA where he received a Bachelors Degree. Matt received his Master of Civil Engineering degree from Villanova University, Villanova, PA.

Matt has more than eight years of environmental engineering experience. He has been responsible for proposal preparation, process and design engineering, WWTP modeling, construction cost estimates, in-

strumentation/equipment specifications, field engineering during construction, validation and turnover deliverables.

Matt is a P.E. licensed in Pennsylvania and New Jersey and, soon to be licensed in Florida.

As a senior engineer he brings those years of experience to BioChem's clients as they prepare for upgrades to meet stringent nutrient standards resulting from the Chesapeake Bay Agreement to lower nutrient levels in the Bay by 2010.



**Matthew Gray, P.E.**

## 3 day Turn-around for Optimization Evaluations

David Palmer, Ph.D., VP of Marketing and Sales for BioChem Technology, announced the quick turn-around for optimization evaluations. "Treatment plant owners and their consulting engineers can take advantage of our rapid response starting in August," said David. "Those facing an upgrade can have our engineering staff look at their current process and their future permit limits to see what technologies will give them optimum compliance with minimum expense.

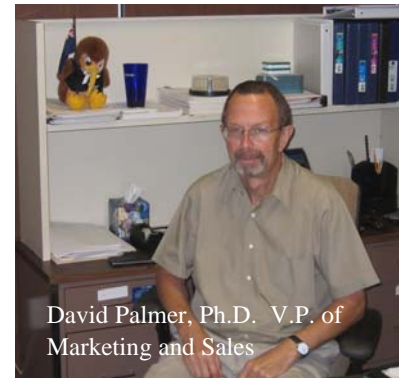
The evaluation is based on data supplied by the end user or their engineer. Each secondary treatment process has a questionnaire designed to collect the needed info. BioChem engineers take the data through the company's proprietary modeling software to determine the optimum solution to achieve maximum nutrient removal and energy efficiency.

This is valuable to plants which are landlocked, those with extra low permit levels due to clean streams legislation and those trying to minimize their energy utilization.

"Oxidation ditches and carrousel that are operating near their capacities struggle to achieve BNR standards", said David.

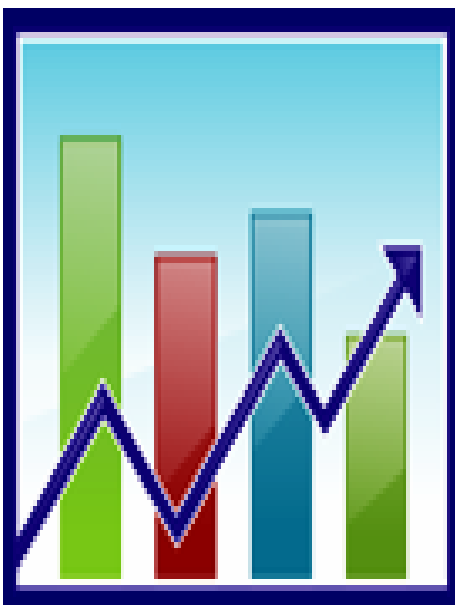
"Some of these can be converted to more efficient processes reducing the need for more real estate."

The reduction in tankage makes for quicker construction and start-up. Project efficiencies; combined with the BIOS process control system and the firm's proprietary DO controls can minimize start-up problems.



David Palmer, Ph.D. V.P. of Marketing and Sales

"Oxidation ditches and carrousel ... some can be converted to more efficient processes ..."



Steven Kestel  
Chemical Engineer

# Controlling Dissolved Oxygen—Part One in a Series

Defining good DO control can be done in several ways.

“I know it when I see it,” is one approach.

**Constant blower start-up** - If the plant’s blowers are starting and stopping constantly during low-flow periods, the plant does not have good DO control.

**Air Supply lags Demand** -If the flow of air to the aerobic zone increases minimally while the loading increases rapidly [typically 7 am to noon], the plant does not have good DO control.

If the flow of air to the aerobic zones decreases slowly throughout the period when the loading is dropping sharply the plant does not have good DO control.

**High DO Set-Points**—If the only solution available to the operator is to increase the DO set-points to 3 or more ppm, the plant does not have good DO control.

**High Energy Consumption**—Studies show that providing DO to the bioreactor consumes 50-65% of the electrical energy used in a WWTP. If a plant is in the middle

or high end of this range, and struggling to meet their permit levels, they do not have good DO control.

**Reliance on HRT**—When a plant depends on a 24 hour or greater hydraulic retention time [HRT] to provide adequate DO, they do not have good DO control.

This series addresses these and related issues.

## Dissolved Oxygen and the Diurnal Cycle— by David Palmer, Ph.D.

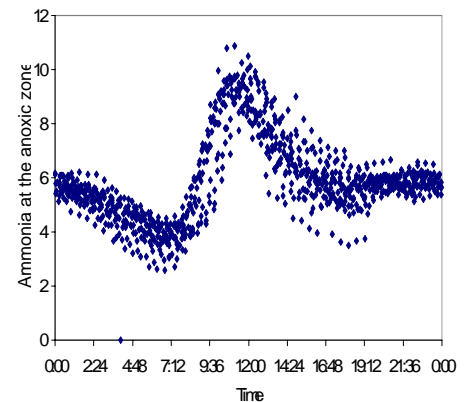
Around day break most people are waking up and heading for the bathroom. Over the next few hours the flow and concentration of carbonaceous compounds and ammonia entering a treatment plant goes from a minimum to a maximum.

While dissolved oxygen (DO) set-points and mixed liquor return ratios (IRQ) can be adjusted, current practice is to leave them set at fixed levels that insure the plant does not exceed its discharge limits under maximum flow/load conditions. Effluent discharged from the plant follows the same diurnal pattern. Most of the time nitrogen levels will be well below the permit requirement.

Continuing to aerate after all the ammonia has been consumed weakens the nitrifying bacteria and wastes significant energy.

One approach for dampening the diurnal wave is to build equalization tanks that can be used to store influent under the heavy loading conditions. It is then released to the process when loads are traditionally low in the early morning hours.

A much less expensive approach is to use BioChem’s BIOS to automatically adjust DO and IRQ set-points to take account of the changing influent load.



“If DO supply lags demand, the mixed liquor is not being processed and the bacteria starved. If it exceeds demand energy is wasted.”

## In the future issues—Oxygen Transfer Efficiency– Control Strategies

In future issues the BioChem Journal will look at:

- Oxygen Transfer Efficiency
- Control Strategies using fixed and variable set-points
- The role of simulations—modeling in optimizing DO utilization
- Component sizing—how to maximize what you have and minimize what you need to buy.
- Energy saving strategies based on good DO control.



BioChem Technology, Inc.

100 Ross Road  
Suite 201  
King of Prussia, PA 19406  
www.biochemtech.com  
Phone: 610-768-9360  
Fax: 610-768-9363  
E-mail: sales@biochemtech.com

## BioChem—Shanghai Visit USA for Hands-On training

Two senior staff from BioChem's Shanghai Office visited the corporate headquarters in King of Prussia, PA.—in Philadelphia's northwest suburbs—as well as local installations of BioChem products.

"It is important for our U.S. staff to understand the needs of our Chinese customers" said George Lee, BioChem President. BioChem manufacturers control systems in Pennsylvania and ships them to China for installation in Shanghai and other municipalities. "The Chinese respect U.S. technology and the quality associated with it. China has proven to be a significant market for BioChem Technology."

The two visitors spent six days reviewing the applications of BioChem's unique feed-forward process controls and analyzers as well as hands-on training for installation and servicing both the hardware and the software. The visiting staff were also trained in the capabilities of BioChem's unique ABAM system. ABAM stands for *Advanced Biological Activity Meter* and the system allows

BioChem staff to do actual process measurement and modeling at the client's wastewater treatment plant to fine tune both their processes and instrumentation. ABAM is used for both engineering evaluations and systems installations in the USA and China.

**Below: Sam Zhang, Matthew Gray, Ed Shang, Jim Zhang (BioChem's USA Sr Systems Engineer) and Steven Kestel review real-time data from a BIOS installation in Arizona. Sam Zhang heads the Sales operation in Shanghai while Ed Shang is the principal engineer.**

