ecoletter

AUTUMN 2010 ISSUE

Braving the Waves at the 2010 Tri-Association Conference

CHESAPEAKE

A Publication of the
Water and Waste Operators Association of
Maryland, Delaware, and the District of Columbia, and the
Chesapeake Water Environment Association

WWOA

Corporate Headquarters
New Equipment - George Salovich
Field Service - David Kachman
Parts - Caroll Phillips or
Karianne Lesko

100 Wormans Mill Court
Frederick, Maryland 21701
Phone: (301) 846-0200
Fax: (301) 846-0808

Kappe Laboratories
Contact - Dr. David Kappe, PhD. or
Julia Patel

100 Wormans Mill Court
Frederick, Maryland 21701
Phone: (301) 846-0210
Fax: (301) 846-0808

Charlottesville
New Equipment - George Long

PO Box 7986
Charlottesville, VA 22906
Phone: (434) 985-7090
Fax: (434) 985-4767

Cumberland
New Equipment - Daniel Thompson

1065 Longwood Avenue
Cumberland, MD 21502
Phone: (301) 724-1627
Fax: (301) 724-0249

Kulpsville
New Equipment - Dave Green or
Brian Hyde
Field Service - Cameron McCaw

1715 Sumneytown Pike, Suite 201
PO Box 327
Kulpsville, PA 19443
Phone: (215) 361-5700
Fax: (215) 361-5107

Monroeville
New Equipment - Paul Alfery
Chad Fenstemaker, or
Brian Fenstemaker
Field Service - Ron Ferguson

4268 Northern Pike
Monroeville, PA 15146-1790
Phone: (412) 373-9309
Fax: (412) 373-9343

Smyrna
New Equipment - Jeff Mancini

36 Elwood Drive
Swyrna,DE 19977
Phone: (302) 659-4016
Fax: (302) 659-4023

www.kappe-inc.com

PRESIDENT'S MESSAGE

CWEA President

—Craig Murray

Participation: The act of taking part, as in some action or attempt.

As some of you (hopefully) heard during my address at this year's CWEA business meeting, the theme of my term as president is "Participation". During the nine years I have been a member of the CWEA I have seen the organization continue to grow and mature. I truly believe that we are primed to make great strides in the coming years but in order to do that we all need to become more active participants.

One shining example of participation is the exciting news that the CWEA has officially formed a Stormwater Committee. As we all know, the Chesapeake Bay is a hot-bed of activity for stormwater issues. Earlier this year, a group of individuals (led by Jeff Cantwell and assisted by countless others) capitalized on the publicity caused by the pending regulatory changes and scheduled a full day conference focused specifically on stormwater issues. As the registration for the conference continued to grow, discussions about the formation of a stormwater committee blossomed. This all culminated on October 20, 2010 when 117 people participated in an extremely informative and interactive stormwater seminar at MITAGS. The stormwater committee was officially formed at the board meeting the very next day. We all look forward to the many more successful activities and opportunities for participation that this committee will surely produce for our members.

Participation can take many forms. The purpose of the CWEA is to improve water quality and protect the water environment through public education, the exchange of technical and scientific information among water quality professionals, the training of wastewater and water treatment plant operators, and by offering technical expertise and advice to the law-making and regulatory processes. Stated above are four specific mechanisms through which our organization is intended to carry out its purpose. I encourage each of you to pick one of them and actively participate. Present at a school, write an article for the Ecoletter, participate in a training program or contact your regulator.

The definition of "participation" provided at the top of this article clearly states that even an attempt counts. Not all of our actions as an organization or as individuals will be successful, but I have no doubt that if we all actively try to participation more, the organization will be better for it.

WWOA President

—Rose Marie Cline-Lowe

Hello members! I'm the new President of the Water and Waste Operators Association. The Tri-Con committee did a great job keeping everything running smoothly with a lot of great classes on new technology. We applaud all our exhibitors for their continued support.

First, I want to thank the Delaware Rural Water Association for granting me time to participate on the board working for the water and waste operators. I'm privileged by the fact my job is being the wastewater technician for Delaware. I get to work with the operators on a daily basis and I'm so proud of them.

While at the conference, I was standing by an operator talking to a vendor over a product. The statement made by this operator was: *"I'm not important, I'm just an operator."* This statement brought tears to my eyes. The vendor, as well as I, let him know that his job is very important. Operators, you are the eyes and ears, electricians, plumbers, scientist and engineers. Your dedication and hard work are very important to the water and waste field.

I hope this will remind superintendents, mayors, town managers, boards to pat the backs of these operators and say **"JOB WELL DONE."**

Editor's note: I must echo and amplify what our president said about the importance of operators. Our industry is not well served when operators sell themselves short for they have much to offer. Any engineer who does not seek out operators is not much of an engineer, and any operator who does not get involved in a project is letting down their employer and their profession. So operators step up and make your valuable contribution. The experience you have in living with equipment and processes, and making them work, gives you unique knowledge.

Floyd B. Johnson, Licensed Wastewater Operator

ecoletter

Co-Editors

Floyd B. Johnson, P.E.
Box 175A-1
Paw Paw, WV 25434
202-379-6085
crittonrun@hotmail.com

Cynthia A. Lane, P.E.
Regulatory Engineer
American Water Works Association
1300 Eye Street NW, Suite 701W
Washington, DC 20005
W / 202-628-8303
clane@awwa.org

Advertising Managers

Bob Andryszak, P.E.
Rummel, Klepper & Kahl, LLP
81 Mosher Street
Baltimore, MD 21217
W / 410-728-2900
F / 410-728-2992
randryszak@rkkengineers.com

Bob Wimmer, P.E.
Black and Veatch
2533 Paso Fino Drive
Finksburg, MD 21048
W / 410-259-6274
F / 301-921-2862
wimmerb@bv.com

Staff

Pearl Laufer
Laufer and Associates
6252 Kind Rain Court
Columbia, MD 21045
H / 410-997-0694
C / 443-812-9658
lauferandassociates@hotmail.com

Charles C. Reichert
City of Balt Dept of Public Works
Utility Engineering Section
305 Abel Wolman Munic. Bldg.
Baltimore, MD 21202
W / 410-396-5315
F / 410-545-3649
Charles.Reichert@baltimorecity.gov

Samuel R. Schlegel
White Marsh Environmental
Systems, INC.
1100 South Little Creek Rd.
Dover, DE 19901
W / 302-734-7500 ext. 1110
F / 302-734-9297
sschlegel@tuiwater.com

Peter J. H. Thomson, P.E.
Black & Veatch
18310 Montgomery Village Ave.
Gaithersburg, MD 20879
W / 301-921-8239
F / 301-921-2868
thomsonpj@bv.com

Chip Wood, P.E.
Water & Sewage Systems
16 Bittersweet Dr.
Hagerstown, MD 21740
W / 301-733-0849
F / 301-733-4438
chipwoodenhead@myactv.net

www.wwoa-cwea.org

TO ALL MEMBERS:

When completing membership renewals, make sure all information is correct and current. We use WMBA (WEF Membership By Access) for membership information. If there is an e-mail address, please include it.

CHANGE OF ADDRESS

Please forward your change of address and membership number to the appropriate organization:

WWOA Secretary	CWEA Secretary
Janet Owens	Carlos Espinosa
DCWASA	KCI
202-787-4197	410-316-7858
Janet_Owens@dcwasa.com	cespinosa@kci.com

Printed on Recycled Paper

TABLE OF CONTENTS

EDITOR'S CORNER

We must comment on the poor attendance of the Conference Opening Session. One reason for this was not total conference attendance, for it was nearly 500 and similar to the last Tri-Conference in 2008. It was disappointing to see less than one-tenth that number at the opening session, where CSAWWA member and National AWWA president, Joe Mantua gave the keynote address. Hopefully this situation will be on the conference committee's agenda for next year so the opening ceremonies are better attended.

●●●●●●

The York, Pennsylvania WWTP will make pellets and sell them as fertilizer. That's been done before, so what? Except these pellets will be white and come from treatment of the filtrate stream of the dewatering process. Magnesium Chloride is added to the filtrate to form crystals with this phosphorus rich stream. After drying the crystals, phosphorus laden, white pellets are produced. These pellets are then sold to a fertilizer company, saving the plant an estimated $90,000 / year.

●●●●●●

There was a big fish kill in Delaware Bay this year. Back in August, eight miles of New Jersey shoreline were littered with dead menhaden that died from low dissolved oxygen. A major contributing factor to the kill was a water temperature of 85 F (10 degrees above normal for the summer). We all know that warmer water holds less oxygen than cooler water. The last time a similar Delaware Bat fish kill took place was in the 1970's.

●●●●●●

In Southwest Kansas, a large cellulosic ethanol/electric generation plant is scheduled to open in 2012. In the meantime the plant operator, Abengoa Bioenergy is contracting with farmers in the area for corn stover (corn stalk and cob minus the kernels), wheat straw (wheat stalk minus the kernels) and switchgrass (native, heat and drought tolerant, grass). The 870,000 dry tons/ year facility will need a daily diet of over 4,500, 3'X4' bales of material. The plant will not be the only market for what used to be considered waste. Feedlots are using crop residue mixed with high protein, dried distillers grain (a byproduct of starch-based ethanol plants) to replace alfalfa and corn silage. Also agronomists have concluded that leaving half of the crop residue in the fields helps prevent soil erosion, builds soil quality, and reduces loss of soil moisture and irrigation needs, while sequestering carbon. So the next time you see a harvested field with left over stalks, think not of waste but of further uses. Like a WWTP, a farm does not have waste.

DC Area Water Issues Program (DCAWIP), a feature of the University of the District of Columbia's College of Agriculture, Urban Sustainability and Environmental Sciences offered free seminars for anyone interested in water every Thursday in September. Funded by the US Geological Survey, this multi-disciplinary program has a goal of creating a more cohesive water research community in the DC area. Seminar topics thus far have included ; DC Regional Severe Flood Risks and Protection, Getting to Know DC's Water, Watersheds, and Stakeholders, DC Drinking Water Supplies and Systems, Regional Coordination on Stormwater and Water Quality Protection, DC Department of Environment's Water Pollution Control Approach and DC Waters in History and Culture. For more information on future programs contact Dr. Tolessa Deksissa at *tdeksissa@udc.edu* / 202 274-5273 or Dr. Cat Shrier at *cat@watercatconsulting.com* / 202 344-7894.

●●●●●●

The largest engineering school in the Bay watershed just received a large allocation of supercomputing time to scale up models of local watersheds to regional and national levels. The goal of this Penn State University study is to better predict how changes to land use, population and climate effects watersheds and water resource management.

●●●●●●

Well the you know what's hit the fan and you know what? It ain't pretty. And none of us should be surprised for it's been a long time coming. We speak of the Bay TMDL, or as one Virginia farmer calls it Take Mom, Dad Land. Way back in our Spring 2000 issue we put that acronym on our cover and presented many possible meanings for it such as Too Many Damn Laws, Testing Man's Disciplinary Limits, Tough Mandatory Discharge Liability and Taxing Mankind's Disposable Lust. It's a case of all of the above and more as EPA rolls out the TMDL's impact to the watershed community in a series of meetings that has brewed considerable consternation to the far reaches of the watershed. Officials, farmers, developers and of course politicians are screaming bloody murder (largest unfunded mandate ever) of the drastic harm that the TMDL will do to an already weak economy. The wild ride has begun so buckle down and hang on as we enter a new era in the effort to improve Bay water quality. If any of our members and readers has to enter the fray, we wish you well and may you take a thick skin and a clear mind with you. It won't be hard to follow this issue for it will certainly be tailed by a herd of journalists as we determine just how important the Bay is to all of us.

Envirep, Inc.
Camp Hill, PA 17011
Phone: 717-761-7884
Fax: 717-737-5817
Website: www.Envirep.com
Email: Sales@Envirep.com

Envirep TLC

TLC Environmental
Lancaster, PA
Phone: 717-299-3596
Fax: 717-299-8956
Email: TLCEnvironmental@aol.com

WATER AND WASTEWATER EQUIPMENT SALES

AERZEN: Rotary Positive Displacement Blowers and Enclosures

AIR PRODUCTS: Pure Oxygen Dissolution and Generation Equipment for Supplemental Aeration Applications

ANDRITZ: Belt Filter Presses, Thickeners, Centrifuges, Sludge Dryers, Screening Equipment, and Sand Filters

ANOXKALDNES: MBBR and IFAS Systems for Wastewater BNR and Plant Upgrade Applications

AQUA-AEROBIC SYSTEMS: Sequencing Batch Reactor (SBR) Systems, AquaPASS™ Phased Activated Sludge Systems, Floating Aerators and Mixers, AquaABF® Filters, AquaDisk® and AquaDiamond® Cloth Media Filters, AquaMB Process® Multiple Barrier Membrane Systems and Aqua-Aerobic® MBR Membrane Biological Reactor Systems

AQUIONICS: In-Line UV Systems

ASHBROOK SIMON-HARTLEY: Wilfley Weber™ Fine and Coarse Bubble Diffused Aeration Systems

CUSTOM CONVEYOR CORPORATION: Belt & Screw Conveyors

D.R. CORDELL: Dumpster-Veyor™

EASTERN GLASS LINED SYSTEMS: Bolted Glass Fused and Stainless Steel Tanks

ELEVEYOR: Vertical Conveyor Systems

ENVIRONETICS: Floating Baffles and Curtains

FLO-PAK: Water Booster Stations

G.E.T. INDUSTRIES: Comminutors

GORMAN-RUPP: Sewage Pumps, Sludge Pumps, Wastewater Pumping Stations, and Water Booster Stations

G-R RAMPARTS: Air Operated Diaphragm Pumps

JAEGER ENVIRONMENTAL: Plastic Submerged and Trickling Filter Media, and Dura-Sac Screening Systems

KRUGER: BIOSTYR™ Biological Aerated Filters, ACTIFLO™ Ballasted Floc Systems, Oxidation Ditch and Pure Oxygen Activated Sludge Systems, NEOSEP™ MBR Systems, Class A Sludge Systems, and BIOCON™ Dryers

LANDIA: Submersible Mixers, Recycle Pumps and Chopper Pumps

LIQUID TECH TANK: Bolted Stainless Steel Tanks

OMNI-SITE: Wireless Telephone Dialers

PURAFIL: Odor Control Systems and Clean Room and Emergency Gas Scrubbers

SHAW ENVIRONMENTAL: Biofilter Systems for Odor Control and VOC Removal

SHELTER WORKS: Fiberglass Enclosures

THERMAL PROCESS SYSTEMS: ATAD Sludge Systems and Odor Control

WATER INCORPORATED: Package and Field Erect Wastewater Treatment Plants

PHILADELPHIA OFFICE
Phoenixville, PA
Phone: (610) 933-3744
Fax: (610) 933-8629

MARYLAND OFFICES
Sykesville, MD
Phone: (410) 552-6995
Fax: (410) 552-6985

Fallston, MD
Phone (410) 877-1582
Fax: (410) 877-1583

Isco has the Solutions to your Wastewater Monitoring Problems!

Portable Wastewater Samplers

Isco offers a full line of rugged, field-portable samplers for monitoring in sewer systems and at treatment plant effluent discharge

Compact composite samplers fit in small manholes

Advanced 6700 Series samplers have interchangeable modules for measuring flow and pH

Stormwater systems measure rainfall and monitor runoff from industrial and agricultural sites

Transportable Refrigerated Samplers

Isco's new Glacier™ Sampler combines the small size, light weight, and mobility of a portable with an exclusive new active temperature control system. Its revolutionary design gives you the best of all worlds: easy transport, quick setup, and accurate sample preservation – without reliance on ice or utility power!

Glacier delivers 48+ hours of refrigeration from a 12 volt deep cycle battery. Glacier can wait for days or weeks to collect event-triggered samples, and preserve them until a convenient pickup time. The dual-power version runs on either 12 VDC or AC line voltage for added versatility.

Open Channel Flow Meters

Isco's new 2100 Series Flow Meters offer flexible, modular design, variable rate data storage, and easy configuration for a variety of networked flow monitoring applications, including I & I studies, cMOM data collection, and river monitoring. Modules snap together to provide the capabilities needed to meet specific site requirements.

9 month memory & 15 month battery life

Variable data storage rate (will trigger on flow event)

Uses standard alkaline batteries

Great for I&I, CSO and SSO studies

For sales, service, consulting, or leasing information, call

Hartco Environmental
P.O. Box 678
Kennett Square, PA 19348-3354
Phone: (610) 444-4980
Fax: (610) 444-4983
e-mail: hartco@prodigy.net

ISCO®
www.isco.com

2010 Annual WWOA Business Meeting

—By Floyd B. Johnson, Ecoletter Co-editor

During the Tri-conference, the WWOA held a business meeting/luncheon. After serving as WWOA president for a term and half, Duane McCoy handed over the reins to Rose Marie Cline-Lowe. In his parting speech, Mr. McCoy urged everyone to be mindful of the need to train the next generation of operators. In her first act, the incoming president presented Mr. McCoy with a well deserved Past Presidents Award.

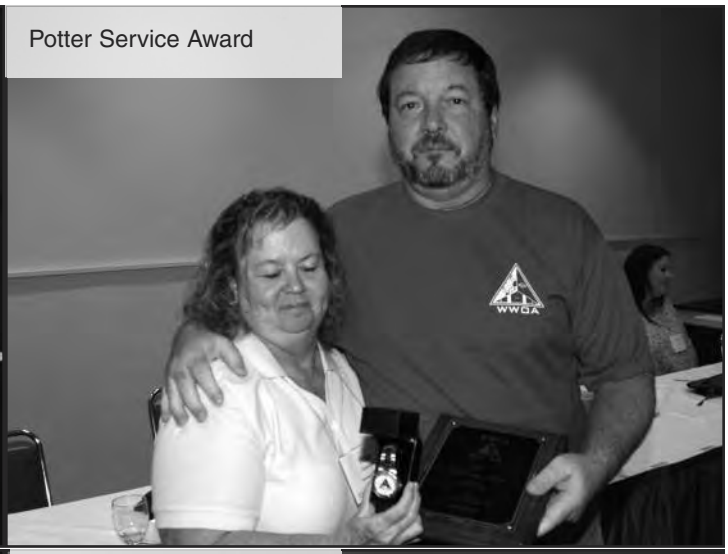
WWOA membership remains stable and stands around 700. Finances are strong with $65,000 in a saving account, and a well stocked checking account supporting organization activities. The largest inflow of funds continues to be the annual conference. The 2009 conference brought over $26,000 into WWOA coffers. For the foreseeable future the annual conference will be a tri-association affair and as such a tri-association group will form to plan conferences and to bring the organizations closer together.

Anthony Rocco, the webmaster, announced he's working on a WWOA Facebook page. Incidentally, if you want to read a past issue of the Ecoletter, they can be found on the WWOA–CWEA webpage.

Awards were given to Duane McCoy and DuWayne Potter for service to the organization. Employer Recognition Awards were given to ; WSSC- Western Branch WWTP, DC Water, Rehoboth Beach, Delaware Rural Water, City of Salisbury, Charles County, St. Mary's County and Middletown, Maryland. James Timmons received a Lifetime Award.

McCoy Service Award

Potter Service Award



Rehoboth
Recognition Award

DC Water
Recognition Award

Delaware Water
Recognition Award

Salisbury
Recognition Award

Western Branch
Recognition Award

Charles County
Recognition Award

St. Mary's
Recognition Award

Middletown
Recognition Award

Pre-Conference Session:

Replacing Our Infrastructure and Extending Its Life

—By Chip Wood, Ecoletter *Staff*

The session consisted of seven speakers grouped into two panels. The first three speakers spoke on replacing infrastructure while the remaining four speakers spoke on ways to extend the life of infrastructure. Each speaker made a presentation followed by a question and answer period. Hiram Tanner introduced the speakers and performed as moderator.

REPLACING OUR INFRASTRUCTURE *(1st Panel)*

Lisa Ochsenhirt, *Attorney, AquaLaw*

Enforcement Perfect Storm Brewing for Wastewater Systems. Lisa presented on the changing regulatory climate and gave points on how to avoid enforcement aimed at our water and sewer systems. Lisa cautions that a perfect storm may be brewing for wastewater collection and treatment system owners and operators, especially for wastewater systems that discharge into the Chesapeake Bay watershed.

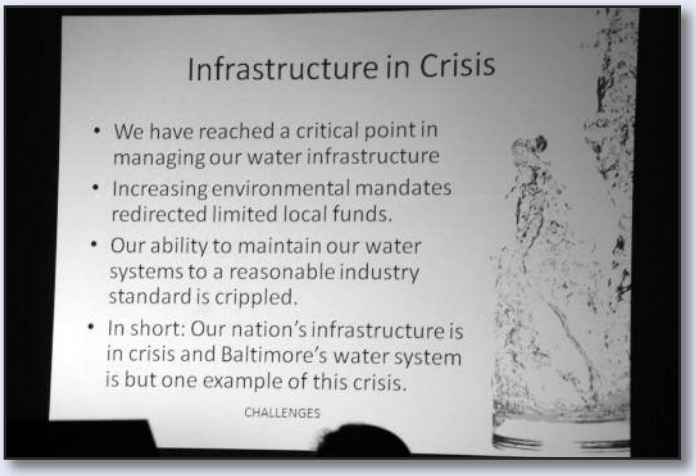
National Spotlight on the Bay: There is renewed emphasis at both Federal and State levels. At the Federal level, we have the President's 2009 Executive Order, new EPA appointments, increased EPA resources, and US Congress bills sponsored by Cardin and Holden. At the State level, there is more pressure from EPA. Also interest groups are heavily involved and are exerting pressure such as CBF litigation and the Riverkeeper petition to rescind EPA's delegation of NPDES Permitting to MDE.

SSO Rulemaking: EPA is working on a new SSO rule (but is likely to be a long process.) Watch out for how EPA will address: Definition of Avoidable SSO, Acceptable level of wet weather capacity for your collection system, Use of peak flow management strategies at treatment plants.

Increased Level of Enforcement: Expect more citizen suits together with more federal and state enforcement actions for SSOs—many actions have stipulated penalties for unavoidable overflows.

Tips for Avoiding Enforcement Include: Have a CMOM program (Capacity Management Operation Maintenance.) Respond carefully when you have unexpected occurrences" (5-day letter & talking to MDE.) Report both gross and net SSO releases. Check MDE's online SSO reporting system.

Alfred Foxx, *Director of Public Works, Baltimore City*



Baltimore City's Bleak Situation. Alfred provided a candid overview of Baltimore City's bleak situation and related it to the national water infrastructure deficit.

Challenges Include: The City's Bureau of Water and Waste Water serves a growing population of 1.8 million people who reside in Baltimore City and in several surrounding counties. New regulations and mandates necessitate new operational and capital requirements. Many of Baltimore's main line pipes are beyond their useful life, which EPA defines as between 60 and 95 years. Major capital investment is needed. If funded thru water user charges, then City needs annual rate increases for customers. While politically unpopular, there is growing need to educate public and legislators on need to invest in water infrastructure and the serious consequences if this work is deferred.

Water Needs: Unaccounted for water loss is 15 mgd. City experiences 5000 main breaks in five years, causing costly property damage, service disruption for customers and lost revenues for businesses. In year 2009, 13 miles of water mains were rehabbed. At this rate, it will take 340 years to rehab the water distribution system.

Wastewater Needs: City's location in Chesapeake Bay watershed means City experiences tighter NPDES discharge limits than other US utilities. Total wastewater debt has doubled during years 2004 thru 2008. City borrowed heavily for treatment plant and collection system upgrades in accordance with Chesapeake Bay Restoration Act and MDE Consent Decree.

Major actions to increase efficiencies and address needs include: Water system leakage audits and corrective rehab, source water meter accuracy tests, energy savings contracts, educating legislators and collaborating with other localities and industry leaders to present a unified voice.

Assessment: City has reached a critical point in infrastructure management. Increasing environmental mandates redirected local funds. Ability to maintain water systems to a reasonable industry standard is crippled. Baltimore is one example of nation's water infrastructure crisis. City predicts that they can not succeed on their own. "We are not alone, but we are on our own." Nation needs sustainable funding on a national level.

State and Federal Funding: During last two decades, State Revolving Loan funding for water and wastewater has decreased dramatically, despite increasing needs. Between 2004 and 2008, the wastewater loan fund was cut incrementally from $1.3 to $0.6 billion, representing a net decrease of 33% in federal funding.

National Outlook: Over next twenty years, an estimated $2.5 to $4.8 trillion dollars needs to be spent on nation's water and wastewater infrastructure, with 90% paid locally. Continued deferred maintenance and capital investment leads to: poor water systems performance, major main pipe breaks that cause property damage, lost water revenues, lengthy service disruptions, treated water loss, etc.

Compare Federal Funding for Water to Funding for Transportation: Between 1994 and 2008, federal investment in water and wastewater state revolving LOANS was approximately $36 billion. Such SRFs place 100 % of the financial burden on the utilities which must pay off the loan over a lengthy period of time. Consider that during the same period, federal investment in surface transportation, i.e., highways and transit, was approximately $557 billion in GRANT monies. Why such a disparity? Foxx observes that the US Department of Transportation serves as an advocate of highways where as the USEPA serves as primarily as a regulatory function

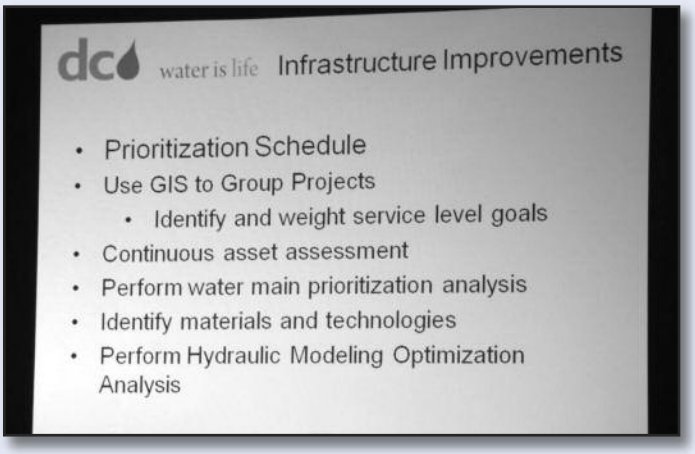
Continued on page 12

Pre-Conference Session

Continued from page 11

over water and wastewater. Foxx suggests that we need a single advocate for the water and wastewater utilities. Politicians relish ribbon-cutting ceremonies related to roads and bridges—but how is this to be done with invisibly buried water main pipes?

Charles Kiely, *Assistant General Manager, DC Water*



Managing an Aging (Water) Infrastructure Includes: develop an asset management plan; define the assets, develop maintenance plans, deploy limited resources, and extend assets' useful life.

Inventory of small diameter water mains installed from years1860 to 2009 found: Unlined Cast Iron, 749 miles; Lined Cast Iron, 249 miles; Lined Ductile Iron, 129 miles; 1127 miles total. Median Age is 77 years; 180 miles are over 100 years old

Leak Detection on Large Steel water mains: DC employed an acoustic acquisition device in a 36-inch main and a 1-inch diameter hydrophone device in a 48-inch main—the hydrophone will indicate leaks and also measure pipe wall thickness.

Performance criteria includes: hydraulics, fire flow, head loss, water quality, and leakage. Risk criteria includes: probability of failure, break history, pipe age, pipe material, soil conditions, environmental conditions and failure consequences such as critical customers, hydraulic impacts, and property damage. Crews are directed to do every thing they can when crews are on location, e.g. scheduling, data collection, preventive maintenance.

Prioritizing Water Main Replacement: Coordinate with other projects at same location, such as street repair, leak and break history, pipe age, flow characteristics, customer complaints. DC is developing "Deterioration Point Assessment Methodology" which involves extensive use of GPS and hydraulic modeling. Also, method uses analytics that incorporates all assert management data as a predictor of where to do main replacements.

EXTENDING THE LIFE OF OUR INFRASTRUCTURE *(2nd Panel)*

This panel delivered four presentations dealing with corrosion.

Tim McComas, *Kerschner Environmental Technologies* (vendor presentation)

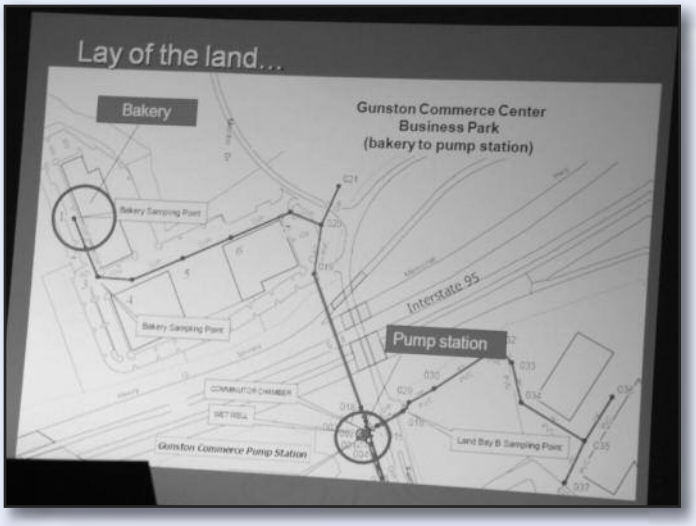
Making Corrosion-Resistant Concrete. Con Shield is an ingredient that is added to the various concrete mixes that are used either to make new concrete sewer pipe or to make repairs to manholes, lift stations, clarifiers, etc. Con Shield provides an electro-physical action that acts as a biocide for destroying bacteria that are produced by the action of hydrogen sulfide gas in the wastewater. Since its first commercial use in 1996, Con Shield has provided long-term protection from microbiologically-induced corrosion of concrete and it is used throughout the world. Unlike coatings and plastic liners, Con Shield can not chip, peel, delaminate, pinhole or wash away because it is molecularly bound through out the entire thickness of the concrete material.

David Haines, *Pipeline and Water Manager, NACE International*

NACE Battles Corrosion. Established in 1943, NACE, the corrosion society, is the largest worldwide professional association dedicated to protecting assets from the damaging effects of corrosion. Corrosion is a naturally occurring phenomenon defined as the deterioration of as material (usually metal) due to a reaction with its environment. Corrosion can be mitigated through materials selection and design, chemical inhibitors, coatings and linings, cathodic protection, and inspection. NACE is committed to offering standards, training, and tools for meeting the requirements of federal and local governments.

NACE estimates that the annual costs due to corrosion incurred by our water and wastewater infrastructure approaches $36 billion. Corrosion results in material failure rates that can cause excessive repair and replacement costs. Up to 50 percent of the annual costs are preventable. NACE estimates that implementing sound corrosion control strategies in water and wastewater facilities can save $6.80 in maintenance and replacement costs for every $1.00 spent. Governmental incentives for sustainability design include: HR 5320 (AQUA Act) subparagraph VI.

Andrew Rupprecht, *Chemical Engineer, Premier Chemicals* (vendor presentation)



"MoM" Prevents Concrete Piping Corrosion. Avoid or prevent corrosion to the crown of concrete main piping and to walls of man holes and wet wells. Add magnesium hydroxide, commercially called "MoM," (short for Milk of Magnesia) to the wastewater collection system piping. This raises the liquid pH from about 7 to 8 which draws any hydrogen sulfide (H2S) gas situated above the liquid surface back into the liquid and traps the gas in a liquid state. Moreover, MoM increases pH and alkaline levels which acts to prevent formation of sulfate-reducing bacteria that produce hydrogen sulfides. Undissolved MoM particles can react directly with H2S converting H2S to magnesium poly-sulfide. Thus, foul odors from the presence of H2S gas and the subsequent bacterial conversions of H2S gas to very corrosive sulfuric acid (H2SO4) are prevented.

"MoM" Benefits Wastewater Treatment Plants in ways that include: pH and alkalinity control, reduced corrosion and odor, enhanced nutrient removal, decreased settling volume to improve dewatering and effluent TSS. When compared to calcium hydroxide and sodium hydroxide, MoM substantially reduces sludge volume. Vendor claims relative costs of MoM chemical per mgd are less than other competitive chemicals such as: potassium permanganate, sodium hypochlorite, chlorine, hydrogen peroxide, nitrates, and iron salts. MoM is a safe, cost-saving and environmentally responsible chemical strategy which prolongs infrastructure life, manages wastewater odor and corrosion, improves treatment and enhances bio-solids quality.

Jimmie Jenkins, *Client Manager, CH2M Hill, (formerly DPW Director of Fairfax County)*

Bakery Waste Corrodes Collection System. Jenkins described a case history of severe corrosion in a wastewater collection system caused by waste discharge from a doughnut bakery. The Bakery started up in May 2004 and within 22 months corrosion was discovered in the downstream pumping station.

Bakery waste discharge was not flagged during the plan-review process. Bakery went into operation without pre-treatment staff review. Grease interceptor was the only pre-treatment. Floor drains were connected to the sanitary sewer system. No monitoring manhole was provided. Effluent was low pH. Within two months of going

Continued on page 14

Pre-Conference Session

Continued from page 13

into operation, workers noticed FOG accumulations in pumping station, force main, and gravity sewer. No hydrogen sulfide-related odors were present, i.e., odors were like doughnuts.

Conditions in the collection system were a perfect storm of high-temperature wash water in combination with flour, yeast, sugar, dough and oil. The resulting mix resulted in a fermenting, high-strength corrosive wastewater. In 2008, the force main piping failed. Subsequent County repairs to pumping station, force main and gravity sewers cost $1 million. Bakery was fined $0.95 million. County paid out $0.5 million for legal fees.

Lessons learned: Improve coordination with plan-review staff, pretreatment staff, and collection system staff. Develop a clear and stronger pre-treatment ordinance,

OPENING SESSION & REMARKS

After initial greetings and thank-you's from Angela Borders, CSAWWA Chair; Duane McCoy, WWOA President; Hiram Tanner, CWEA President; and James Chaffee, Vice-President of AWWA. Joseph Mantua, President of AWWA presented a piece of inspirational guidance for our industry.

Joseph Mantua, *President of AWWA*

Coping With Failure. Those individuals who are accustomed to always being successful may eventually fail at a task or challenge. When this occurs, try to find out why. Many people in the water industry are risk-averse and too conservative. After a failure occurs, they react in such a way as to be more afraid of failure and then can become almost paralyzed by fear of failure. We need to embrace change and accept that we need to do things differently. Our staff people need budget dollars for training and preparation to implement the new policies and procedures. Work to enhance your communication skills. Provide valuable messages to our customers.

EARLY BIRD RECEPTION

After the discussions ended, the attendees and panelists adjourned to the Early Bird Reception in the Exhibit Area.

TRACE Laboratories

Trace Laboratories, Inc.

Full Service Environmental

Analytical Services

General Chemistry • Organics Analysis • Metals Analysis • Microbiological Analysis • Toxicity Characteristic Leaching Procedure (TCLP) • Air Monitoring • RCRA Hazardous Waste Characterization

Sampling

Emergency Services • Field Sampling • Pick-up • Delivery

Field Services

Landfill Remediation • NPDES Permit Monitoring • Groundwater/ Stormwater Monitoring • Drinking Water Analysis • Air Quality Monitoring • Wastewater Discharge Monitoring • Soils

Trace Laboratories, Inc.
5 North Park Drive
Hunt Valley, MD 21030
410-584-9099
E mail: traceeast@tracelabs.com
www.tracelabs.com

Education and Entertainment at the Technical Sessions

—By Floyd B. Johnson, Ecoletter *Co-editor*

As always I received a wonderful education in the technical sessions, where there were 135 papers to choose from. New this year was a stream-lined way of tracking session attendance. Gone were the certificates given out for each session. This year after each session, the session monitor stamped a form given to each conference attendee, then at the end of the conference the completed form was signed at the registration desk. For a new system that was approved by MDE, it seemed to work well and I would imagine it will continue as long as it does not cause any problems in DC and Delaware. One last note—the Pre-Conference Session was approved by MDE after the conference so it can be used to renew operator licenses.

As in past years, some presenters added moments of entertainment along with their instruction, however there was one session that offered special entertainment—at least for me.

For years, many of you have seen our photographers taking pictures at the conference and probably ended up in one of those pictures at least once, but something happened at this year's conference that's never happened before. One of our photographers was told to stop taking pictures. Having witnessed the demand by the presenter at the technical session, and after being taken back in surprise, I could not restrain a private chuckle.

At the start of the session, the presenter acknowledged he was a lawyer and apologized for being one and received a good natured laugh in response. Then a few minutes later he displayed behavior that gives his occupation its less than stellar reputation and gave reason for his apology when he told our photographer to cease. I think (a lot of thoughts were going through my mind at that point—it was a pregnant moment) his reason for not wanting any pictures taken involved copyright and intellectual property issues. We did stop taking pictures.

To avoid any future legal ramifications, I will not provide a summary of his presentation and will report the lawyer gave a good presentation and appeared to be experienced, knowledgeable, and likely good counsel for clients. I hope all this keeps me out of libel, slander, copyright, intellectual property and loss of income issues. If it doesn't, I beg forgiveness and mercy.

Here's a sampling of the presentations I attended, which was as usual restrained by my need to maintain my wastewater operator's license.

The Chesapeake Bay TMDL—A Model for EPA"S New Accountability Framework—The formal attempts to clean up the Bay in recent history go back to the 1983 and 1987 Bay Agreements, followed by Chesapeake 2000 and Tributary Strategies in 2004. Now, something we've talked about for years, the Bay wide TMDL, will be issued by year's end. The states have drafted Phase 1 Watershed Implementation Plans which give target loads. Phase 2, focusing on non-point sources, is due November 2011. Maryland has done the best job of reducing point source loads and will be conducting pilots in Anne Arundel and Caroline Counties for state wide application on non- point source reductions.

Environmental and Economic Benefits of Reusing Treated Wastewater Effluent for Agriculture Irrigation—The Inland Bays Regional WWTP in Delaware will expand from 1.46 to 2.1 mgd and using an aerated lagoon with chlorine disinfection; will discharge into fields leased to farmers. Corn and soybean will be grown in the fields and winter wheat will be the off season cover crop. Operation of the discharge will be governed by a limit of 250 pounds of nitrogen per acre per year and less than 10 mg/l of total nitrogen in monitoring wells surrounding the fields. Class B biosolids are applied to non-irrigated fields where corn and soybeans are also grown. Fields are leased to farmers at twice the rate normally paid for non-irrigated land so the plant sees some nice revenue from the operation.

Impact of Thermal Hydrolysis Solids Pretreatment on Sidestream Treatment Process Selection at the DC WATER Blue Plains AWTP—Thermal hydrolysis processes produce a concentrated sidestream high in volatile fatty acids and ammonia. The VFAs have a benefit for they can be used to reduce methanol dosages in nitrogen removal and they also produce ammonium sulfate, a liquid fertilizer. Interestingly, soils in the Delmarva Peninsula need sulfur thanks to reductions in sulfur emissions from power plants. While the idea of liquid fertilizer seems to be gaining favor, the market is still uncertain and because of that and larger process issues, Blue Plains is hesitant to pursue development of this technology.

The Bay TMDL is Finally Here: What it Means for Bay Watershed Communities—The TMDL will have hard regulatory implementation deadlines and will impose costly measures on watershed states. To get a sense of how painful things will be, Maryland, with the best funded Bay Restoration Fund will have a $660 million shortfall for WWTP upgrades beginning in 2012. Good luck, Pennsylvania, Virginia, West Virginia and

New York. This situation will demand pursuit of cost effective solutions. What is clear is the TMDL will slow development and to not make matters worse than they have to be, EPA needs to provide a stable regulatory environment so officials can make better plans for what will be a challenging road ahead.

Selection of the Enhanced Nitrogen Removal Process Alternative for the Blue Plains Advanced Wastewater Treatment Facility—Deciding what ENR process to use at a WWTP is a big decision and that decision at the largest WWTP in the Bay watershed serving 2 ½ million people, is very big. And given the small space available, very challenging. Along with cost, the key considerations were process risk and O&M issues. Will the process be robust and able to handle varying flows? Will the effort to operate and maintain it be reasonable and not overly complex and equipment intensive? A process that will be part of the existing activated sludge configuration using similar type equipment would work the best for the plant.

Expanding the World's Largest Thermal Hydrolysis Facility—Thermal hydrolysis is the heating and pressurizing of biosolids to reduce organic solids and make the solids more readily bio-degradable. The Ringsend WWTP in Dublin, Ireland, the largest THF in the world was recently expanded to 130 dry tons/ day. That commitment to thermal hydrolysis technology was noted close to home. Blue Plains is beginning to plan an even larger facility, capable of producing Class A biosolids.

Cost Reductions Strategies, Opportunities and Technology Improvements for Remote Station Monitoring—Cecil County, Maryland has 32 WWPS spread out of over a large part of the county. The SCADA system for the stations was replaced by a radio frequency system with monitoring from one location. A particular challenge was creating a line of sight relay network in the 535 feet elevation difference in the WWPS network. That problem was solved by careful transmitter location and even use of a Harford County antenna. The system should be more reliable, reduce station visits and provide reporting for better O&M performance.

The Train is Coming, Biofuels and the WW Industry—The wastewater industry's input to the biofuels equation mainly comes from digester gas and vegetable based grease (don't call it scum). The grease is produced at an approximate rate of nearly 5 tons/ yr/ mgd. Biofuels production is coming from more different sources, resulting in keen competition for products and funding. Two areas, celluloid ethanol and algae based fuels, are particularly promising. Since fossil fuels remain the lowest priced, biofuels must find ways to compete. Several years ago biofuels were attractive, but the current situation has swung back in favor of fossil fuels. For example, for biodiesel to be competitive diesel prices need to be around $5/gal.

Expansion and Upgrading of the Woodstock, Virginia WWTP—Flow to the plant along the North Fork

Continued on page 18

Technical Sessions

Continued from page 17

of the Shenandoah River increased from 0.4 to 0.7 mgd and the tighter Bay requirements demanded change. So an oxidation ditch plant was replaced by a higher capacity MBR plant with high heat lime stabilization capable of producing Class A or B solids. An interesting part of the upgrade was the use of a mobile MBR unit for operator training. Given the orders of magnitude change in technology, a good idea.

Embedding Sustainability into a Wastewater Treatment Plant Upgrade—The Alexandria WWTP wanted to focus on sustainable practices, even as a project was being built by working with the contractor to use procedures to reduce energy consumption and to use renewable fuels. The project itself will explore use of solar panels and wind turbines throughout the plant and realizing the plant was directly along the beltway and surrounded by thousands of people, the many neighbors will be consulted about impacts.

Fine Bubble Isn't Always Better—Evaluating Upgrades to the Secondary Treatment Plant Aeration System at Blue Plains AWTP—The plant was having trouble maintaining a proper DO level with the existing course bubble diffuser system. A major problem was the poor condition of the system with damaged and missing diffusers and broken air lines. After a study it was determined that despite conventional wisdom, new course bubble diffusers with new blowers would be more efficient than fine bubble diffusers. Add to that the more painful cleaning requirements of fine bubble diffusers, requiring tanks to be taken out of service for weeks at a time and the decision to stay with course bubbles made itself evident. The only concession was providing for a possible hybrid system with both course and fine bubble diffusers.

ADS. A Nova Technologies

ADS

STEP INTO OUR OFFICE AGAIN . . .

. . . For even more new products and services.

- Low-Cost Alarming and Notification Systems
  - Battery-Operated, Versatile 8-Alarm Monitor
  - Overflow Alarming and Reporting
  - Remote Wet and Dry-Weather Rain Gauging
- New Flow Monitoring Technologies
  - Advanced Digital Noise Filtering
  - Gated Cross Correlation
  - Ten-Path Chordal Transit-Time Flowmeter
- New Pitometer Group Water Services
  - Water Audits
  - Operations Preventive Maintenance
- GPS, Utility Location, and Mapping
- SSES, Closed-Circuit TV, and Line Cleaning
- Line Stopping, Pipe Tapping, and Valve Insertion

Unmatched Performance. Proven Results.

www.adsenv.com
(410)472-1590

ADS ENVIRONMENTAL SERVICES® HYDRA-STOP® ACCUSONIC

KAPPE LABORATORIES/KAPPE ASSOCIATIES, INC.

EST. 1963

KAPPE SCIENTIFIC RESEARCH

- Water & Wastewater Analyses
- Bench Studies
- Field Investigations
- R&D Projects
- Scientific Consulting Services
- Sampling (Md. Certified Samplers)

Serving Government, Industry, and the Individual

Certified by Maryland, Pennsylvania, and Virginia

100 Wormans Mill Court, Frederick, MD 21701 ● tel: (301)846-0210 ● fax: (301)846-0808
e-m: kappe@erols.com ● www.kappe-inc.com

«« Celebrating 50 Years »»

Engineering • Service • Parts

Contact us for information on any of the following manufacturer's products

AMES, Inc.
Manufacturers' Representative
Since 1957

A.M.E.S., Inc.
8918 Herrmann Drive
Columbia, MD 21045
(P) (410) 995-6971 (Balto)
(P) (301) 621-8899 (DC)
(F) (410) 381-5760

Fairbanks Morse
Pentair Water

Strong. Dependable. Reliable.

These are attributes of great pumps - like the ones you'll get from Fairbanks Morse.

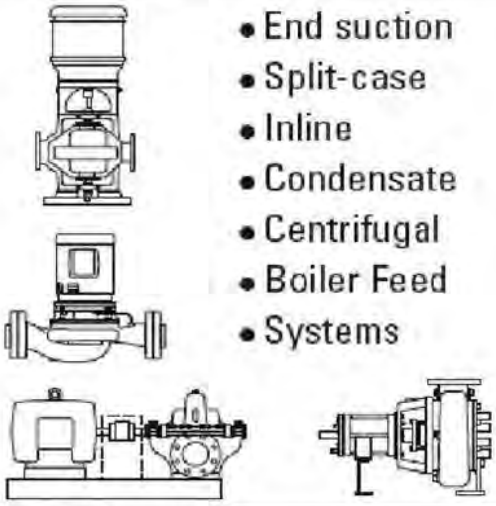
Featuring a full line of pumps for the municipal marketplace, including:

Centrifugal Non-Clog
Vertical Turbine
VTSH® (Vertical Turbine Solids-Handling)
Dry-Pit Submersible
Split Case Pumps
Propeller Pumps

As a public works pump manufacturer for over 100 years, we can move fluids in water and wastewater treatment plants and pump stations - from source to end user.

www.fmpump.com 913/371-5000

From pumps to systems, we have it all.



- End suction
- Split-case
- Inline
- Condensate
- Centrifugal
- Boiler Feed
- Systems

AURORA® Pentair Water

When you want the best!

800 Airport Road
North Aurora, IL 60542

(630) 859-7000
www.aurorapump.com

TSURUMI PUMP

C SERIES CUTTER PUMP

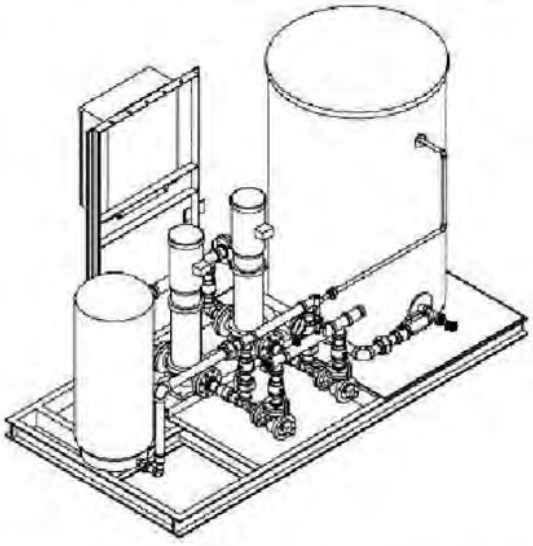
Your local representative:
AMES, Inc.
8918 Herrmann Drive
Columbia, MD 21045
Phone: 410-995-6971
Fax: 410-381-5760

Built for Work.

TIGERFLOW
Engineered Systems to the World

(P) (800) 783-6756
www.tigerflow.com

Tigerflow, Inc.
Packaged Pumping Systems
- Seal Water Pump Station
- Booster Pump Stations
- House Enclosures
- Variable Speed Pumping Systems



Contact AMES, Inc. for information.

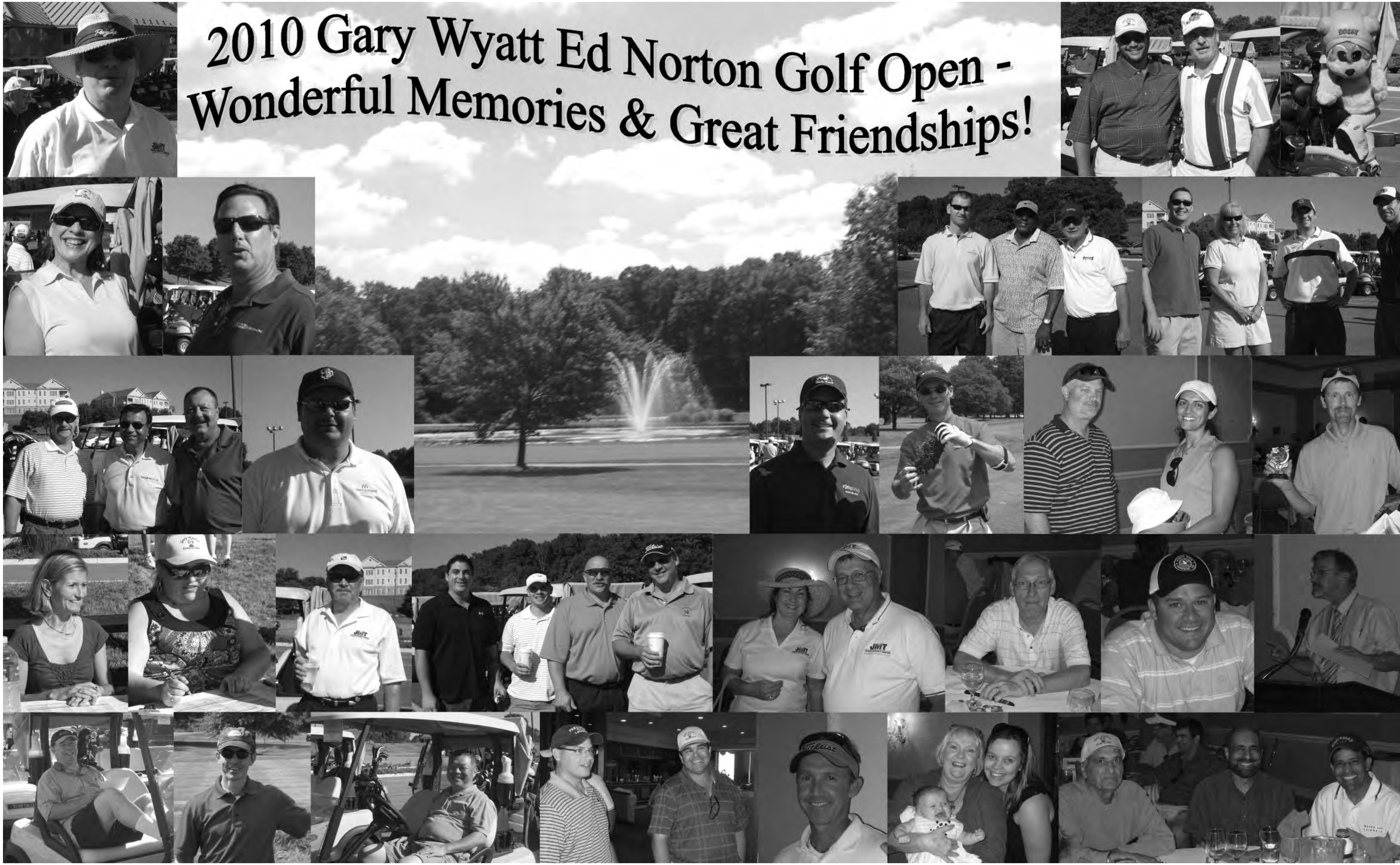
GOEL SERVICES
Phone: (888) 351-FLOW
Fax: (888) 329-1322
Email: info@flowrent.com
FLOWRENT.COM
Sewer System Evaluations
Engineering Support
Flow Monitoring
Manhole Inspection
Smoke Testing
Rainfall Data
CCTV Pipeline Inspection
Flow Meter Rentals
NASSCO PACP/MACP COMPLIANT

Taste The Quality !
TIDEWATER UTILITIES INC.
"Southern Delaware's Premier Water Company Since 1964"
1-800-523-7224

listen. think. deliver.®
CDM®
www.cdm.com
7611 Little River Turnpike
Suite 600 West
Annandale, Virginia 22003
tel: 703 642-5500
825 Diligence Drive
Suite 205
Newport News, Virginia 23606
tel: 757 873-8850
consulting · engineering · construction · operations

(410) 682-2660
GEIGER
Process Equipment, Pumps, Engineered Systems, Equipment Repair
Everyone's ready to serve before the sale, but only Geiger delivers with 24 hour emergency service, locally stocked OEM parts and a team of certified repair technicians for after.
GEIGER
Visit us online at www.geigerinc.com or call us at (410) 682-2660

2010 Gary Wyatt Ed Norton Golf Open - Wonderful Memories & Great Friendships!



We Couldn't Have Done It Without You!

Platinum Level

RK&K

ADS Environmental Services

pure Technologies

Brown and Caldwell

WACHS Utility Services

EA Engineering, Science, and Technology, Inc.

rjngroup — Excellence through Ownership

JMT — Johnson, Mirmiran & Thompson — Engineering A Brighter Future

Gold Level

Video Pipe Services

CES Compliance EnviroSystems, LLC — Engineers • Scientists • Planners • Contractors

Silver Level

Phoenix Engineering, Inc.

URS

Transviron, Inc. — Consulting Engineering

ACS Hydrostructures, LLC

Gannett Fleming

Savin — The Savin Group

Insituform — Clean water for the world

FLOWAssessment Services LLC

EBA Engineering, Inc. — Professional Services Since 1952

DUKE'S — The Root Control Experts — 1-800-44-ROOTS

Whitman, Requardt and Associates, LLP

SENSUS — The Measure of the Future

KCI Technologies

WR&A — engineers, architects, planners

Hazen and Sawyer — Environmental Engineers & Scientists

Sidhu Associates, Inc.

Bronze Level

godwin pumps

Honorable Mention:

Russell Corrosion Consultants, Inc.

110 %

Garrison

Buchart Horn, Inc.

Hank Hulse

Roome Enterprises

2010 Gary Wyatt's Annual Ed Norton Open

Thank You Sponsors!

Solutions for Water

Water is the sustaining element of all life.

Regardless of where in the water cycle our clients' needs fall, Malcolm Pirnie provides expertise to maintain a clean and safe water environment.

MALCOLM PIRNIE

Solutions for Life™

Arlington, VA 703.351.9100 | Baltimore, MD 410.230.0680 | Wilmington, DE 302.658.1718 | www.pirnie.com Offices Worldwide

CWEA Awards Presented at the Conference

—By Hiram Tanner, CWEA Past President

Bob Wimmer was recognized as a past WEF Delegate. He served as the at-large member of the House of Delegates representing the Young Professionals.

Rekha Hareendran, from The George Washington University won the WEF Student Paper-Master Division for her paper, A Study of Denitrification Kinetics of Methanol Utilizing Organisms at Wastewater Treatment Plants in the Chesapeake Bay Watershed. Methanol is widely used as an external carbon source by a number of wastewater plants in The Bay watershed to enhance biological denitrification. Ms Hareendran paper reported on the denitrification kinetics of methanol utilizing organisms at temperatures in the range of 12 degrees to 27 degrees C to obtain a better understanding of the kinetic parameters of heterotrophic denitrifying bacteria. *(Editor's Note: Ms. Hareendran's paper appears on pg. 34 of this issue.)*

Derik Morin received the Outstanding Contribution to Wastewater Collection Award. This award recognizes published contributions to the fundamental principles of wastewater collection and transport as comprehensively described and published in a Federation periodical. His abstract said, "The possible causes for pump station performance are numerous and finding the correct cause quickly can be daunting. In such circumstances it is important to use a methodical process to gain and maintain the owner's confidence and to ensure that all issues are found and resolved efficiently. Evaluating an underperforming pump station can be divided into two phases that are easily delineated by effort, costs and time."

Walter Bailey, Alan Cassel, Marija Peric, Dilli Neupane, Rumana Riffat, and Sudhir Murthy from the Blue Plains WWTP received the George Bradley Gascoigne Medal. This medal is given for a published paper that presents the solution of an important and complicated operational problem within a full scale wastewater treatment plant. Their abstract said, "Primary clarification can help downstream biological processes by removing much of the biochemical oxygen demand and suspended solids from wastewater. If chemicals are added, the clarifier can also reduce phosphorous levels. In addition, capturing more primary solids can change the primary/secondary ratio in the centrifuge thereby improving dewatering performance and reducing the volume of solids in the recycling to the liquid treatment processes."

Rekha Hareendran, WEF Student Paper—Master Division

Derik Morin, Outstanding Contribution to Wastewater Collection Award

John McGettigan was recognized as the Outstanding Young Water Environment Professional. This award goes to young professionals for significant contributions to WEF and the wastewater collection and treatment industry. Mr. McGettigan has played a critical role in ENR projects discharging into the Bay and regularly publishes articles in WEF journals and makes presentations on developing ENR technology. He led the formation of VWEA's first Young Professional Committee and chairs the Continuing Education and Development Committee. CWEA is a co-sponsor of this award since VWEA is his home association.

Jerry Johnson, WSSC General Manager, won the WEF Local Public Official Award. Mr. Johnson has unified support of both counties the WSSC serves to face the needs of the future. WSSC is a nationwide leader in inspections of water and sewer infrastructure. Mr. Johnson, recently quoted in the Washington Post, said the enhanced inspection program was responsible for locating and repairing a serious defect in a large water main that if it failed could have been more serious that the one that made international news prior to him joining the WSSC. Mr. Johnson continues to serve and support national organizations, including serving on the board of directors of the CSO Partnership, and the National Association of Clean Water Authorities. In April 2009, Mr. Johnson became President of the National Forum for Black Public Officials, where he leads a nationwide group of local and state officials and executives in enhancing efficiency of government at all levels.

WWOA Awards Presented at the Conference

Barry Walter, WWOA Distinguished Service in Water Distribution

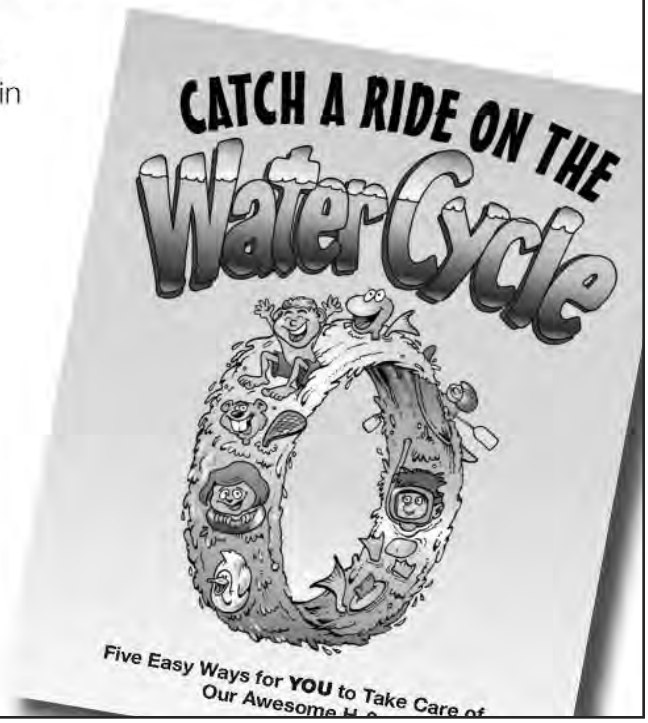
John Wayne Swann, WWOA Distinguished Service in Wastewater Collection

Terry Bradley, WWOA Stanley Kappe Training Award

New and Free! Coloring Book from WEF

Water Environment Federation
the water quality people

This fun and educational coloring book for grades k-3 can be easily downloaded for free and copied for use in classrooms or other settings. Check it out at www.wef.org/coloringbook.



wef distance learning
water quality training

Learn at your own pace. All you need is an internet connection.

Whether this is your introduction to wastewater treatment, a refresher course, or an intellectual stimulator, WEF's Distance Learning training courses cover operation, design, and engineering from top to bottom. More than just a series of online quizzes, these courses offer hours of instructional material needed by wastewater professionals.

Choose from a number of fundamental and accelerated courses, ranging from 1 to 7 hours worth of content and recommended educational credit.

http://training.wef.org

Water Environment Federation
the water quality people

Operations Challenge

DCWater's Operation Challenge Team, Centrifugal Force, competed in the Water Environment Federation Operation Challenge events held in New Orleans, Louisiana, on October 4 and 5, 2010. There were 37 teams from the United States, Canada, and Argentina that participated in the fast-paced, two-day event. Centrifugal Force was placed 13th out of 30 divisions-2 teams. Centrifugal Force placed 6th, 7th and 9th in the laboratory, collections, and safety events respectively. The members of this distinguished team are Duane McCoy, Aaron Montgomery, Mike Addison, Moses Reilly with alternates Melvin Keys and Gregory Stephens and assistant Coach Wendell Smith.

DCWater won the Best Team Creative Picture category. The picture was created by Larry Bastian and recognizes the essence of Operations Challenge which is committed to team work, unity, competition, and fun.

We would like to thank all the managers of DC Water's Departments of DWT, Engineering, DMS, and Sewer Services that supported our effort to be successful and to be best in the country. Also we would like to thank Chesapeake Water Environmental Association for sending us to represent our region. We are looking forward to this upcoming year to bring back the gold.

STH, INC.
SHAFER, TROXELL & HOWE
MANUFACTURERS' REPRESENTATIVE
Since 1973

97-C Monocacy Blvd., Frederick, MD 21701
800-233-7718 & 301-682-3390
Fax 301-682-3391
www.sthinc.com

Municipal Water & Wastewater Products

Fybroc—Fiberglass Pumps, Vertical & Horiz. To 5000 GPM for Corrosive Solutions
F.E. Myers—Grinder Pumps, Sump & Effluent Pumps, Submersible Non-Clog Sewage Pumps, Package Stations, Storm Water Pumps
Peerless—Vertical Turbine, Horizontal, Propeller, End Suction & Inline Pumps
Yeomans—Non-Clog Sewage Pumps, Submersible & Dry Pit Submersible Pumps, Vertical & Horizontal Pumps, Pneumatic Ejectors, Storm Water Pumps
Cromaglass—Packaged Wastewater Treatment Systems
SyncroFlo—Pre-Pkgd Water Booster Systems, Eng. Assistance, Constant Speed, VFD Drives & Controls, Fiberglass & Metal Enclosures
Grundfos—Vertical In-Line Boosters, Stainless Steel Construction
LaBour—Alloy Horizontal, Self Priming, Magnetic Drive Seal-less
AK Industries & Topp Industries—Pre-Fabricated Fiberglass Lift Stations, Inside Valving, Outside Valve Boxes
Thermaco—"Big Dipper" Automatic Grease/Oil Removal System

Sales - Parts & Service
Factory Trained Technicians

METCALF & EDDY | AECOM
Wastewater Engineering
Treatment Disposal Reuse

SERVING OUR CLIENTS
FOR 100 YEARS

14504 Greenview Drive, Suite 400 • Laurel, MD 20708
T 301.317.9600 • F 301.317.9431
www.m-e.aecom.com
Offices Worldwide
Regional Offices Located in:
Laurel • Philadelphia • Virginia • Washington, D.C.

Nitrex

BEST WASTEWATER NITROGEN REMOVAL TECHNOLOGY

TOTAL NITROGEN < 5 mg/l
Averaging 3 +/- mg/l

APPROVED IN STATES OF MARYLAND, DELAWARE & VIRGINIA

For More Information Contact:
Lombardo Associates, Inc.
617-964-2924
Pio@LombardoAssociates.com
www.LombardoAssociates.com

BUILDING A WORLD OF DIFFERENCE®

In our world, it's all about water: the best and most advanced ways to move it, control it, clean it, conserve it. If you're looking for resourceful water solutions, peer into our world. We know water.

weknowwater@bv.com www.bv.com

BLACK & VEATCH
Building a world of difference.

The Answer to ALL Your Blower Needs!

- **Complete Blower Packages**
- **Noise Attenuating Enclosures**
- **Custom Design & Fabrication**
- **Blower Parts & Accessories**



Excelsior Blower Systems, Inc. is the Gardner Denver Authorized Distributor and Warranty Center for Sutorbilt, Duroflow, Cycloblower, Triflow and Heliflow models. As one of the nations largest blower package manufacturers, we have the proven experience of thousands of installations throughout the country. Responsive design, sizing and specification capabilities are available to all engineers.

- **Blower Service & Repair**
  - SutorBilt
  - Duroflow
  - Hoffman
  - Gardner Denver
  - Aerzen
  - Roots
  - Lamson
  - MD-Pneumatics
  - Spencer
  - Others

- **Our factory trained technicians are available for:**
  - Removal and installation
  - Onsite repairs
  - Pick-up and delivery
  - Preventive maintenance contracts

Excelsior Blower Systems, Inc.
www.excelsiorblower.com
Contact Brett Jorgensen: Office: 410-654-1056 ■ Cell: 410-935-6638 ■ Fax: 410-654-1057 ■ brett@excelsiorblower.com

Engineers Without Borders – USA – Not Just for Engineers:

Continuing a Lifelong Multi-Disciplinary Education After College

—By Kristen Markham, University of Maryland, College Park Civil Engineering Graduate Student; 5-year member of EWB-USA

Entering the working world is a bit like being a freshman in college again—a new environment, new people, new expectations, a world in which you are relatively inexperienced, and where finding your niche is somewhat of a daunting task. Read any book or website on career advice, it recommends getting involved in professional organizations outside of the workplace for an expanded knowledge base and network of contacts. Yet amidst the multitude of professional organizations established it is hard to know what might be most amenable to our individual interests. Engineers Without Borders—USA (EWB-USA), a nation-wide volunteer organization, is one such organization where both young and experienced professionals alike have found a rewarding way to apply their skills and passions, and enjoy doing it. Side-by-side with other like-minded professionals of all levels of experience and backgrounds, members join together to design and build engineering solutions to help address the needs of communities in the developing world.

"That's what attracted me to Engineers Without Borders-USA" states Patrick Williams, a graduate from Virginia Tech in Chemical Engineering. "On every international project that Engineers Without Borders-USA works on, members have the opportunity to be intimately involved in something you might never have experienced before" explains Mr. Williams. "Even if you are working on something far outside your field of expertise, you have the ability to affect the lives of those less fortunate while simultaneously being able to expand your knowledge base, and develop friendships with other professionals you might otherwise never have a chance to interact with." As a young professional and doctoral student at the University of Maryland, Mr. Williams, like many other professionals, joined the Chesapeake Professional Chapter (CPC) of EWB-USA hoping to apply his strengths for the benefit of others. Already he has been intimately involved in the CPC through the organization of one its most recent fundraisers—Kickball Without Borders—a kickball tournament for professionals and students.

Members of CPC and the University of Maryland Chapter of EWB-USA at the Kickball Without Borders Tournament in September 2010. Patrick Williams congratulates the winners.

The Chesapeake Professional Chapter (CPC) of EWB-USA is one of over 250 professional and student chapters across the country in which multi-disciplinary teams of professionals, students, and professors collaborate together to implement sustainable engineering projects for the benefit of communities in need of the everyday essentials that we often take for granted. As CPC member Sebastian Smoot, explains, "EWB-USA plays a crucial role in addressing the serious challenges that face the world, and it is great to feel like you're a part of that." Building water distribution and chlorine dosing systems, latrines, youth center buildings or wastewater treatment systems are just a few of the thousands of EWB-USA projects that have been completed by EWB-USA chapters today.

Sebastian Smoot, CPC member.

The national non-profit organization started at the University of Colorado only ten years ago with a small group of students, and a professor who desired to help address a small Belizean community's need for water. The project's success led to the exponential growth of the program over the past decade, attesting to its benefit to both those involved and those communities that receive the end product of its member's efforts.

Amidst the growth, the organization has been able to maintain the opportunity for anyone interested and motivated, to find a niche within an individual chapter, such as the CPC.

Despite what its name might suggest, EWB-USA is not just an organization for engineers—in fact its members assert that a diversity of fields of knowledge is beneficial to the creativity and efficiency of the organization. "It is for anyone with a desire to make a difference," explains Paul Hlavinka, a three-year member and current treasurer for CPC. While many of the projects might be considered civil engineering-type projects, there is a great need for much more than just civil engineers. Just as with any U.S. based engineering project, the projects of EWB-USA require funding, design and approval, planning, material acquisition, and travel arrangements, among other things. Skills in project management, fundraising, language, culture, public policy, and the ability to teach and listen are only some of the many skills that are useful to have beyond engineering expertise. "The projects we work on in the communities abroad are as diverse as our skill sets," Mr. Hlavinka continues. For those professionals desiring to expand their skill set, "what better opportunity?"

Projects within EWB-USA typically take 1-2 years to complete a full cycle from assessment of the community's needs, to the final design approval and implementation of the project. Within that time the project first starts with an assessment trip of a small travel team of project members to determine the greatest needs of the identified community. The travel team then returns to the U.S. to collaborate with the project team on the possible solutions to the identified problems. The team comes up with several designs, and determines the most feasible, sustainable, and economically viable option. "The idea is that we build something that solves the problem, that the community can understand, maintain, and ultimately replicate in the future," explains Mr. Smoot, "that is sustainability."

Once approved by the national umbrella organization, the EWB-USA team then returns to the community to implement the design. As is imaginable, much pre-trip planning must occur for a successful implementation trip—something that requires especially detailed project scheduling, as well as safety and cultural training.

The Chesapeake Professional Chapter recently began a potential new project in El Toro, an Argentinean community in the Jujuy Province. This small community in the extreme north of Argentina endures harsh weather conditions that limit its ability to grow sufficient crops to sustain itself. In addition it lacks sufficient potable water and sanitation systems. As the CPC gears up to complete their assessment trip this fall, the project team is gathering information on the village and its inhabitants, determining a travel schedule, and brainstorming potential solutions to the known problems to discuss with the village.

To teach its members about what to expect in Argentina, in August 2010 the chapter organized a Spanish Language and Culture Workshop. "Understanding the cultural dynamics in the developing world is critical to the success of a project," explains Kate Strass, member of the CPC, the lead organizer of the workshop, and former Peace Corp volunteer in Honduras. "I would say one of the most important skills in the professional world is the ability communicate effectively with others," explains Mr. Smoot. "Here in the U.S. engineers must be able to fully understand their clients' needs and concerns and express their recommendations and designs effectively, but when working in EWB-USA, cross-cultural communication becomes even more important. EWB-USA helps improve these skills to help you become a more effective engineer."

Kate Strass teaches CPC members about Spanish language and culture in preparation for their new project in Argentina.

After their assessment trip this fall, the CPC will focus their efforts on designing a sustainable solution to the community's most important needs, drawing from the unique experiences of each of its project members.

The CPC meets once a month at varying locations throughout the Washington D.C. and Baltimore metropolitan areas, varying their location in attempt to accommodate as many members as possible. Project meetings are held separately in small groups at a time and location that works best for those involved. Many of the members have regular work schedules, families, and other commitments to juggle, but Mr. Hlavinka assures, "there's definitely the possibility of making EWB-USA fit into your schedule."

In addition to the professional chapter's projects, members of the CPC also have the opportunity to serve as mentors for projects of the student lead chapters in the D.C. and Baltimore metropolitan areas. "Each EWB-USA student project must have a professional mentor that reviews designs and helps provide technical guid-

Continued on page 32

Engineers Without Borders

Continued from page 31

ance," explains Sarah Ness, CPC member and South East Regional President of EWB-USA. Student chapters complete similar projects to those that professional chapters complete, yet they require the help of professionals and professors to ensure that their design ideas are reasonable. "It's a true mentorship," explains Mr. Hlavinka. "You help provide credibility to the students' efforts, and a sounding board for ideas."

Members of the CPC come from a diversity of fields, and vary in experience from recent graduates to senior professional engineers. "It's what makes it such a unique experience," explains Teresa DiGenova, current president of the CPC. Even if problem solving or mentoring is not your forte, the CPC, like many other EWB-USA chapters, holds fundraisers, participates in conferences and committees, and much more. "And if you have a thought or suggestion, we're always open to new ideas."

As the former president of the University of Maryland student chapter and five-year member of EWB-USA, I can certainly attest to the positive impact it has had on my life and the lives of people I know. It has helped open my eyes to some of the most fundamental problems that developing countries face, and how much impact that a team of passionate, driven people can have on a community. The Chesapeake Professional Chapter works intimately with multiple student chapters of EWB-USA, providing support and guidance to their projects in addition to working on projects of their own. Anyone, however great or small a contribution they can make—whether it be technical expertise, translation, or something else—can find their own niche in this organization doing something they enjoy.

Kristen Markham, a CPC and University of Maryland chapter member.

Facing the challenge of improving the essential infrastructure in the developing world is no small task, and one that remains to be resolved. Every little bit helps. Everyone has something unique to bring to the table and that's what makes it fun and interesting.

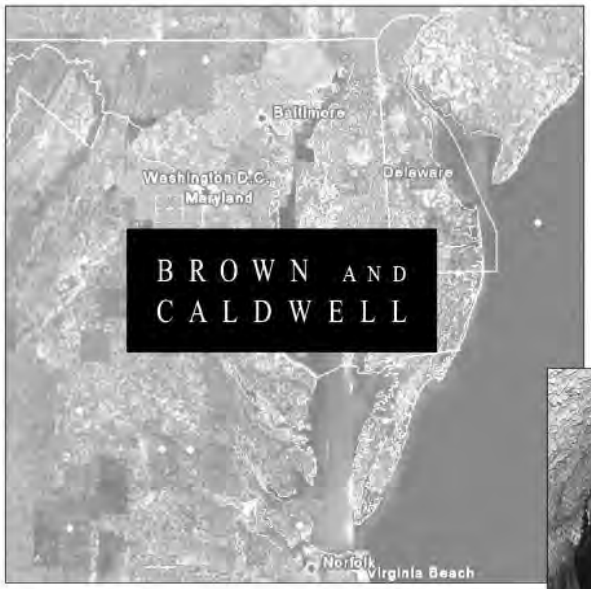
If you are interested in joining or finding out more about Engineers Without Borders-USA, visit the Chesapeake Professional Chapter's website at http://www.chesapeakeewb.org/

On The Ground to Meet Your Utility Needs

Beltsville, MD Alexandria, VA Virginia Beach, VA

Specializing in:

- Enhanced Nutrient Removal Design
- Biosolids Management and Treatment
- Electrical Process and Automation Services
- Asset Management
- Pipeline Rehabilitation
- Sewer System Evaluation Surveys
- Wastewater Treatment Plant Upgrades
- Energy Recovery
- Water and Sewer Modeling



www.brownandcaldwell.com
Telephone: 301.273.2170

GREELEY AND HANSEN

Designing for better urban environments

water supply and treatment
water storage, pumping and distribution
water reclamation and reuse
water and wastewater residuals management
wastewater collection, treatment and disposal
utility management consulting
watershed management
program management

www.greeley-hansen.com
Landover, MD ■ 301-552-4027
Richmond, VA ■ 804-355-9993
Springfield, VA ■ 703-922-4516
Norfolk, VA ■ 757-455-2212
Wilmington, DE ■ 302-428-9530

real vision
Inspiring reality

- Water Treatment
- Regulatory Compliance
- Systems Improvements
- Master Planning

Visualize the future.
Then call PBS&J.

Offices throughout the US
pbsj.com • 800-697-7275
PBSJ

FOR ALL YOUR COLLECTION SYSTEM NEEDS

3700 Koppers Street, Suite 119
Baltimore, MD 21227
410.368.4051
www.savinengineers.com

SAVIN
Savin Engineers, P.C.

IMPROVING QUALITY OF LIFE

A Study of Denitrification Kinetics of Methanol Utilizing Organisms at Wastewater Treatment Plants in the Chesapeake Bay Watershed

—*By Rekha Hareendran*
The George Washington University

ABSTRACT

Methanol is widely used as an external carbon source by a number of the wastewater treatment plants in the Chesapeake Bay watershed to enhance biological denitrification process, in order to achieve low effluent total nitrogen concentrations. The overall objective of this research was to study the denitrification kinetics of methanol utilizing organisms at temperatures in the range of 12°C to 27°C, to obtain a better understanding of the kinetic parameters of the heterotrophic denitrifying bacteria. The denitrification parameters studied were the Specific denitrification rates (SDNRs) and the Nitrate half saturation constants ($Ks_{(NO3-N)}$). Most of the experimental studies were conducted for Blue Plains Advanced Wastewater Treatment Plant in Washington, DC. A few tests were also conducted for samples obtained from the Alexandria Sanitation Authority Advanced Wastewater Treatment Plant (AWTP) in Virginia. A Respirometer system was used to conduct these tests on mixed liquor taken from the anoxic denitrification zones of the AWTPs. A modified specific denitrification rate (SDNR) test was utilized. The maximum specific denitrification rates (SDNR) were found to be in the range of 3.1 to 8.6 mg/gm MLVSS/ hr for temperatures ranging from 12°C to 27°C for samples obtained from Blue Plains AWTP. The temperature dependency of SDNRs was evaluated and an Arrhenius coefficient ( ) of 1.08 was obtained. The average values of nitrate half saturation constant obtained using the nitrate limiting tests for the same temperature intervals were between 0.02 and 2.1 mg/L. It was observed that a higher mixed liquor volatile solids concentration could be used to increase the denitrification rates at low temperature.

KEYWORDS

Denitrification, methanol, specific denitrification rate, half saturation constant, respirometer, temperature, nitrate limiting test.

INTRODUCTION

The Chesapeake Bay is the largest and one of the most diverse estuaries in the United States. It is used both recreationally and commercially. Chesapeake Bay has experienced serious environmental degradation since the early twentieth century. One of the main causes of pollution in the Chesapeake Bay has been eutrophication by the presence of excessive nitrogen and phosphorus in the water. Excess nutrients enter into waterways by point source pollution and non-point source pollution. It is more practical to control the point-source pollution which generally comes from the wastewater discharged from industrial facilities and municipal wastewater treatment plants into rivers, streams, and lakes. The focus of this study is nitrogen removal from wastewater.

Heterotrophic denitrification is a process in which heterotrophic bacteria utilize organic substrate as the electron donor to convert nitrate, the electron acceptor, to nitrogen gas and this process is commonly employed by wastewater treatment plants for nitrogen removal. An external carbon source such as methanol is added to the wastewater to facilitate the denitrification reaction, near complete removal of nitrate, when sufficient internal carbon is not present in order to achieve desired levels of denitrification. More research is required to get a better understanding of the kinetics of the methanol utilizing bacteria to optimize the denitrification process. In particular, the half saturation kinetics (K_s) of the bacteria are either unknown or have not been studied extensively. A high K_s results in inefficient denitrification rates at low substrate (both for the electron donor and acceptor) concentrations. To achieve some of the very low permit limits of 3 to 4 mg/L total nitrogen in the Chesapeake Bay, the effluent nitrate concentration has to be reduced to 0.5 mg/L or less. If the nitrate half saturation concentration is in this range, it will start to impact growth rates of the biomass and the denitrification rates of the electron acceptor. The result would be larger tank requirement to achieve denitrification to low nitrate levels.

The objective of this test was to gain more knowledge of the denitrification parameters for methanol utilizing organisms, by studying the specific denitrification rates (SDNRs) and the nitrate half saturation constant values($K_{s(NO3-N)}$) of samples obtained from a post-denitrification suspended growth process at the Blue Plains AWTP. The nitrate $K_{s(NO3-N)}$ for methanol utilizing organisms was also evaluated for the Alexandria Sanitation Authority's (ASA) AWTP in Virginia. A modified specific denitrification rate test was conducted using a Challenge

AER-200 Respirometer system. Different K_S concentrations may exist not only for the different substrates, but for different processes as well. These tests will be further explained in the methodology section.

METHODOLOGY

Experimental Setup

The CHALLENGE AER-200 Respirometer System (Challenge Environmental Systems, Inc.) consists of biological reaction vessels, a stirring base for mixing the samples, a cell base containing eight flow measuring cells, an interface module, and a computer. When operating in the anaerobic mode, gases produced by biological reactions flow through each cell under the influence of a slight pressure buildup caused by gas production in the reaction vessel and bubbles of a fixed volume are formed in the lower section of the cell. These bubbles in turn pass through a detection section thereby activating a counter in the interface module. Finally, the number of bubbles is registered by the computer to produce a measure of cumulative volume and rate of flow. This data is stored by the computer for later processing. The nitrate half saturation constant and SDNRs for methanol utilizing organisms were estimated under nitrate limiting conditions using the set up shown in Figure 1. All the tests were conducted at the Blue Plains AWTP laboratory.

Mixed liquor was collected from the plant in the anoxic denitrification zones. A sample volume of 5L was collected and substrates were added to this sample. The concentration of chemicals added is shown in Table 1. Ammonium chloride and potassium dihydrogen phosphate were added to provide nutrients to the microorganisms. Excess COD (Chemical Oxygen Demand) as methanol was added to provide nitrate limiting conditions. pH of the sample was maintained between 6.7 and 7.0. Nitrogen gas was initially purged in the liquid to achieve anoxic conditions and to mix the sample. A sample was immediately extracted and filtered to obtain initial concentrations of nitrate, nitrite, COD, MLSS and MLVSS (Mixed Liquor Volatile Suspended Solids). The mixed liquor was then poured into 500mL stopper bottles having septa in the cap to prevent ingress of atmospheric oxygen. Tubes containing a small amount of 30% Potassium hydroxide (KOH) were inserted in the bottles before closing it to absorb the CO_2 in the bottle. All the bottles were purged with nitrogen gas before starting the test. A stir bar rotating at a fixed 700 rpm was provided for mixing using a tachometer. The bottles were placed in a water bath that was maintained at similar temperature (+/-1 °C) as that of the samples obtained from the full-scale AWTP. The production of nitrogen gas was monitored (in mL) at 1.0 minute time intervals and plotted as shown in figure 2. Final nitrate, nitrite, COD were measured using HACH spectrophotometer and stoichiometric calculations were performed using these measured initial and final values. Some of the tests were performed for three different dilutions of the same sample to analyze differences in SDNR and Ks(NO3-N) values for the same set. These tests were performed at different temperatures in the range of 12°C to 27°C.

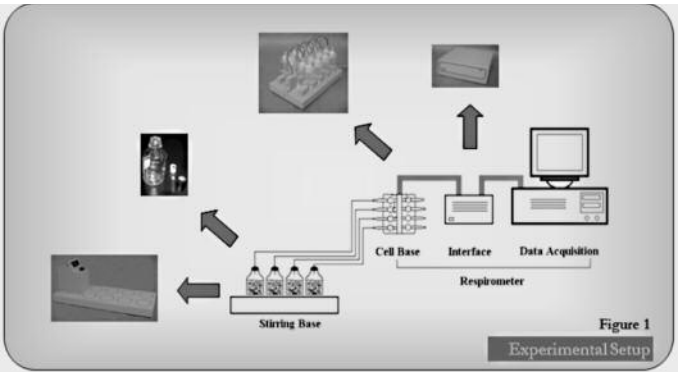


Figure 1. Diagram of anoxic test set up using Challenge AER-200 Respirometer (Challenge Environmental Systems, Inc.)

Table 1. Amount of chemicals added to the mixed liquor

Chemicals Added	Amount in mg/L
KNO_3	20
Methanol	280 mgCOD/L
NH_4Cl	5
KH_2PO_4	5

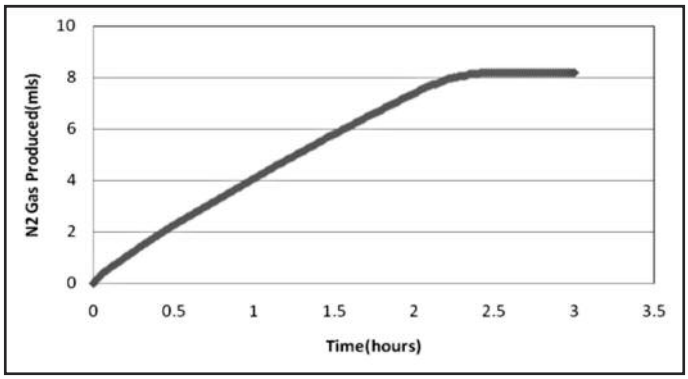


Figure 2. Nitrogen Gas Production at 1 minute Intervals for Blue Plains AWTP at 170C

Estimation of SDNRs and Nitrate Half Saturation Constants

Respirometer provides nitrogen gas production data at 1 minute intervals as shown in figure 2. From these data, cumulative NO_3-N (mg/L) consumed at 1 minute intervals were calculated using equations 1 and 2 and the remaining NO_3-N (mg/L) concentrations at 1 minute intervals were then calculated by subtracting the cumulative nitrate from the initial nitrate concentration. The assumption here is that all the nitrate is converted to nitrogen gas, as there is very little

Continued on page 36

Denitrification Kinetics

Continued from page 35

accumulation of nitrite in these types of tests. Figure 3 shows the graph obtained by plotting the temporal variation of remaining NO_3-N (mg/L). The SDNR values were then calculated for mixed liquor at different temperatures using Eq. 3.

$$n = \frac{PV}{RT} \quad (1)$$

Where :

- n = Number of moles of nitrogen gas produced
- P = 1 atmospheric pressure (atm)
- R = 0.08206 L atm K^{-1} $mole^{-1}$, the ideal gas constant
- T = Temperature, K (273 + °C)
- V = Volume of nitrogen gas produced (L)

$$C = n\left[\frac{2 moles N}{1 mole N_2}\right]\left[\frac{14 g\ N}{1 mole\ N}\right]\left[\frac{1000}{0.5}\right] \quad (2)$$

Where:

- C = Cumulative nitrate (NO3-N) concentrations (mg/L)
- n = Number of moles of nitrogen gas produced
- 0.5 = Volume of the reaction vessel (L)
- 1000 = Conversion factor, mg/g

$$SDNR(\text{mg}NO_3 - N/gMLVSS/hr) = \frac{\text{Slope of } NO_3\text{-}N_{response} \text{ Curve}}{MLVSS} \quad (3)$$

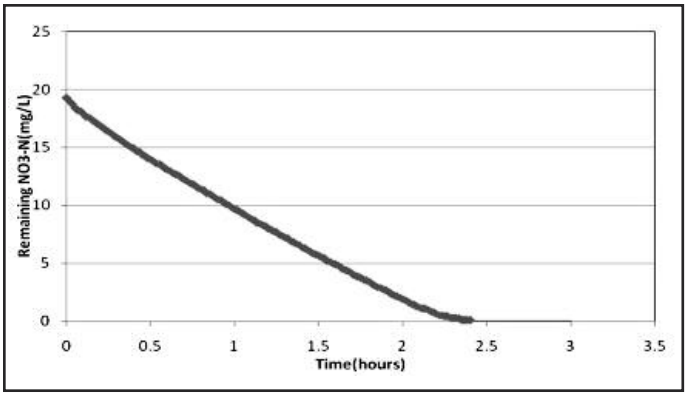


Figure 3. Remaining NO3-N(mg/L) with time for Blue Plains AWTP at 17oC

The nitrate half saturation constants ($Ks_{(NO3-N)}$) were obtained for different temperatures using a model developed based on the Monod kinetic expression and a spreadsheet interactive search routine. For developing this model, time was calculated from measured concentrations and compared to actual sampling time. Time was calculated using Eq. 4.

$$t = \left(\frac{2.86Y}{(1-Y)r_{max}}\right)\left[K_{s(NO_x-N)} \ln\frac{S}{S_0} + S - S_0\right] \quad (4)$$

Where,

- t=time in days
- r_{max} = maximum biomass production rate, g-biomass/(L.d)
- Y = biomass yield coefficient (g $COD_{biomass}$ produced/g COD removed)
- $K_{s(NOx-N)}$ = half-saturation constant (mg/L)
- S0 =Initial nitrate Concentration
- S =Nitrate concentration at time t
- 2.86 = O_2 equivalent of NO_3-N, g O_2/g NO_3-N (Metcalf and Eddy, 2003)

RESULTS AND DISCUSSION

Specific Denitrification Rates (SDNRs)

The first part of this study was the investigation of specific denitrification rates of methanol-utilizing organisms for Blue plains and ASA AWTPs for temperatures in the range of 12°C to 27°C. As discussed earlier, SDNRs at different temperatures were calculated using Eq. 3. Figure 4 shows the SDNRs at different temperature for the plants and their standard deviations. SDNR for each temperature is an average of 2 or more test values. These temperatures were observed during winter and summer at Blue Plains and ASA AWTP, and hence used as the test temperatures to study the temperature dependency of SDNRs. Methanol was used as the external carbon source and all the tests were conducted with nitrate limiting conditions.

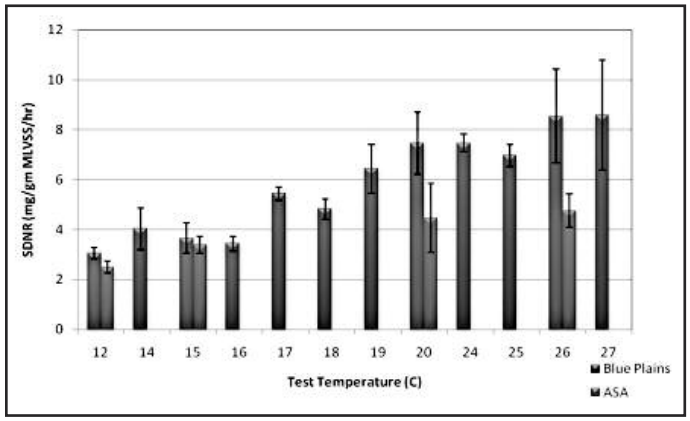


Figure 4. SDNRs at different temperatures for Blue Plains and ASA AWTP

It is clear from the results that at low temperatures there is a significant reduction in the SDNR values. SDNRs for Blue Plains were in the range of 3.1 to 8.6 mg/gMLVSS/hr for temperatures ranging from 12°C to 27°C. The SDNR values for the Blue Plains samples were found to be higher than those of the ASA mixed liquor for most of the tests. The ASA plant uses a single sludge step-feed process for BOD removal and for nitrification and denitrification and the active fraction of the

methanol utilizing organisms should be lower than that for Blue Plains, thus explaining the lower SDNRs. For ASA, as the test temperature increased, SDNRs also appeared to increase. To study the temperature dependency of SDNRs for Blue Plains, Arrhenius coefficient ( ) was calculated to be 1.084 and this indicates a strong temperature dependency. This theta value was close to those obtained by previous researchers (Nichols et al., 2007; Dold et al., 2008; Mokhayeri et al., 2008).

Nitrate ($Ks_{(NO3-N)}$) Half Saturation Constant

The second part of this study involves the evaluation of $Ks_{(NO3-N)}$ values for temperatures ranging from 12°C to 27°C estimated under nitrate limiting conditions. A curve as shown in Figure 5 was plotted using the data obtained from the respirometer and it was used for the analysis. The analysis of half saturation constant for nitrate limiting test was then performed using a model developed based on the Monod model for substrate utilization, and a spreadsheet interactive search routine was used to find the best fit value of the coefficient by minimizing the sum of squared weighted errors. The average values of nitrate half saturation constant obtained using the nitrate limiting tests (with excess COD present) conducted using respirometery for temperatures ranging from 12°C to 27°C were estimated between 0.02 and 2.1 mg/L.

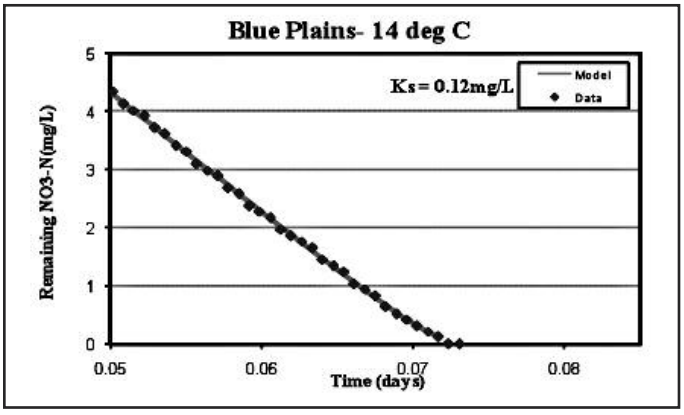


Figure 5. $Ks_{(NO3-N)}$ for Blue Plains AWTP at 14oC(Ks=0.10, MLVSS= 1700 mg/L)

Figure 6 shows the curve obtained by plotting $Ks_{(NO3–N)}$ values and the denitrification rates (DNRs) obtained at various temperatures and dilutions and Figure 7 represents the relationship between maximum biomass production rate(r_{max}) and $Ks_{(NO3–N)}$. In figures 6 and 7 a linear relationship is shown. More research is needed to establish the reasons for this relationship between $Ks_{(NO3–N)}$ and DNR or rmax. One possibility is that an affinity constant relates Ks to growth or denitrification rate. Many of the higher Ks values occurred at higher temperatures and for more concentrated sludge samples, especially when denitrification rates were also the highest. Overall, the $Ks_{(NO3–N)}$ values seem to be dependent on the initial maximum denitrification rate, type of process, as well as sample temperature and mixed liquor concentration. As discussed earlier, to achieve some of the very low permit limits in the Chesapeake Bay, the effluent nitrate concentration has to be 0.5 mg/L or less. $Ks_{(NO3–N)}$ values observed at low temperatures were as low as 0.02mg/L. Denitrifying bacteria are very sensitive to their environment and hence denitrification is greatly affected by temperature changes.

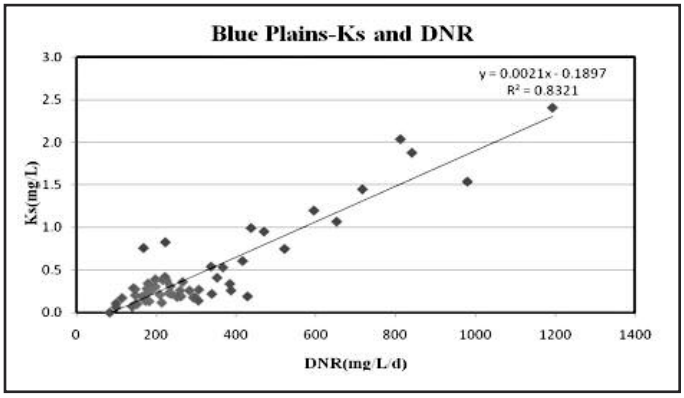


Figure 6. $Ks_{(NO3-N)}$ Vs DNR for Blue Plains AWTP

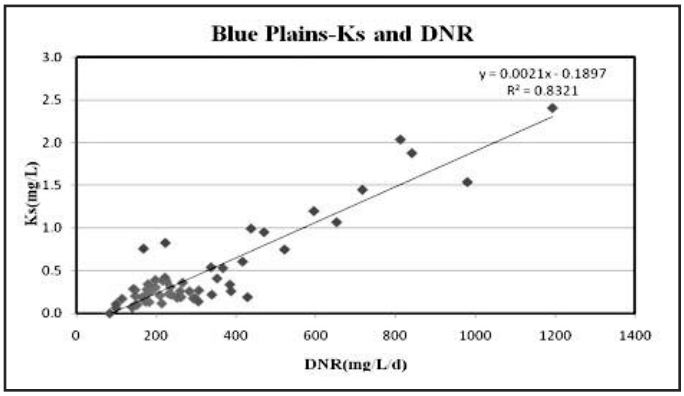


Figure 7. $Ks_{(NO3-N)}$ Vs rmax for Blue Plains AWTP

Effect of Biomass concentration

Tests were conducted for different dilutions of the same sample for each temperature and this resulted in different concentrations of biomass in the respirometer bottles. The biomass concentration was measured in terms of MLVSS. Different dilutions of the same sample were prepared in order to obtain samples with MLVSS concentrations higher and lower than that of the original sample. Figure 8 shows the nitrate-time reduction curves for different MLVSS concentrations of the same sample at 17°C. As MLVSS increases, the active biomass fraction also increases resulting in an increase in denitrification rates. Table 2 shows the DNRs obtained for different MLVSS concentrations of the same sample. From the curves obtained it is clear that DNR increases with an increase in MLVSS. It is also observed that DNRs are different for MLVSS concentrations at different temperatures. At 18°C, DNR was estimated to be 13.52 mg/L.hr with MLVSS of 2500 mg/L. To obtain similar DNR at the low temperature of 12°C, the MLVSS would have to be increased by about 64 percent.

Continued on page 38

Denitrification Kinetics

Continued from page 37

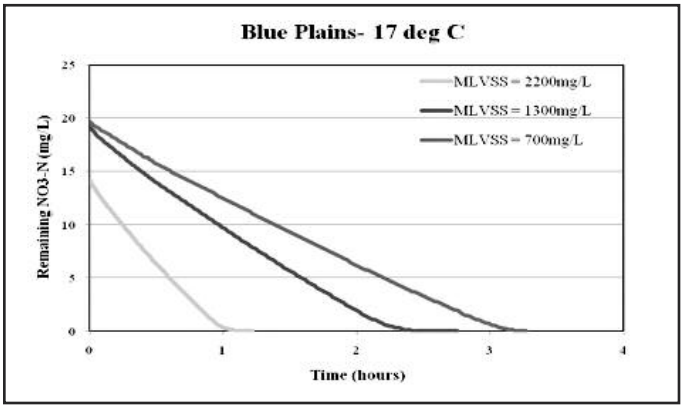


Figure 4-11: Nitrate-time reduction curves for Blue Plains AWTP at 17°C

Table 4-2: DNRs for different MLVSS concentrations

Sample Source	Temperature (°C)	MLVSS (mg/L)	DNR (mg/L/hr)
BP	12	4100	13.8
		2300	6.9
		1400	4.4
ASA	12	2900	7.8
		2000	5.4
BP	17	2200	12.2
		1300	7.4
		700	5.3
BP	18	2500	13.5
		2000	8.9
		1200	5.9

CONCLUSIONS

The objective of this research was to obtain a better understanding of the denitrification parameters, especially the Specific denitrification rates (SDNRs) and the nitrate half saturation constants (Ks) for the Blue Plains AWTP and ASA AWTP. These plants are two large methanol-using advanced wastewater treatment plants in the Chesapeake Bay watershed. The following are the conclusions:

- Specific denitrification rates were estimated for temperatures in the range of 12°C to 27°C. The observed Arrhenius coefficient of 1.084 indicates a strong temperature dependency of SDNRs. As the temperature increased from 12°C to 27°C, the SDNRs also increased from 3.1 to 8.6 mg/g MLVSS/hr. There was significant reduction in the denitrification rates as the temperature was reduced.
- Denitrification rates were determined for different MLVSS concentrations of the same sample for a particular test temperature. DNRs (mg/L/hr) increased with an increase in MLVSS concentration. Reduction in rates at low temperature could be compensated by an increase in MLVSS concentration.
- There appears to be a broad linear relationship between the initial maximum denitrification rate (DNR) and the nitrate half saturation constant for methanol utilizing organisms with a wide range of nitrate half saturation constants obtained (0.02 to 2.1 mg/L). There also appears to be an increase in $Ks_{(NO3-N)}$ with an increase in temperature. More work is needed to establish and understand these relationships.

The results obtained provide useful insights into denitrification behavior of methanol utilizing organisms. The study of half saturation kinetics becomes especially important when the electron donor or acceptor concentrations are small. A high K_S results in inefficient rates at low substrate (both for the electron donor and acceptor) concentrations. Effluent nitrate concentration needs to be 0.5 mg/L or less to achieve some of the very low permit limits in the Chesapeake Bay. If the nitrate half saturation concentration is in this range, it will start to impact growth rates of the biomass and the denitrification rates of the electron acceptor. If such situation arises, larger tanks would have to be used to achieve denitrification to low nitrate levels. Suggestions for future studies include measurement of COD limiting K_S for methanol utilizing organisms, and model development to describe the relationships observed in this study.

ACKNOWLEDGMENTS

This research was coordinated and funded by the District of Columbia Water and Sewer Authority (DCWASA). The authors are grateful to the staff at Alexandria Sanitation Authority for providing samples for this study.

REFERENCES

APHA (1998): Standard Methods for the Examination of Water and Wastewater. 20th Edition, American Public Health Association, American Water Works Association, Water Environment Federation.

Chesapeake Bay Program (last modified 2/20/2008) “Bay Frequently Asked Questions,” *http://www.chesapeakebay.net/bayfaq.aspx?menuitem=14589#big*. Site accessed in March, 2010.

Dold, P., Takacs, I., Mokhayeri, Y., Nichols, A., Hinojosa, J., Riffat, R., Bott, C., Bailey, W. and Murthy S. (2008) “Denitrification with Carbon Addition—Kinetic Considerations.” *Water Environment Research*, vol. 80, no. 5, 417-427.

Metcalf and Eddy, (2003) Wastewater Engineering, Treatment and Reuse, Fourth Edition. Edited by Tchobonoglous, G., Burton, F.L. and Stensel H.D., McGraw-Hill, New York, N.Y. pp. 567, 618, 623, 785.

Mokhayeri, Y., Riffat, R., Takacs, I., Dold, P., Bott, C., Hinojosa, J., Bailey, W., and Murthy, S. (2008) “Characterizing Denitrification Kinetics at Cold Temperature using Various Carbon Sources in Lab-Scale Sequencing Batch Reactors.” *Water Science and Technology*, vol. 58, no.1. 233-238.

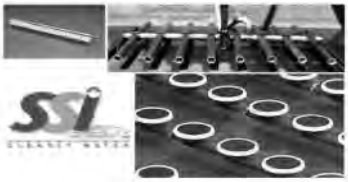
Nichols, A., Hinojosa, J., Riffat, R., Dold, P., Takacs, I., Bott, C., Bailey, W., and Murthy, S. (2007) “Maximum Methanol Utilizer Growth Rate: Impact of Temperature on Denitrification.” Proceedings of 80th Annual Conference of Water Environment Federation, WEFTEC ‘07, San Diego, CA.

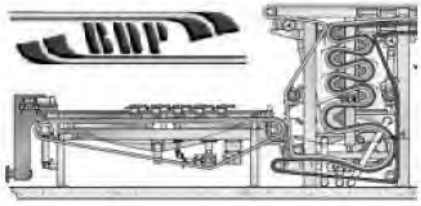
USEPA (1975) Process Design Manual for Nitrogen Control. US EPA Office of Technology Transfer, Washington, DC.

USEPA (1993): Nitrogen Control Manual. United States Environmental Protection Agency—Office of Research & Development, Office of Water, Washington, DC.

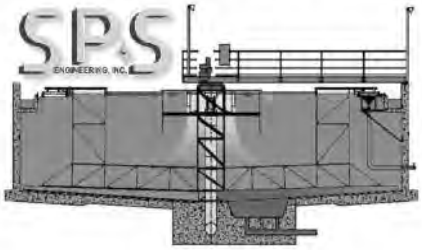
Kershner Environmental Technologies, LLC

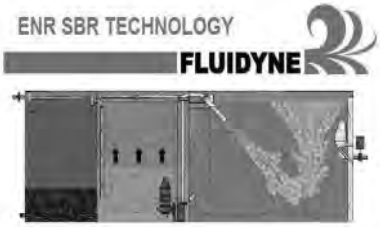
Manufacturers' Representative of Environmental Technologies





Aeration Systems
Analytical Instrumentation
Biological BNR/ENR Processes
Blowers & Compressors
Chemical Feed Systems
UV Disinfection Systems
Clarifiers
Belt and Screw Conveyors
Pumps
Covers & Enclosures
Filtration Systems
Flocculation & Mixing
Industrial Wastewater
Membrane Filtration
Odor Control
Screening Systems
Grit Removal Systems
Sludge Dewatering
Sludge Drying & Processing





9433 Common Brook Road, Suite 201, Owings Mills, MD 21117 Phone: 410-581-0555 **www.ketllc.com**

Ranked #3 Design Firm By *Engineering-News Record*

Proud Sponsor of CWEA

URS

(410) 468-0875
www.urscorp.com

Ted DeBoda
Baltimore Branch Manager
1800 Washington Blvd.
Suite 410
Baltimore, MD 21230

Water/Wastewater • Environmental • Construction Management

A new, supplemental Carbon Source without the flammability concerns of Methanol.

GLYCERIN,
a Biodiesel by-product,
is a clean, non-flammable,
easy-to-handle source of carbon.

Proven in numerous WWTPs and comparable to Methanol on a BOD/COD basis.

For Pricing and Details Contact:

Marty Goldberg

MAGIC 4 MAINTENANCE

807 Parkview Ave, Rockford, IL 61107
815-519-1491 • martyg61107@yahoo.com

Providing solutions to your toughest environmental challenges.

KCI TECHNOLOGIES

Engineers
Planners
Scientists
Construction Managers

www.kci.com
Employee Owned Since 1999

Contact Senior VP Tom Sprehe at (410)316-7800.

MUNICIPAL

ENVIRONMENTAL
MAINTENANCE SERVICES

- SANITARY & STORM SEWER CLEANING
- DIGESTER & TANK CLEANING
- VACUUM REMOVAL of WASTES & DEBRIS
- WATER BLAST CLEANING (up to 20,000 psi)
- LAGOON, PIT & POND CLEANING
- HYDRAULIC DREDGING
- SLUDGE REMOVAL
- SLUDGE DEWATERING
- BIOSOLIDS LAND APPLICATION

Over 47 Years In Business!
All Operators 40 Hour Hazwoper Trained

GUARANTEED
You Must Be Satisfied Or You Pay NOTHING for Our Services!

A CARYLON COMPANY

MOBILE DREDGING & PUMPING CO.

The Environmental Protection Specialists

3100 Bethel Road ▪ Chester, PA 19013-1488 ▪ Fax (610) 497-9708

Call Toll Free **1-800-635-9689**

Heyward
INCORPORATED

Established 1908

Representing leading process equipment manufacturers with state of the art technologies for the water and wastewater industry

CONSERVATEK
covering space creatively

FORCE FLOW
CHEMICAL MONITORING AND CONTROL SYSTEMS

NEFCO

Marley
AN SPX BRAND

ITT
WEDECO

JMS
JIM MYERS & SONS, INC.

BÖRGER.

K-S Komline-Sanderson

AQUARIUS
TECHNOLOGIES, INC.

SIEMENS Water Technologies

TURBLEX

UB United Blower Inc.

HUBER
TECHNOLOGY

- AERATOR PRODUCTS
- GENERAL FILTER
- MICROFLOC
- STRANCO
- ENVIREX
- JWI
- SERNAGIOTTO
- WALLACE & TIERNAN

GEA Westfalia Separator, Inc.

Ed Presnell Tel (301) 473-4700 Cell (301) 676-0917 Fax (301) 473-9555
John Seaman Tel (410) 726-2960 Cell (410) 726-2960 Fax (757) 414-0253

Visit our website at www.heywardincorporated.com

O'BRIEN & GERE
www.obg.com

Water & Wastewater Solutions for Municipalities, Authorities, & Agencies

For more information:
Farah Foster
fosterfl@obg.com
(757) 285-8116

MARYLAND
Landover
Hunt Valley

VIRGINIA
Virginia Beach
Richmond

NORTH CAROLINA
Raleigh
Fayetteville

with 28 offices throughout the U.S.

McCRONE
ENGINEERS • SURVEYORS • PLANNERS

Evaluation, Design, Construction Services

- Wastewater Collection: Pump Stations, Various Collection Technologies
- Infiltration and Flow Analysis
- Wastewater Treatment: Activated Sludge Sequencing Batch Reactors, Membrane Bio Reactors
- Wastewater Disposal: Surface Discharge, Innovative Septic and Land Application Systems, Drip Irrigation, Subsurface Disposal
- Industrial Waste Treatment Systems

McCrone is a full service environmental and civil engineering firm. We are proud to have several LEED APs on staff and we are an active member of the USGBC.

Contact us for all your engineering needs.

Annapolis • Centreville • Dover • Elkton • Richmond • Salisbury • West Grove
www.mccrone-inc.com • 410-267-6947 • annapolis@mccrone-inc.com

EBA ENGINEERING, INC.

Professional Services Since 1952

■ *Civil* ■ *Structural* ■ *Geotechnical* ■ *Environmental*
■ *Haz-mat* ■ *Transportation* ■ *Water/Wastewater Utility*
■ *Construction Management and Inspection*
■ *Surveying and Mapping* ■ *Materials Testing*

4813 Seton Drive • Baltimore, MD 21215
(410) 358-7171 • (800) 950-3223 • (410) 358-7213
www.ebaengineering.com

HARTWELL ENGINEERING, INC.

ENGINEERS ● INTEGRATORS

Electrical • Instrumentation • SCADA
Control Systems • Communications
Design • Integration • Construction

2141 Priest Bridge Drive, Suite 8, Crofton, Maryland 21114
(410) 451-7335 FAX: (410) 451-1412
www.he-inc.com solutions@he-inc.com

WHITE MARSH ENVIRONMENTAL SYSTEMS, INC.

"Systems....Operations.....Solutions"
For Your Water and Wastewater Contract Operation Needs

1100 South Little Creek Road
Dover, DE 19901

1-800-523-7224
Email: sschlegel@tuiwater.com

RK&K

Headquarters:
81 Mosher Street • Baltimore, Maryland 21217
410-728-2900 • 410-728-2992 Fax
www.rkkengineers.com

Rummel, Klepper & Kahl

Water
Wastewater
Water Resources
Residuals Management
Computer Applications/GIS
Hazardous & Solid Waste Management

Maryland • Virginia • North Carolina • Pennsylvania
Maine • West Virginia • Delaware • D.C.

JMT

JOHNSON, MIRMIRAN & THOMPSON
Engineering A Brighter Future®

jmt.com
72 Loveton Circle
Sparks, MD 21152
(P) 410-329-3100
(F) 410-472-2200

Wastewater Collection & Treatment Systems
Facility Planning & Design
Process Control Engineering
Biological Nutrient Removal
Construction Management

WASTEWATER ● WATER ● FACILITIES
STORMWATER ● HAZARDOUS/SOLID WASTE
PLANNING, DESIGN, AND CONTRACT MANAGEMENT SERVICES

Gannett Fleming

SINCE 1915

4701-A Mount Hope Drive
Baltimore, Maryland 21215
www.gannettfleming.com

410.585.1460
(fax) 410.585.1470

WR&A WHITMAN, REQUARDT & ASSOCIATES, LLP

ENGINEERS · ARCHITECTS · PLANNERS EST. 1915

- Sewershed Planning
- Collection and Conveyance
- Wastewater Treatment, including BNR and ENR Processes
- Class A and Class B Biosolids Processes
- CSOs and SSOs

Baltimore, MD
Georgetown, DE
Wilmington, DE
Pittsburgh, PA
York, PA
Fairfax, VA
Newport News, VA
Richmond, VA

www.wrallp.com

TIDEWATER ENVIRONMENTAL SERVICES, INC.

Professional Engineering — Construction Services For Large Centralized and Decentralized Water and Wastewater Systems

"Full responsibility for permitting, design, construction and ownership of water and wastewater utilities serving residential and commercial customers"

1100 South Little Creek Road
Dover, DE 19901

800-523-7224
Fax: 302-734-9297

RIORDAN

Maryland Office

P.O. Box 3404
Crofton, MD 21114-3404
301-858-0609
FAX: 301-858-0569

Tom Schell

Pennsylvania Office

6198 Butler Pike, Ste 150
Blue Bell, PA 19422-2600
215-629-9936
FAX: 215-628-9979

Carl Janson

Bob Smith

Art Auchenbach

Matthew Seng

What type of wastewater/ water treatment problem do you need to solve?

Call us today for help with the best solution!

RIORDAN MATERIALS CORPORATION

P. O. Box 3404, Crofton, MD 21114-3404
PHONE: (301) 858-0609, **FAX:** (301) 858-0569
WEB SITE: http://www.riordanmat.com

WWOA/CWEA ECOLETTER
Cynthia A. Lane
American Water Works Association
1300 Eye Street NW, Suite 701W
Washington, DC 20005

PRESORTED
STANDARD
U.S. POSTAGE
PAID
PERMIT #273
ANNAPOLIS, MD

Manufacturers' Representative for Engineered Instrumentation, Process Equipment, and Pumping Systems, serving Maryland, Virginia, Pennsylvania, Delaware, New Jersey, and the District of Columbia for over 30 years

SCHWING BIOSET · Ashbrook Simon-Hartley · ITT F.B. Leopold Sanitaire Flygt · MRI · VOGELSANG
WATSON MARLOW Bredel PUMPS · GE Zenon · Infilco Degremont SUEZ · ALFA LAVAL · PVP
VELODYNE · Lakeside Equipment Corporation · OZONIA · invensys FOXBORO · S-L CONTROLS
Patterson · AIRVAC · Hydro International · RODNEY HUNT · Hayward Gordon

WWW.SHERWOODLOGAN.COM
MD. Annapolis (410)841-6810
VA. Richmond (804)897-1361
PA. Philadelphia (610)207-3200