

Ecoletter

SUMMER 2008 ISSUE



CHESAPEAKE



*A Publication of the
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PRESIDENT'S MESSAGE



WWOA President

—DuWayne Potter

Wow has it been a year already? It seems like it just got started and now it's over. I have enjoyed this year, making new acquaintances and renewing old friendships while attending functions at each of the WWOA

sections. I'm glad to say I was able to attend meetings and training events from the Western Section to the Eastern Shore including the Central and the Southern Section.

With the work environment these days, I wasn't sure time would permit my attendance at all of the meetings for the Executive Board, Tri Con Committee, and Section meetings I wanted to attend, but you know me, feed me lunch and I'm there!!

I feel we at the WWOA have had a successful year; I haven't had any complaints from members that we weren't able to solve and there were very few to start with. Membership is holding at around 700. I don't think we had any issues with lack of attendance at Executive Board meetings and not having quorums so we could handle business and guess what, they even started on time. (One of my pet peeves is people being late) Hurrah!! While these may seem minor, remember, the longest journey starts with the first step.

Sharita Lyle took on the Education Chair position and at this time is putting the finishing touches on a scholarship program for our members and their dependents. Currently, the plan is to offer one five hundred dollar scholarship per year to a person seeking education in a science or engineering field. Stand by for more information on this program. We hope to have it finalized in time for the Tri Con in August.

All indicators are that we will be making a successful transition from the Joint Conferences at the Clarion, to this year's Tri Conference at the Ocean City Convention Center. I'm one of the ones that were lead kicking and screaming down the path, not wanting to venture out for fear of failure. However, it looks like it was the right thing to do.

I'll leave you with the same message I started with a year ago. This is your organization. Its success or failure is directly related to the time and effort you as members put in to it. Step up, make a difference, be part of it. We always need people to volunteer for projects. Too

Continued on page 33



CWEA President

—Karl Ott

It's hard to believe that nearly a year has passed since I took the reins of this Association. Thus, it is ironic, in the waning days as CWEA president, I finally am beginning to feel comfortable with the position. Too late to do much

good and yet timely enough to prevent further damage. Or, perhaps it is the knowledge that I will soon be handing the gavel to a new president.

Despite being a member of CWEA for 25 years, and being part of the Executive Board for the past several years, the duties and time commitment of this office still came as quite a shock. I had always thought of the presidency as something akin to being the captain of a ship, using skills and abilities to guide the vessel along the way. And in all truthfulness, I would be lying if I didn't tell you that, for the most part, that is how this past year progressed. What I failed to remember, though, is that from time to time, ships get caught in unforeseen situations and it becomes the captain's job simply to keep the vessel from dashing itself on the rocks.

But, despite an in-box jammed with email messages from committees, officers, trustees, WEF and countless phone calls and voice mail messages, it has been an honor and privilege to serve as your President. CWEA has enjoyed a productive year. The Collection Systems, Water Re-Use, Plant O&M and Spring Meeting committees have all put on successful programs. The 2008 Short Course was a huge success and Conference Committees (2008 Tri-Con) has been working diligently to produce what looks to be the biggest and best Tri-Association Conference, August 26–29, at the Ocean City Convention Center. 119 exhibitors and nearly 100 papers will keep even the most ardent conference attendee busy. By the way, have you registered yet? The Ed Norton Open Golf Classic was a big success, with proceeds going to Water For People. The Public Education Committee was instrumental in CWEA's participation in World Water Monitoring Day, and is gearing up to exceed last year's program, partnering with WEF for the September 18 kick-off.

On the national level, CWEA delegates have been busy on various WEF committees, most recently working on a House of Delegates Workgroup to address

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Ecoletter

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CALENDAR OF EVENTS *Summer/Fall*

August 26–29, 2008
Tri-Conference
Ocean City, Maryland

September, 2008
Instrumentation Seminar
Location: TBD

November 14, 2008
FOG Seminar
Linthicum, Maryland

www.wwoa-cwea.org

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CHANGE OF ADDRESS

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

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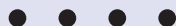
EDITOR'S CORNER

Impaired waters in Virginia just got a lot of press. The State published their 2008 Water Quality Assessment Report and the news was not good for rivers, lakes and estuaries. Looking at streams: 10,604 miles are impaired out of 16,190 miles assessed so far, applying this ratio to the 51,000 total miles in Virginia there will be 33,400 miles of impaired streams. The most common cause of impairment in streams is bacteria. On the lake side, 94,059 acres out of 112,189 are impaired most commonly by low Dissolved oxygen and PCB's in fish tissue. It's even worse looking at estuaries; of the 2,307 square miles, 2,185, or 94.7%, are impaired. As in lakes, low dissolved oxygen and PCB's in fish tissue are the most prevalent causes of impairment in estuaries.

Maryland also published the same report as Virginia but it didn't get much attention. That's because, while it is more detailed, it lacks a hard-hitting summary. Maryland's dense report is difficult to get your hands around and therefore it doesn't come to the general public's attention. Here's a nudge to Maryland to provide a similar summary as Virginia so the all the bad water in and around the Bay gets to the ultimate decision makers in a democracy—the citizens.



Bernie Fowler waded out in the Patuxent again this year and it was 26 inches of water before he couldn't see his sneakers. This was an improvement over last year's 21 inches, but not nearly as good as the 42.5 inches in the 2002 drought. Are things that much worse than six years ago? Hardly. Or as the sign used to say in Albert Einstein's office—"Not everything that counts can be counted and not everything that can be counted counts." But give Bernie credit for bringing the issue of Patuxent water quality to the attention of all kinds of people. And give The University of Maryland's Center for Environmental Science extra credit. Looking at a variety of parameters, they graded the Patuxent at D-. With all the money and effort applied over the years to improving river water quality, it has to be very frustrating to be so poorly regarded to get such a low grade.



The Chesapeake Bay Foundation (CBF), whose job it is to bring up controversial topics, got themselves into an unusual controversy of their own making. Instead of taking their usual critical posture counter to regulators, policy makers and big players in the Bay water community, they've seemingly gone soft in the head

and decided to get in cahoots with agricultural interests to work together on Bay issues. The president of CBF says it's a new day for the Bay. We don't know about that, but it's certainly a new day for the CBF. Time will tell if the new day will be a better day and if the partnering pays off. A lot can be said about a strong advocacy group shifting gears to try a different tack, but one thing is for certain there will always be a place for advocacy on the Bay's behalf. Togetherness is fine, just as long as it doesn't become too expedient or forgiving. Or is something else going on here? Is it a case of, "If you can't beat 'em, join 'em?"



Nutrient trading in Maryland is finally a reality. Phase 1, Point Source to Point Source trading was adopted in April. Phase 2, Point Source to Non-Point Source is still in the future. Also, Maryland stated that avoidance of plant upgrades to ENR standards with trading would not be allowed since the Bay Restoration Fund will provide funding for all upgrades. Given the above, it's hard to imagine the trading office seeing much activity. Over in Virginia where Point and Non-Point Sources can trade, Phosphorus is selling for \$2/Lb./Yr. and Nitrogen goes for \$5/Lb./Yr.



Another biosolids prohibition case is in the courts up in Pennsylvania. East Brunswick Township, in Schuylkill County passed ordinance in 2006 and now the State Attorney General is challenging it because it violates state waste management and nutrient management laws. The township maintains its ordinance regulates corporations and not biosolids. A state court will rule on this matter.



A lawsuit, this time in Maryland, seeks to make agricultural nutrient management public information. The present regulation only allows plans older than three years to be shared with the public but newer plans are kept confidential. It is not clear what noble purpose is served by keeping nutrient management plans secret.



After a hiatuses of too many years, Charley the photography man returned with one of his famous photo collages in this issue. If this doesn't get in you in the mood for coming to the beach and being with friends, then nothing will. See you in late August at the biggest and best Tri- Association Conference in sunny Ocean City, Maryland.

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CWEA Spring Meeting

—By Paul Sayan, Black & Veatch and
Laura Bertrand, EA Engineering



Jerry Johnson, DC WASA General Manager

Wastewater professionals from the private, municipal, and regulatory sectors gathered at the 2008 CWEA Spring Meeting held at the Blue Plains Advanced Wastewater Treatment Plant in Washington D.C. on May 16th. The meeting was broken into two sessions; the morning session discussed *Lessons Learned from Baltimore City's Sewershed Studies*, and the afternoon session discussed *Challenges in Enhanced Nutrient Removal*. A morning and afternoon bus tour of the plant was provided for inquisitive attendees. Mr. Jerry Johnson, General Manager for the District of Columbia Water and Sewer Authority, provided the meeting's opening remarks in which he emphasized the importance of utilizing approaches that can be applied to combined sewer overflows and nutrient control to improve efficiency and control costs.

Jim Ridenour with Rummel, Klepper & Kahl, LLP (RK&K) started the morning session by discussing some of the key data management challenges encountered when editing Baltimore City's geographic information system for the Jones Falls sewershed study. Jim also discussed RK&K's data management approach and presented some tools developed by RK&K to link and analyze the massive amounts of field data. Paul Sayan (Black & Veatch) provided the second presentation, which focused on developing a large scale smoke testing program in Baltimore City for the Herring Run sewershed study. Paul discussed various logistical challenges and stressed the importance of developing an effective public relations program. Burt Curry (Johnson, Mirmiran & Thompson) discussed the use and intricacies of ADS' Slicer software, which is the standard inflow and infiltration analysis software adopted by Baltimore City. Burt presented examples from the High Level sewershed study of Slicer's powerful capabilities,

but stressed that engineering judgment must still be used to interpret the data and analysis results. The final presentation for the morning session was provided by Cece Nguyen with Hazen and Sawyer and Phil Hwang with Patton Harris Rust & Associates. Cece and Phil discussed the challenges performing large diameter sewer inspections in the crowded Inner Harbor and the significant debris found in the sewer interceptors.



Morning Presenters (from left to right) Burt Curry (JMT), Jim Ridenour (RK&K), Paul Sayan (B&V), and Phillip Hwang (PHR+A)

After lunch, Dale Emerson with Whitman, Requardt and Associates, LLP, eased attendees into the afternoon session with his informative presentation on enhanced nutrient removal (ENR) at Baltimore City's Back River Wastewater Treatment Plant. Dale discussed the reasoning for recommending ENR at the facility and the four stages of its implementation. Beverly Stinson (Metcalf and Eddy) discussed the challenge of implementing ENR while still remaining economically and environmentally sustainable. Beverly discussed the relationship between increasing water quality and the potential resulting greenhouse gas emissions. The resulting audience discussion was an appropriate precursor to Dimitrios Katehis' (CH2M Hill) presentation on greenhouse gas and nitric oxide emissions from nutrient removal processes. Dimitrios explained how advances in molecular biology have led to a better understanding of the emissions

Afternoon Presenters (from left to right) Dale Emerson (WRA), Beverly Stinson (M&E), and Dimitrios Katehis (CH2M Hill)



associated with nutrient removal. Mindy Selman (World Resources Institute) was the final presenter for the afternoon session. Mindy discussed the recently released nutrient trading program for the State of Maryland and explained how Phase I of the program addresses trading between point sources and Phase II will address trading between point source and non-point sources.

Congratulations to the following winners of the Spring Meeting door prizes:

Satish Patel—WSSC

Winner of the \$50 Circuit City Gift Card courtesy of Patton Harris Rust & Associates

M. Pierre Stewart—City of Baltimore

Winner of Orioles tickets courtesy of Patton Harris Rust & Associates

Aaron Z.C. Hughes—Greeley and Hansen

Winner of National Aquarium tickets courtesy of EA Engineering, Science, and Technology

Haile Z. Tsehayu—Delon Hampton & Associates

Winner of \$50 Gift Certificate to Rock Bottom Brewery courtesy of Black and Veatch Corporation

Anita Narh-Dometey—EBA Engineering

Winner of \$50 Gift Certificate to Rock Bottom Brewery courtesy of Black and Veatch Corporation

Bryan Samuels—City of Baltimore

Winner of 1 GB USB flash drive courtesy of Black and Veatch Corporation

The Spring Meeting Committee thanks each of the presenters for their time and effort, the sponsors for their generosity, and DC WASA for hosting the event and providing bus tours of the facility. The Committee also thanks each attendee and hopes to see everyone again next year!



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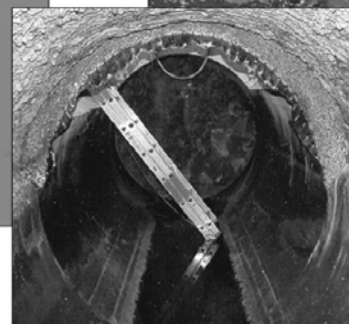
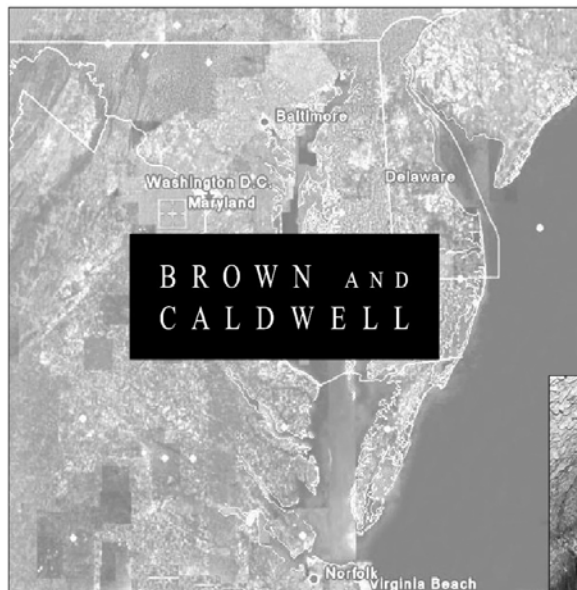
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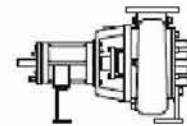
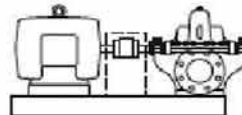
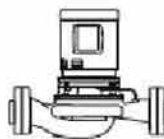
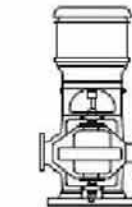
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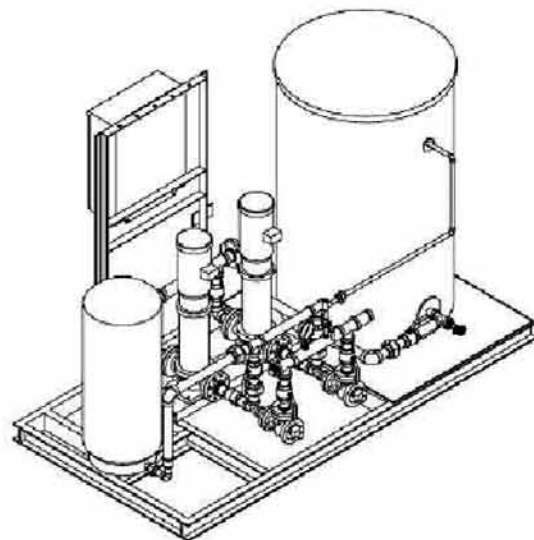
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2008 Tri-Association Conference

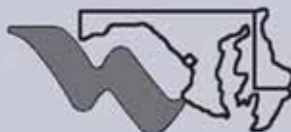


Roland Powell Convention Center
August 26-29

Ocean City, Maryland



Chesapeake Section,
American Water Works
Association



Chesapeake
Water Environment
Association



Water and Waste Operators
Association of
MD, DE, and DC

CONFERENCE PRE-REGISTRATION FORM

Please complete one form per attendee.

2008 CSAWWA /CWEA/WWOA TRI-ASSOCIATION CONFERENCE

August 26 – August 29, 2008 — Roland E. Powell Convention Center, Ocean City, MD

☐ **Association Member:** Enter membership numbers for all Associations you belong to:

CSA WWA _____ CWEA _____ WWOA _____

☐ **Certified Operator:** Number: _____ State: _____

☐ **Non-Member**

☐ **Full-Time Student**, not employed in the Water/Wastewater Industry. Name of School: _____

Individual Registration: Circle only one of the following options:

	Member	Member, Certified Operator	Non- Member	Full-Time Student	Total Due: Individual Registration
Full Conference – Complete Package	\$210	\$180	\$250	NA	\$
Full Conference – No Ticketed Events	\$170	\$140	\$210	\$25	
One-Day Registration - Wednesday	\$100	\$75	\$120	\$15	
One-Day Registration - Thursday	\$100	\$75	\$120	\$15	
One-Day Registration -Friday	\$35	\$25	\$50	\$10	

Full Conference - Complete Package: Includes Pre-Conference, Technical Sessions, Exhibit Hall, Social Events, 1 Ticket to Wednesday Night Dinner @ Seacrets, & select 1 Ticket to your choice of Association Business Luncheon/Meeting: ☐ CSAWWA ☐ CWEA ☐ WWOA

Full Conference - No Ticketed Events: Includes Pre-Conference, Technical Sessions, Exhibit Hall & non-ticketed Social Events.

No tickets included to Wednesday Night Dinner@ Seacrets or Association Business Luncheon/Meetings.

One-Day Registration: (Wednesday or Thursday) Includes Technical Sessions, Exhibit Hall and non-ticketed Social Events that day.

One-Day Registration: (Friday) Includes Technical Sessions and non-ticketed Social Events that day.

Ticketed Events: Additional Tickets	# Tickets	Subtotal	
Wednesday Night Dinner at Seacrets: \$40		\$	
Assoc. Business Luncheon/Meeting: \$20 Check One: <input type="checkbox"/> CSAWWA <input type="checkbox"/> CWEA <input type="checkbox"/> WWOA		\$	
Total Due: Additional Tickets		\$	

Sports	Include names of Golfers in your group (full or partial foursomes) or single	Subtotal	
Golf: \$95 per golfer paid for on this registration form		\$	
\$100 hole sponsor		\$	
Clay Target Shoot: _____ Shooters @ \$40 per shooter		\$	
WFP Fun Run: _____ Runners @ \$25 per runner		\$	
Total Due: Sports		\$	

CONFERENCE REGISTRATION TOTAL	Total from above selections	\$
	\$30 Late Fee (After August 15, 2008)	\$
	TOTAL PAYMENT DUE	\$

☐ Special Dietary Requirements? Specify _____

Do you plan to ride the **Shuttle Bus** from your Hotel to the Wednesday Night Dinner at Seacrets?

☐ No ☐ Yes If yes, enter the name of your Hotel: _____

Your Name _____	
Employer _____	
Phone _____ Fax _____	
Address _____	
Nickname (for badge) _____	
Guest Names _____	

<input type="checkbox"/> Check #: _____ Make checks payable to ACTEVA , and include Tri-Association Conference in the memo line. <input type="checkbox"/> Credit Card: <input type="checkbox"/> Visa <input type="checkbox"/> Master Card <input type="checkbox"/> Discover <input type="checkbox"/> American Express Card #: _____ Exp. Date: _____ Name on Card (print) _____ Signature _____ Billing Address (if different than above): _____ _____ 3 or 4 digit Card Security Code: _____

For questions regarding conference registration, contact Alan Will at triconregistrar@jmt.com (preferred) or at 443-662-4240.

2008 Tri-Association Conference Schedule

TUESDAY, AUGUST 26TH, 2008

- 8:00 am check-in **Tri-Association Conference Golf Outing and Awards**
- 9:00 am start *To register: Use the Conference registration form or register online at rtatariw@tatariw.com. Cost is \$95 per golfer.*
- 10:00 am **Tri-Association Conference Clay Target Shoot and Awards**
To register: Use the Conference registration form or register online at Jane_Bayer@URS Corp.com. Cost is \$40 per shooter.
- 10:00 am–5:00 pm **Exhibitor Set-Up**
- Noon–6:00 pm **Registration open** on the 2nd floor of the Convention Center, at the top of the stairs.
- 1:00–4:30 pm **Pre-Conference Session** in Room 204
Topic: Sustainability and Infrastructure
The 2008 Pre-Conference centers around two recurring themes: Sustainability and Infrastructure. Two panels of recognized experts will discuss these issues from various viewpoints. On the topic of Sustainability, panelists represent a large water/wastewater utility, an electrical utility and corporate America. The second panel will discuss Infrastructure. WEF will discuss their *Water is Life and Infrastructure Makes It Possible*, a public education program, while other panelists will provide the viewpoints of a developer interested in waterfront property, as well as what our jobs would be like in a third-world country.

Speakers include:

Mike Porter, Washington Suburban Sanitary Commission
Greg Fox, Constellation Energy
Suzen Adams, Weston Solutions
Loraine Loken, Water Environment Federation
Uves Brandeis, Anacostia Waterfront Development Corporation
Dr. Lilia A. Abron, P.E., DEE, PEER Consultants, P.C.

4:30–6:00 pm **Opening Ceremonies** in Rooms 201, 202, & 203

Opening Remarks: Aaron Duke, CSAWWA Chair
Karl Ott, CWEA President
DuWayne Potter, WWOA President

Welcome Remarks: The Honorable Richard Meehan (Invited), Mayor of Ocean City

Keynote Speaker: Jerry N. Johnson (invited), General Manager, DC WASA

6:00–8:00 pm **Early Bird Reception** in Grand Ballroom of the Convention Center, sponsored by ADS Environmental Services and URS

WEDNESDAY, AUGUST 27TH, 2008

- 7:30 am–9:00 am **Past Presidents/Chairs Breakfast**
Invitation only.
- 7:30 am–9:00 am **Water For People Fun-Run/Walk** on the boardwalk at the Grand Hotel.
-
- "Water for People" Fun-Run/Walk and Auction**
Run/Walk: Wednesday, August 27th,
7:30 am on the boardwalk at The Grand Hotel
Entrance fee: \$25 (Pre-registration not required)
Silent Auction at 10:00 am–4:30 pm will be located at the Convention Center outside the Grand Ballroom. Throughout the day, you can bid on—and possibly win!—items to brighten your day! All proceeds benefit Water For People.
-
- 8:30 am–9:15 am **Moderator and Room Monitors Meeting,**
Room 206
- 8:30 am–4:00 pm **Registration open** on the 2nd Floor of the Convention Center, at the top of the stairway.



Jerry N. Johnson

General Manager, D.C. Water and Sewer Authority

Jerry Johnson currently serves as General Manager of the District of Columbia Water and Sewer Authority. The Authority provides retail and wholesale water and wastewater treatment services to the District of Columbia and parts of Virginia and Maryland with a customer base of approximately 2 million. The Water and Sewer Authority operates Blue Plains Wastewater Treatment Plant, which is the largest advanced Wastewater Treatment Plant in the world.

Mr. Johnson is nationally known as a turnaround specialist. As the first General Manager of the newly created Authority, he guided it from an unrated agency with a projected \$8 million deficit to one with an A+ credit rating and \$170 million reserve in two years. Prior to joining the Water and Sewer Authority, Mr. Johnson served as Deputy City Manager for Operations in the City of Richmond, Virginia. During his tenure in Richmond, he also served as Director of Public Utilities, responsible for four separate utility operations including gas, electric, water and wastewater providing service to the metropolitan Richmond area. Before moving to Richmond, he was Assistant to the City Manager for the City of Alexandria, Virginia and was a Senior Planner for the City of Charlottesville, Virginia.

He graduated with a Business Degree from Ferrum College; a Degree in Urban Affairs and Economics from Virginia Tech and completed the Program for Senior Executives in State and Local Government at the JFK School of Government, Harvard University.

8:30 am–6:00 pm	Exhibits open in the Grand Ballroom of the Conference Center
8:30 am	Continental Breakfast in the Grand Ballroom, sponsored by <i>Riordan Corp.</i>
9:00 am–1:00 pm	Biosolids Beauty Contest at the CWEA Table in the Lobby outside the Grand Ballroom.
9:30–11:30 am	Technical Sessions in Rooms 201/202, 203, 204, and 205/206
10:00 am–4:30 pm	Water For People Silent Auction outside the Grand Ballroom
11:00 am–12 noon	Operators Challenge Orientation in Room 217
11:30 am–Noon	Visit Exhibits/Break/Door Prize in the Grand Ballroom, sponsored by <i>RJN Group</i>
Noon–1:15 pm	Committee Fest in Room 215, sponsored by <i>PBS&J</i>
1:30–3:00 pm	Technical Sessions in Rooms 201/202, 203, 204, and 205/206
1:30–5:00 pm	Operators Challenge: Classroom/Lab in Room 217
3:00–3:30 pm	Visit Exhibits/Break/Door Prize in the Grand Ballroom
3:30–5:00 pm	Technical Sessions in Rooms 201/202, 203, 204, and 205/206
5:00–6:00 pm	Meet & Greet in the Grand Ballroom at the Convention Center, sponsored by <i>Gannett Fleming and KCI Technologies</i>
5:00–6:00 pm	Operators Challenge: Pipe Cutting Shootout in Room 208

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Fun Night Social Event “Dinner and Beach Party”
Wednesday, August 27th, 7–11 pm

Enjoy dinner and an evening on the beach at one of the best venues in Ocean City. Appetizers and a full dinner will be served. Each person will receive two drink tickets, but the bars will be open all four hours. Shuttle buses to and from Seacrets will be running from 6:30–11:30 pm, free of charge. Be sure to indicate during registration if you plan to ride the shuttle bus to Seacrets, and if so, your hotel. Sponsored by *Black & Veatch, O'Brien & Gere, Sherwood Logan, Metcalf & Eddy and Malcolm Pirnie*

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WEDNESDAY—TECHNICAL SESSIONS

Room 201/202

9:30 am	Update on the Fullerton WFP Study: Pilot Results and Conceptual Design Criteria Stephen Gerlach—Gannett Fleming Jenna Manuszak—Malcolm Pirnie
10:00 am	Stage 2 D/DBP—What will it Ultimately Mean for Treatment and Water System Management George Budd, Ph.D.—Black & Veatch
10:30 am	Are Membranes the Right Fit for Everyone? Comparison of Low Pressure Membrane Products (Based on Case Study Experience) Korkud Egrican, PE.—CH2M Hill

Room 201/202 (cont'd)

11:00 am	Planning and Implementation of the Frederick P. Griffith, Jr. Water Treatment Plant in Northern Virginia Douglas G. Brinkman—Black & Veatch
1:30 pm	The Swimming River Pipeline: When Pipe is not Just Pipe Paul J. Paparella and Bryan Slota—Hatch Mott MacDonald Joseph Dugandzic—New Jersey American Water
2:00 pm	Town of Chincoteague In-Place Rehabilitation of 16-Inch Water Main Mike Cosby—Town of Chincoteague Andy Landrum—Whitman, Requardt & Associates, LLP
2:30 pm	Optimizing State-Wide Water Diversions During Drought Conditions in New Jersey Pam Kenel, John Dyksen, and Carlos Cuneo—Black & Veatch John Ulrich—Gannett Fleming
3:30 pm	Manganese—A Real World Water Treatment Nemesis George Budd, Ph.D. and Joseph Goodwill—Black & Veatch
4:00 pm	Innovative Strategies/Tools for Stage 2 D/DBP Rule for a Large City Harish Arora—Narasimhan Consulting Services Company
4:30 pm	New Elevated Water Storage for Growing Baltimore County Dominic Tiburzi and Luther Bathurst—Whitman, Requardt & Associates, LLP Michael Mazurek—Baltimore County Water Design Section

Room 203

9:30 am	The New Spin On VFD Replacement Grant Davies, Yasser Rizk, Paul Guiney, and Richard Adams—Metcalf & Eddy AECOM
10:00 am	Critical Owner-Performed Evaluation and Maintenance of Water Storage Tanks Christine Gunsaulus—Tank Industry Consultants
10:30 am	Sustainability for Water Quality Infrastructure: South Bethany Beach's Tidal Pump System Christopher L. Overcash, PE., BCEE and Timothy W. Wolfe, PE., BCEE—KCI Technologies, Inc. Ralph G. Dorval—Oceaneering International, Inc.
11:00 am	Application of Membrane Technologies for Surface Water, Ground Water, Brackish Water, Seawater and Wastewater Ben Movahed, PE., D.E.E.—Watek Engineering Corporation

Continued on page 20

WEDNESDAY, TECH. SESSIONS (cont'd)

Room 203 (cont'd)

- 1:30 pm **The Other Water Systems**
Pedro Ramirez, PE.—URS Corporation
- 2:00 pm **Navigating Allocation and Regulatory Issues for Water Reuse Initiatives**
Thomas Dumm—O'Brien & Gere
- 2:30 pm **Use of Reclaimed Wastewater Effluent for Air Quality Control for Anne Arundel County**
Thor Young—Stearns & Wheeler, LLC
Mike Bonk, Chris Phipps, and Ron Neugebauer—Anne Arundel Co.
Paul Miller and Dori Costa—Constellation Energy
- 3:30 pm **Challenges and Methodology for Implementing a Pretreatment Program**
Kristi Perri, Olga Miroshnikova, and Scott Crosswell—Stearns & Wheeler, LLC
George Skinner and Paul Visser—City of Aberdeen
- 4:00 pm **Solids Removal in Oil-Water Separators**
Vince Angermeier, Robert Wimmer, PE., Chris Riley—Johnson, Mirmiran, & Thompson (JMT)
- 4:30 pm **Restoring a Community: Stakeholder Perspectives Associated with a Joint Sewer & Stream Restoration Project**
Barry Lucas—DC WASA
Pam Kenel and Joe Mantua—Black & Veatch

Room 204

- 9:30 am **GIS: Making Sewershed Studies More Efficient**
Joe DeLuca and Jennifer Lishman—URS Corporation
- 10:00 am **City of Baltimore Base Sanitary Flow Model**
Michael A. Sevener, PE.—KCI Technologies, Inc.
- 10:30 am **Capacity Assessment: The Challenges of Assembling Reasonable Model Inventory for Baltimore City's Herring Run Sewershed Study**
Paul Sayan and Carlos Cuneo—Black & Veatch
- 11:00 am **The Future for CIPP—Better Design will Require Better QA/QC**
Henry R. Derr, PE.—Brown and Caldwell
- 1:30 pm **Tower of Poo: Increasing Operating Capacity of Pump Station through Forcemain with Multiple Connections and Varying Pressures**
Steven D. Schulz, PE.—Harford County DPW
- 2:00 pm **Sanipor Flood Grouting I/I Reduction Demonstration**
Andy Lukas, PE.—Brown and Caldwell
Csilla Pall—Sanipor
- 2:30 pm **Repair & Rehabilitation of the City of Baltimore's Southwest Diversion Pressure Sewer at Cherry Hill and Chesapeake Avenue**
Dave Smyth, PE.—Gannett Fleming, Inc.

3:30 pm

A Separate Piece: Removing Run-Off From DC WASA's Combined Sewers

Barry Lucas—DC WASA
Sandra Pavlovic and Robert Tuttle—Black & Veatch

4:00 pm

An Evaluation of Dry and Wet Weather Flow Characteristics within the WSSC Sanitary Sewer System

Srinivasa Gadiparthi, PE. and Charles Moore, PE.—CDM Corporation
Craig A. Fricke, PE. and Kenneth C. Dixon—WSSC

4:30 pm

Investigating I/I for a Small Diameter, Septic Tank Effluent Sewer System

Aaron Z. Hughes, Angela Essner and P. D. Huston—Greeley and Hansen
Karl Ott—Charles County Department of Utilities

Room 205/206

9:30 am

Using MBBRs to Meet ENR N Levels for Over 7 Years

Tom Wilson, James Castle, Kirsten Newnham and Chris-Pipe Martin—Earth Tech

10:00 am

The Moving Bed Process for Nitrogen Removal—Leveraging this Flexible Technology to Meet Your Specific Needs

James McQuarrie and Dimitrios Katehis—CH2M Hill

10:30 am

Planning and Membrane Equipment Selection for the 15 MGD Ballenger-McKinney ENR WWTP Expansion

Jeff Thompson and Dennis Hasson—Whitman, Requardt & Associates, LLP
Gary Weil and Anabela Fonseca—CH2M Hill
Kevin Demosky—Frederick County Division of Utilities and Solid Waste Management

11:00 am

Combining MBR Technology with Aesthetic Design Elements to Create a Futuristic Wastewater Treatment Facility

Peter Schuler, Paresh Sanghavi, John Bratby, Ray Williams, Kelly Comstock, and Rod Pope—Brown and Caldwell
Kun Suwanarpa and Paul Williams—Fulton County Dept. of Public Works

1:30 pm

Waste Biodiesel Glycerol 101: What You Need to Know About Purchasing, Handling and Utilizing Waste Glycerol as a Supplemental Carbon Source

Robert Wimmer, PE.—Johnson, Mirmiran & Thompson (JMT)
Kevin Selock Bill Burton and Sam Amad—WSSC
Charles Bott, PE. Ph.D.—Virginia Military Institute
Sudhir Murthy, PE. Ph.D.—DC WASA
Jeneva Hinojosa—George Washington University
Nick Cutting—Student, Virginia Military Institute

Room 205/206 (cont'd)

- 2:00 pm **Full-scale Piloting of Alternate Carbons (Glycerine) to Achieve ENR Goals at Parkway WWTP**
Kevin Selock and Bill Burton—WSSC
- 2:30 pm **External Carbon Pilot Testing for the 1.5 mgd Damascus WWTP ENR Upgrade**
Scott Crosswell, Rip Copithorn, and Brad Hice—Stearns & Wheeler, LLC
Tom Harshman, Paul Brennan, Sam Amad and Bob Buglass—WSSC
- 3:30 pm **Blue Plains Pilots Post Denitrification MBBR to Achieve Limit of Technology ENR Performance**
Marija Peric, Beverley Stinson, Edward Locke, Kathleen Kharkar, and Dilli Neupane—Metcalf & Eddy | AECOM
Sudhir Murthy, Walter Bailey, Salil Kharkar, Nicholas Passarelli, and Leonard Benson—DC WASA
- 4:00 pm **Supplemental Carbon Testing in a Biolac® System**
Kelly Spivey, E.I.T., Robert Wimmer, P.E., and Derek Morin, P.E.—Johnson, Mirmiran & Thompson (JMT)
Hans Medlarz, P.E.—Kent County Dept. of Public Works
- 4:30 pm **Enhanced Nutrient Removal at the Little Patuxent Water Reclamation Plant**
Lawrence H. Hentz, Jr., P.E.—PBS&J
Daniel L. Ward, P.E.—Howard County Bureau of Utilities
Rob Simm, P.E., Ph.D.—Stantec Consulting

THURSDAY, AUGUST 28TH, 2008

- 8:00 am–4:00 pm **Registration open** on the 2nd Floor of the Convention Center, at the top of the stairway.
- 8:00 am–12:30 pm **Exhibits open** in the Grand Ballroom of the Convention Center
- 8:00 am **Continental Breakfast** in the Grand Ballroom, sponsored by Stearns & Wheeler
- 9:00–10:30 am **Technical Sessions** in Rooms 201/202, 203, 204, & 205/206
- 10:00 am–5:00 pm **Operators Challenge** at the Convention Center Loading Dock, sponsored by JMT, RJN Group, KCI Technologies, WR&A LLC, Passaro Engineering LLC, Duke's Root Control Experts, Sprayroq, CES LLC, and ADS Environmental Services
- 10:30–11:00 am **Visit Exhibits/Break/Door Prize** in the Grand Ballroom, sponsored by Stearns & Wheeler
- 11:00 am–12:30 pm **Technical Sessions** in Rooms 201/202, 203, 204, & 205/206
- 12:30–1:30 pm **Operators Challenge Luncheon** at Convention Center Rear Patio
- 12:30–2:15 pm **CWEA Business Lunch** in Room 215. Vote for 2008–2009 Officers. Sponsored by PBS&J



Charles V. Weir
2007–2008 Treasurer

Charles V. Weir is the 2007–2008 Treasurer of the Water Environment Federation (WEF), an international organization of water quality professionals headquartered in Alexandria, Va.

He is currently General Manager of East Bay Dischargers Authority, a joint-powers public agency that provides wastewater treatment and disposal services to southern and eastern Alameda County, located on the east side of San Francisco Bay, Calif. With more than thirty years experience in the operation, maintenance and management of wastewater treatment systems, Chuck has also held positions with the City of Sunnyvale, Calif., State Water Resources Control Board, and the City of Riverside, Calif.

A WEF member since 1973, he has been a member of the Board of Trustees, House of Delegates and served as vice chair and chair of the Long Range Planning Committee. Chuck has served as editor of WEF's MOP OM-10, Activated Sludge manual.

He has also been an active member of the California Water Environment Association (CWEA) serving as president, treasurer, board member and chair of several CWEA committees including long range planning and operator training and technical certification.

A recipient of several WEF awards, including the prestigious WEF Service Award (1992 and 2000), Quarter Century Operators' Club (1999), and Arthur Sidney Bedell Award (2004), Chuck is a member of the Select Society of Sanitary Sludge Shovelers. A Grade V Wastewater Treatment Plant Operator in California, he has a B.S. in chemistry and biochemistry from the University of California and is a credentialed California Community College instructor.

- 12:30–2:15 pm **WWOA Business Lunch** in Room 207/208, sponsored by CH2MHILL
- 12:30–3:00 pm **CSAWWA Business Lunch & Town Hall Meeting** in Room 217
Vote for 2008–2009 Officers. Sponsored by Hazen & Sawyer
- 2:30–4:00 pm **Technical Sessions** in Rooms 203, 204, & 205/206
- 3:00–5:30 pm **Top Ops Competition** preliminaries and finals in Rooms 201/202, sponsored by Kelso Solutions
- 4:00–4:30 pm **Break** in lobby outside Technical Session Rooms
- 4:30–5:30 pm **Technical Sessions** in Rooms 203, 204, & 205/206
- 5:45 pm **Awards Ceremony** in Rooms 201/202/203
Awards Reception follows in Ballrooms 2 & 3, sponsored by Greeley & Hansen and Brown & Caldwell
- 9:00–11:30 pm **Chair/Presidents' Reception** at The Grand Hotel. Invitation only.

Continued on page 22



Dean Fritzke

**Vice-President (2008–2010)
American Water Works Association**

Dean Fritzke joined AWWA in 1989, and currently serves as Vice-President, and Director for the Pacific Northwest Section on the Board of Directors and the Executive Committee. He is a member of the Emerging Issues in Water

Quality Committee, Diversity and Member Involvement Board standing committee, and serves on the Ad Hoc Committee on Association/Section Relations.

Dean has been the Oregon-Idaho subsection trustee, and chair, as well as past chair of the Pacific Northwest Section. He has also chaired the Subsection Advisory Council, Education and Certification, and Conference Program committees. He currently works on the Web Site Advisory, Water Quality, and Past Chairs Committees of the section. He was Northwest Oregon Subsection officer from 1992–1996 and received the Subsection Advisory Council Activities Award in 1998. In 2006, Dean was the recipient of the George Warren Fuller Award.

Dean, who attended Oregon College of Education and Portland Community College, has been a member of the Oregon Environmental Services Advisory Council since 2000, chairing it for four years, and currently serving as vice-chair. Dean is the Water Quality Coordinator for the Tualatin Valley Water District in Beaverton, Oregon.

Dean and his wife Leslie live in Portland, Oregon.

THURSDAY—TECHNICAL SESSIONS

Room 201/202

- | | |
|----------|---|
| 9:00 am | Fast Paced Water Treatment Plant Design-Build
Daniel String and Jared Wray—Green Stone Engineering
Jeremy Kalmbacher—Tidewater Utilities, Inc. |
| 9:30 am | Maintaining Operations at a Major Water Treatment Plant During Extensive Process Improvements
Mathew R. Roder, P.E. and Brian M. Balchunas, P.E. B.C.E.E.—PBS&J
Joseph D. Johnson and D. Michael Vitagliano—WSSC |
| 10:00 am | Managing Risk in the Design and Construction of a Large Water Transmission Tunnel
Douglas G. Brinkman and Bob Goodfellow, P.E.—Black & Veatch |
| 11:00 am | A New Perspective on an Old Idea for Water System Improvements
Henry R. Derr, P.E.—Brown and Caldwell |
| 11:30 am | Large-Diameter Pipeline Assessment Program: A Key Component of Managing Your Transmission Main Assets
Ahmad Habibian, Ph.D., P.E.—Black & Veatch |

Room 201/202 (cont'd)

- | | |
|---------|---|
| Noon | An Asset Management Strategy for Large Diameter Water Transmission
Mike Garaci—Pressure Pipe Inspection Company |
| 2:30 pm | Fate of PBDEs in Biosolids and Soil from Commercial Farms that Receive Biosolids Application
Nataasha Almeida Andrade—Student, University of Maryland |
| 3:00 pm | TOP OPS |
- ### Room 203
- | | |
|----------|--|
| 9:00 am | A Comprehensive Sewer Strategic Plan for Anne Arundel County—Tools and Results
Laurens van der Tak, Cheri Salas, and Andrew Hu—CH2M Hill
George Albright, Christopher Murphy—Anne Arundel County |
| 9:30 am | Standardizing Sanitary Sewer Assessment
Robert Jacobsen, P.E.—KCI Technologies, Inc.
Christopher Patakis, P.E.—Camp, Dresser & McKee, Inc. |
| 10:00 am | Master Planning “Plus”: Utility Master Planning Built upon the Principles of Asset Management
Gage Muckleroy and Mert Muftugil—Stearns & Wheler, LLC
Duncan Rose—GHD Consulting, Inc.
Thais Vitagliano and Craig Fricke—WSSC |
| 11:00 am | Evaluation of Particle Retention by Nutrient Separating Baffle Box
Daniel P Smith, Ph.D., P.E.—Applied Environmental Technology |
| 11:30 am | Ensuring Sustainability Using an Environmental Management System
James J. Newton, P.E., BCEE—Kent Co. Dept. of Public Works |
| Noon | Maximizing the Benefits of Nutrient Trading in the Chesapeake Bay Watershed
Cy Jones, Dan Nees, Mindy Selman, and Evan Branosky—World Resources Institute |
| 2:30 pm | Sharp Division in the Wastewater Industry Over the “No Sludge Left Behind” Act
Alan L. Will, P.E. and Robert F. Wimmer, P.E.—Johnson, Mirmiran & Thompson (JMT) |
| 3:00 pm | Unique Challenges of a Pipe-in-a-Pipe Solution for Residuals Conveyance at Washington Aqueduct
Jennifer Armstrong and Jolelle Gascon—CH2M Hill
Patty Gamby—Washington Aqueduct |
| 3:30 pm | Update on 2-Phase AG Anaerobic Digestion—2008
Tom Wilson and Lee Potts—Earth Tech
Rudy Killan—Carollo Engineers |

Room 203 (cont'd)

- 4:30 pm ***Pilot Testing, Design and Operation of an Innovative Biosolids Dewatering Process***
Peter Schuler, Paresh Sanghavi, and Tiffany Shaw—Brown and Caldwell
Walter Gottschalk—Orange Water and Sewer Authority (OWASA)
Merat Zarrei—DeKalb County Dept. of Watershed
- 5:00 pm ***Energy Markets Foster Innovative Biosolids Management Options***
Jay Surti, PE., Dimitrios Katehis, Ph.D., PE., and Todd Williams, PE.—CH2M Hill

Room 204

- 9:00 am ***Sewer Sleuthing***
John Blondell, PE.—Century Engineering
Laurie Terry, PE.—RJN Group
- 9:30 am ***Installation of New Pumps to Achieve Major Energy Savings at the Anacostia II WWPS***
Rob Taylor, Stan Talbot, and Kevin Selock—WSSC
John Hendricks—Constellation Energy
Tom Fink—KCI Technologies
- 10:00 am ***Operational Experience with First Biogest Wet-Weather Storage System in the United States***
Rick Carrier—Brown and Caldwell
Stuart Rosenberger—Charlotte-Mecklenburg Utilities
- 11:00 am ***Pump Station Criticality Model and CIP Development***
David J. Ihde, PE.—City of Virginia Beach, Department of Public Utilities
Timothy M. O'Brien, Ph.D. and Ricardo Campos—Brown and Caldwell
- 11:30 am ***Collection Systems: An Innovative Approach to Hydraulic Modeling for Reducing Inflow and Infiltration***
Laura Siemers, and David Kerr, PE., BCEE—Stearns & Wheeler, LLC
James Webber, PE. and Mark Yoder, PE.—Allegany County Utilities Division (ACUD), Allegany County, MD
- Noon ***Hydraulic Modeling for Cost-Effective Solutions to Improve Collection Systems***
Celina Perez, EIT and Marcus Williams—URS Corporation
- 2:30 pm ***Visualizing Sewer Planning Information-An Easily-Implemented Approach to Wastewater Decision Support***
L. Burton Curry, PE.—Johnson, Mirmiran & Thompson (JMT)
Elinor Blackwell, PE.—New Castle County
- 3:00 pm ***WaterISAC: Geographic Analysis of Water Security Incidents***
Susan Trampusch—WaterISAC

Room 204 (cont'd)

- 3:30 pm ***SCADA and Control System Cyber Security for Water and Waste-Water***
Jacob Brodsky, PE. and Anthony W. McConnell, PE.—WSSC
- 4:30 pm ***Odor Control at the Elkton Wastewater Treatment Plant***
Kelvin George, PE.—Stearns & Wheeler, LLC
- 5:00 pm ***First Moment Delay (FMD) of RDII—An Approach to Effective Time of Concentration of RDII in Sanitary Sewers***
Masatugu Takamatsu, Ph.D., PE. and L. Burton Curry, PE.—Johnson, Mirmiran & Thompson (JMT)
Srinivasan Rangarajan, Ph.D., PE.—HydroQual

Room 205/206

- 9:00 am ***Back River WWTP Enhanced Nutrient Removal***
Dale Emerson, PE. and Per Struck, PE.—Whitman, Requardt and Associates
Beverly Stinson, Ph.D.—Metcalf & Eddy
- 9:30 am ***Construction Coordination at Patapsco WWTP—(Ten Pounds of Sugar in a Five Pound Bag)***
Jaswant Dhupar, PE.—Baltimore DPW Division of Water and Wastewater Engineering
Gurminder Singh, Baltimore DPW Wastewater Facilities Engineering
Alan L. Will, PE.—Johnson, Mirmiran & Thompson (JMT)
- 10:00 am ***Analysis of Large-Scale Operating Ballasted Flocculation Systems***
Lawrence P. Jaworski—Black & Veatch
- 11:00 am ***Quantifying Sustainability Through Carbon-footprinting of Alternative Enhanced Nutrient Removal Technologies***
Dimitrios Katehis, Ph.D., PE., Scott Weikert, PE., and John Fountas, PE.—CH2M Hill
- 11:30 am ***Full-Scale Performance Testing and Optimization of an Old-School Process with Limit of Technology Nutrient Removal Capabilities***
Kevin Frank and Grant Davies—Metcalf & Eddy
Nick Shirodkar and Alan Sauvageau—WSSC
- Noon ***Startup of Indian Head Enhanced Nutrient Removal Wastewater Treatment Facility***
Vince Maillard and Akshay Kumar—Stearns & Wheeler
- 2:30 pm ***Full-Scale Side by Side Comparison of Coarse and Fine Bubble Aeration in a High Rate Activated Sludge System***
Kevin Frank and Grant Davies—Metcalf & Eddy
Nick Shirodkar and Alan Sauvageau—WSSC
- 3:00 pm ***Passive Nitrogen Removal for Decentralized Wastewater Treatment***
Daniel P. Smith, Ph.D., PE.—Applied Environmental Technology

Continued on page 24

THURSDAY, TECH. SESSIONS (cont'd)

Room 205/206 (cont'd)

- 3:30 pm ***A Pilot Wastewater Treatment Plant Shows the Way Towards Protecting the Coral Reefs Surrounding a Caribbean Island***
Don Jacobs, PE.—WSSC (Retired)
Yanjin Liu, PhD—American Water
Eldon Gemmill, B.A., M.S.—DEPRM (Retired)
- 4:30 pm ***Process Impacts and Economic Evaluation of Struvite Recovery from Dewatering Centrate at HRSD's Nansemond WWTP***
Ahren Britton—Ostara Nutrient Recovery Technologies Inc.
Bill Balser—HRSD
Laurissa Cubbage—Hazen and Sawyer
- 5:00 pm ***Determining the Right Level of Model Complexity and Calibration when Evaluating a Three-Sludge System for Enhanced Nutrient Removal***
Kevin Frank—Metcalf & Eddy
John Copp—Primodal, Inc.
Spencer Snowling—Hydromantis, Inc.
Nick Shirodkar—WSSC

FRIDAY, AUGUST 29TH, 2008

- 8:00–9:30 am **Registration open** on the 2nd Floor of the Convention Center, at the top of the stairway.
- 8:30 am **Continental Breakfast** outside Technical Session Rooms, *sponsored by Dutchland, Inc.*
- 9:30–11:30 am **Technical Sessions** in Rooms 201/202, 203, 204, 205/206
- 11:30 am **Conference adjourns/Final Door Prize** in hallway outside Technical Session Rooms
- Noon–2:00 pm **CSAWWA Lunch Board Meeting** in Room 210
- Noon–2:00 pm **CWEA Lunch Board Meeting** in Room 213
- Noon–2:00 pm **WWOA Lunch Board Meeting** in Room 214

FRIDAY—TECHNICAL SESSIONS:

Room 201/202

- 9:30 am ***Improving the Lives of Dominicans in El Copey—Construction of a Gravity-Fed Water System***
Melissa Gagnier—Black & Veatch
- 10:00 am ***Horizontal Directional Drilling with Ductile Iron Pipe***
Dennis J. McClain—Ductile Iron Pipe Research Associates
- 10:30 am ***Trenchless Renewal of Potable Water Mains—Changing Perceptions and Practices***
Marty Mazzella—InsituformBlue
- 11:00 am ***Case Studies of Five Full-Scale UV-Oxidation Systems for Taste and Odor Treatment and Disinfection***
Michael Leach, Adam Festger, Alan Royce and Christian Williamson—Trojan Technologies

Room 203

- 9:30 am ***Countywide Onsite Sewage Disposal System (OSDS) Characterization and Selection of Appropriate Centralized or Distributed Treatment Options for Anne Arundel County, Maryland***
Laurens van der Tak and Brian G. Marengo, PE.—CH2M Hill
Thor A. Young—Stearns and Wheler, LLC
Blaine Weitzel, PE.—Harms & Associates
Chris Murphy, PE. and Chris Phipps, PE.—Anne Arundel County Dept. of Public Works
- 10:00 am ***The Housing Boom/Bust Cycle: How It Affects Municipalities and the Infrastructure Funding Gap***
Carrie A. DeSimone and Jeffrey A. Flairty—CABE Associates, Inc.
- 10:30 am ***Living the WSSC Core Strategies Through Cross-Training in the Customer Relations Group***
Jacqueline Y. Barry—WSSC
- 11:00 am ***The Baltimore City Consent Decree Implementation***
Carlos A. Espinosa, PE.—KCI Technologies, Inc.
Wazir Qadri—Baltimore City Department of Public Works
Mike Marsjanik, PE.—EA Engineering, Science, and Technology

Room 204

- 9:30 am ***Impact of Exposed Sewer Components on Natural Streams***
Edward Carpenetti and Jagdeep Singh—URS Corporation
- 10:00 am ***Don't Just Do It! Hagerstown, MD Makes the Most of the CMOM Process***
Teresa DiGenova, Robert Rectanus, and Philip Hannan—Black & Veatch
Donnie Barton—City of Hagerstown, MD
- 10:30 am ***PACP—No Panacea! How to Make Sure You Get What You Paid For***
Wazir Qadri—City of Baltimore
Derek L. Morin, PE., and Crystalann M. Deardorff, PE.—Johnson, Mirmiran & Thompson (JMT)
- 11:00 am ***Using Technology to Streamline the SSES Data Collection & Analysis Process***
Nathan Atkinson, PE. and Alejandro Galvis-Sterling, EIT—URS Corporation

Rooms 205/206

- 9:30 am ***Design Considerations for Upgrading POTWs to treat Power Plant Waste Discharges***
Hong Yin and Brian Aylaian—Metcalf & Eddy | AECOM

Rooms 205/206 (cont'd)

10:00 am

Swan Point Wastewater Pumping, Water Reclamation Facilities, Parallel Force Mains, and Existing Outfall Modifications

Kelly C. Duffy, P.E. and Robert J. Andryszak, P.E.—RK&K Engineers, LLP

10:30 am

North Coastal Planning Area Wastewater Treatment and Disposal Alternatives Analysis

Michael A. Izzo—Sussex County Engineering Department

11:00 am

Dennis J. Hasson and Kimberly D. Six—Whitman, Requardt, and Associates, LLP (WR&A)

Thor A. Young—Stearns and Wheler, LLC

Small Town Upgrades WWTP to Meet Requirements of Chesapeake Bay Agreement

Erica Latker and Pavol Plecenik—Parkson Corp.

Chris Derbyshire—GMB

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— Conference At-A-Glance —

TUESDAY, August 26 th	WEDNESDAY, August 27 th		THURSDAY, August 28 th		FRIDAY, August 29 th
GOLF AND AWARDS Ocean City Golf Club Berlin, MD 8 AM check-in, 9 AM start	PRESIDENTS'/CHAIRS' BREAKFAST Grand Hotel 7:30 - 9 AM (by invitation)	BREAK/VISIT EXHIBITS Grand Ballroom 11:30 - Noon	REGISTRATION 2 nd Floor, Top of Stairway 8 AM - 4 PM	WWOA BUSINESS LUNCHEON Rooms 207-208 12:30 - 2:15 PM	REGISTRATION 2 nd Floor, Top of Stairway 8 - 9:30 AM
CLAY TARGET SHOOT Synepuxent Rod & Gun Club Libertytown, MD 10 AM - 12:30 PM	WFP FUN-RUN/WALK Grand Hotel, Boardwalk 7:30 - 9 AM	COMMITTEE FEST Food/Drinks/Door Prizes Room 215 Noon - 1:15 PM	EXHIBITS OPEN Grand Ballroom 8 AM - 12:30 PM	CSAWWA LUNCHEON/ TOWN MEETING Room 217 12:30 - 3 PM	CONTINENTAL BREAKFAST Outside Rooms 201-206 8 AM
EXHIBITOR PACKAGE PICKUP Btwn. Rms. 208-209 10 AM - 3 PM	REGISTRATION 2 nd Floor, Top of Stairway 8:30 AM - 4 PM	TECHNICAL SESSIONS Rooms 201-206 1:30 - 3 PM	CONTINENTAL BREAKFAST Grand Ballroom 8 AM	TOP OPS Rooms 201-202 3 - 5:30 PM	TECHNICAL SESSIONS Rooms 201-206 9:30 - 11:30 AM
EXHIBITOR SETUP Grand Ballroom 10 AM - 5 PM	EXHIBITS OPEN Grand Ballroom 8:30 AM - 6 PM	OPS CHALLENGE (Classroom/Lab) Room 217 1:30 - 5 PM	TECHNICAL SESSIONS Rooms 201-206 9 - 10:30 AM	TECHNICAL SESSIONS Rooms 203-206 2:30 - 4 PM	ADJOURNMENT/DOOR PRIZE - Registration Desk 11:30 AM
PRE-CONFERENCE LUNCHEON Room 214 11:30 AM - 1 PM	CONTINENTAL BREAKFAST Grand Ballroom 8:30 AM	BREAK/VISIT EXHIBITS Grand Ballroom 3 - 3:30 PM	OPS CHALLENGE Loading Dock 10 AM - 5 PM	BREAK/DOOR PRIZE Outside Rooms 203-206 4 - 4:30 PM	CWEA BOARD MTG./LUNCHEON Room 213 Noon - 2 PM
REGISTRATION 2 nd Floor, Top of Stairway Noon - 6 PM	BIOSOLIDS BEAUTY CONTEST CWEA Table outside of Grand Ballroom 9 AM - 1 PM	TECHNICAL SESSIONS Rooms 201-206 3:30 - 5 PM	BREAK/VISIT EXHIBITS Grand Ballroom 10:30 - 11 AM	TECHNICAL SESSIONS Rooms 203-206 4:30 - 5:30 PM	WWOA BOARD MTG./LUNCHEON Room 214 Noon - 2 PM
PRE-CONFERENCE <i>Sustainability and Infrastructure</i> Room 204 1 - 4:30 PM	TECHNICAL SESSIONS Rooms 201-206 9:30 - 11:30 AM	PIPE CUTTING SHOOTOUT Room 208 5 - 6 PM	TECHNICAL SESSIONS Rooms 201-206 11 AM - 12:30 PM	AWARDS CEREMONY Rooms 201-203 5:45 PM	CSAWWA BOARD MTG./LUNCHEON Room 210 Noon - 2 PM
OPENING SESSION Rooms 201/202/203 4:30 - 6:30 PM	WFP SILENT AUCTION Tables outside of Grand Ballroom 10 AM - 4:30 PM	MEET & GREET Grand Ballroom 5 - 6 PM	OPS CHALLENGE LUNCHEON Rear Patio 12:30 - 1:30 PM	AWARDS RECEPTION Ballrooms 2 & 3 Following Awards Ceremony	
EARLY BIRD RECEPTION Grand Ballroom 6 - 8 PM	OPS CHALLENGE ORIENTATION Room 217 11 AM - Noon	FUN NIGHT! Seacret's 7 - 11 PM	CWEA BUSINESS LUNCHEON Room 215 12:30 - 2:15 PM	PRESIDENTS'/CHAIRS' RECEPTION Grand Hotel 9 - 11:30 pm (by invitation)	

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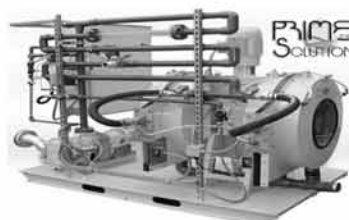
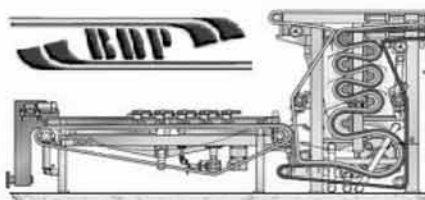
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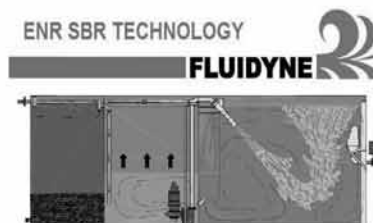
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DCWASA Research Project Progress Report and Summary

Title: Multiobjective optimization models for distributing biosolids to reuse fields

Date: February 11, 2008

Main Contact: Dr. Steven A. Gabriel

Abstract

DCWASA produces approximately 1200 tons of biosolids daily. These biosolids are then distributed to reuse fields in Virginia and Maryland. Although carefully regulated by EPA to protect the environment and lessen impacts to humans, biosolids' potential malodor can generate adverse affect to the local population. In some cases, the local population has made efforts to ban biosolids recycling programs due to its odor impact. In this research multi-objective optimization models were developed to minimize biosolids odor, and thus decrease the risk of banning of biosolids recycling programs. In particular, these models find tradeoffs between biosolids odor and their treatment as well as distribution costs. Biosolids managers can then use optimal wastewater treatment and biosolids distribution strategies associated with these tradeoffs to produce least odorous biosolids at minimal cost.

Summary of Work to Date:

In research efforts funded by DC Water and Sewer Authority (DCWASA), Dr. Gabriel and Dr. Sahakij, in consultation with Chris Peot and Mark Ramirez of DCWASA, have built multiobjective optimization [1] models to determine optimal levels of processing and distribution variables for balancing the resultant odor and costs, the details of which are described in [2, 4, 5, 6]. Typical daily variables include: the amount of lime used at DCWASA, the percent of flow from the blend tank to the on-site contractor, and the amount of biosolids applied to each field site by specific contractors, to name just a few.

One of the more interesting results from [2] is the determination of the Pareto optimal curve [1] for biosolids odor and costs. This curve corresponds to levels of all the decision variables that minimize both odor and costs. That is to say, a step away from one of these

Pareto optimal solutions to improve one of the objectives must necessarily worsen the other objective. Based on early work in [2], the approximation to this curve as computed from the model is shown below in Figure 1 in which three cases were considered; see [2] for a description of these cases.

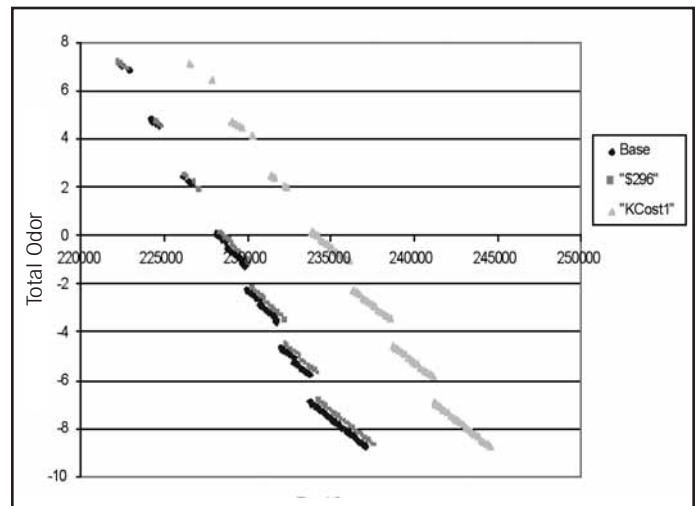


Figure 1: Approximation of the Pareto Optimal Set from [4]

It is interesting to note that:

1. the curve is not continuous due to integrality constraints imposed by the model
2. the curve has collections of points (for each case) that are roughly linear
3. overall, all the points for a particular case are approximately linear.

In [2], linear regressions were run for each case to determine the equation of the Pareto curve. These regressions produced statistically significant coefficients and the models had extremely high (adjusted) R^2 values indicating reasonable approximations to the odor-cost relationship. An example for the Base Case is shown below in Figure 2 with the resulting equation being estimated as

$$\text{Total Odor} = -0.0011(\text{Total Cost}) + 257.5 \quad (1)$$

Continued on page 30

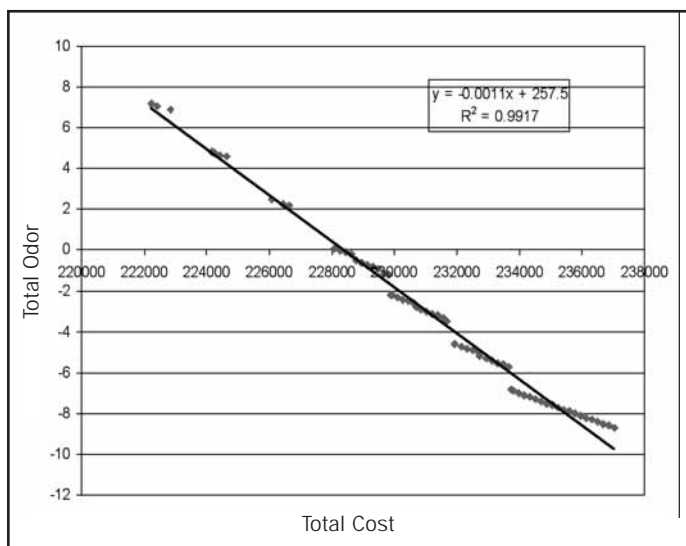


Figure 2: Regression for the Approximation of the Pareto Optimal Set, Base Case

From these equations, to reduce the odor by one index point, it is necessary to pay on average $\frac{1}{0.0011} = \$909$ for the Base Case. As described in [4], for the other two cases, “\$296” and “KCost1” cases, the cost per reduction of odor by one point was $\frac{1}{0.0011} = \$909$, and $\frac{1}{0.0009} = \$1,111$, respectively. This is important information for wastewater management since it allows them to more accurately estimate the cost of improving odor levels and respond proactively to complaints from constituents.

To determine each point on this curve, a separate optimization problem needs to be run, some times requiring about 30 minutes of computational time for a three-day model time horizon, 40 reuse fields, and three contractors. It is desirable from a management point of view to include a longer time period (e.g., one week) and more fields (out of a total of about 3,000).

To improve its practicability, later in [5], the optimization model in [2] was modified to include a longer time period (30 days) and more reuse fields (782 fields). In addition, some constraints appearing in [2] were removed and/or modified, while some were added. Another change also included the modification of the odor threshold calculations. Figure 3 shows the approximation of the Pareto optimal set obtained from [4].

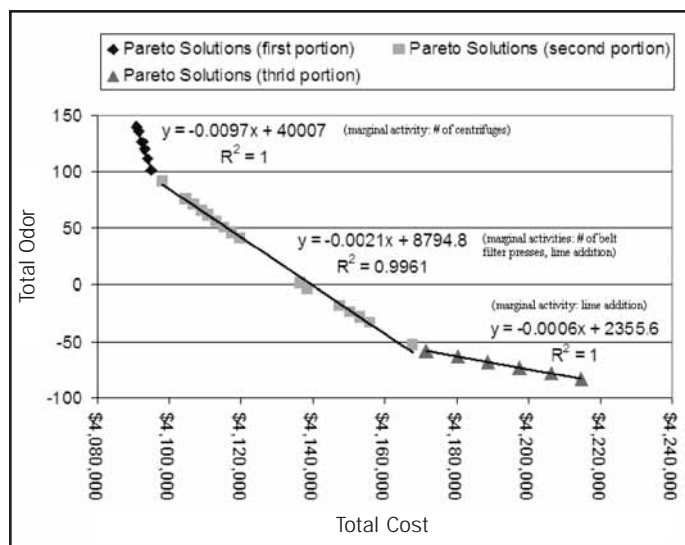


Figure 3: Approximation to the Pareto Optimal Set from [4]

As indicated, the Pareto optimal set can be divided into three portions each associated with marginal activities and a linear equation for total odors as a function of total costs. Further analysis found that, to reduce the odor by one index point, one needed to pay on average $1/0.0097 = \$103$, $1/0.0021 = \$476$, and $1/0.0006 = \$1,667$, respectively when at the first (top left corner), second, and third portions of Pareto optimal curve. Next, in order to validate the model, we fixed values of decision variables corresponding to historical data and reran the model (DCWASA Case). Figure 4 shows the result.

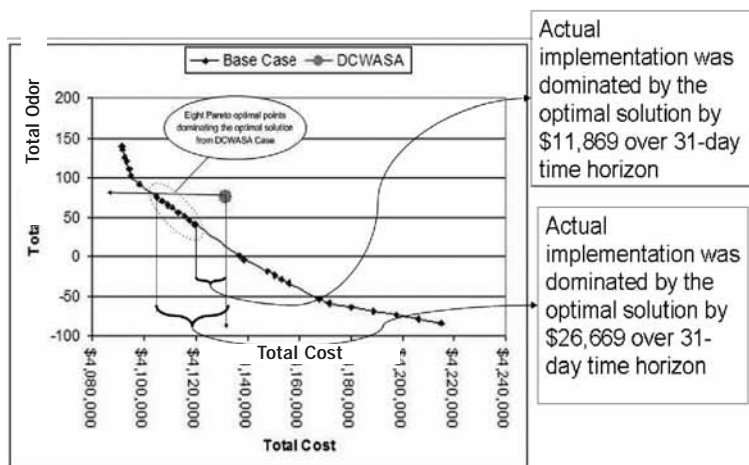


Figure 4: DCWASA Case VS Base Case

As indicated, the total cost from using the historical data was higher than eight of the Pareto optimal points to the “southwest” of this point. Southwest here means that either cost and/or odor was lower and thus these

points dominate the DCWASA case. From a cost perspective, moving to one of these Pareto points by a combination of adjusting lime additions, number of centrifuges, etc., would have resulted in costs reduction between \$11,869 and \$26,669 over a 31-day time frame. In addition, the total odors for this same time frame would have decreased by 0.56 to 35.34 odor index points.

We also performed several sensitivity analyses as described in [5, 6]. Varying the odor threshold input for our optimization model was one of the sensitivity analyses we performed. More specifically, two sets of odor thresholds were used: odor threshold when wind directions were taken into account for the threshold calculation and odor threshold when wind directions weren't taken into account for the threshold calculation (see [5]). Nevertheless, the analysis did not yield an obvious conclusion for the differences in optimal solutions obtained from the two setups. We had anticipated that how the wind directions were taken into account for the threshold calculation contributed greatly to the optimal solutions (also commented by one of the dissertation committees for [5]). The new approach to take wind directions into account for odor threshold calculation is considered and included in the proposed work. With this in mind, we next summarize the result from another sensitivity analysis.

One of the more interesting sensitivity analyses was when we varied the percentage flow from the blend tank to DCWASA (F_d^{dc}), given DCWASA dewatering costs (DCD) = \$70, \$80, or \$90 per dry ton solids. (The model considered flow to DCWASA as well as to an on-site contractor consistent with the conditions present when model development was started and still reasonable for the current conditions.) The most interesting result was when DCD = \$70/dry ton solids, where Pareto optimal points corresponded to when $F_d^{dc} \in \{0.2, 0.3, 0.9\}$. In contrast, when DCD = \$80 or \$90 per DTS, all Pareto optimal points always corresponded to when $F_d^{dc} = 0.2$. Since the dewatering percentage can vary greatly by the dewatering cost used, this result suggests that exogenously determining F_d^{dc} may not be sufficient. This led us to our next analysis where F_d^{dc} was endogenously determined.

Due to its larger feasible region, the model where F_d^{dc} was endogenously determined provided Pareto optimal set that was more cost-efficient than the one where F_d^{dc} was exogenously determined, however with added computational difficulties. More specifically, the model became a bilinear, non-convex program due to the product of the lime additions (L_d^{dc}) and percentage flow vari-

ables (F_d^{dc}) appearing in the modified objective function. The approximation of the bilinear term was achieved using Schur's decomposition and SOS of type 2 (SOS2) variables [7]. Through transformations, the resulting model was a larger linear mixed-integer binary program and much more computationally challenging to solve but with a gain in model insights. In fact, the resulting model was too large to solve to optimality within a reasonable time limit (12 hours). However, by making use of Dantzig-Wolfe decomposition technique [3], we were able to break down a large problem into several smaller sub-problems and one master problem coordinating those small problems. Consequently, we were able to solve this large problem and obtained eight Pareto points as shown in Figure 5.

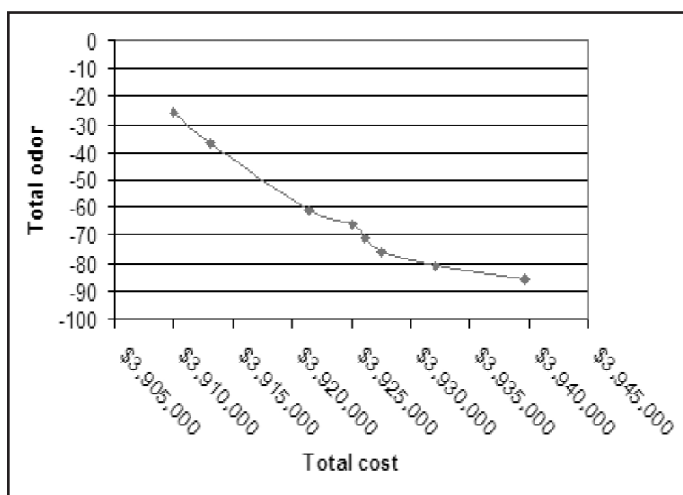


Figure 5: Approximation of Pareto optimal set when was endogenously determined

Our analysis showed that optimal F_d^{dc} were in $\{1, 0.92, 0.14\}$ with further explanation as follows. The choice of optimal F_d^{dc} relates directly to F_d^k where, on each day, the sum of flows to DCWASA and the on-site contractor must equal one. F_d^{dc} equaling one corresponds to when the on-site contractor belt filter presses and centrifuges were not needed in odor reduction (i.e., no flow to the on-site contractor or $F_d^k = 0$). F_d^{dc} equaled 0.92 or, $F_d^k = 0.08$ when only the on-site contractor centrifuges were needed for odor reduction. However, in order to have at least one centrifuge in service, at least eight percent of the flow must be assigned to the on-site contractor ($F_d^k = 0.08$). These restrictions come from the dewatering capacity of the on-site contractor belt filter press. Lastly, $F_d^{dc} = 0.14$ or, $F_d^k = 0.86$ happened when all of the available on-site contractor belt filter presses and

Continued on page 32

DCWASA Research Project

Continued from page 31

centrifuges were needed for odor reduction. Hence, the flow was assigned to the on-site contractor at their full capacity.

Publications to Date:

1. P. Sahakij, S.A. Gabriel, M. Ramirez, and C. Peot (2007). "A multi-objective optimization model for processing and distributing biosolids to reuse fields." Proc., 12th European biosolids and organic resources conference, Aqua Enviro, Wakefield, UK.
2. P. Sahakij, S.A. Gabriel, M. Ramirez, C. Peot, "Multi-objective Optimization Models for Distributing Biosolids to Reuse Fields: A Case Study for the Blue Plains Wastewater Treatment Plant," December 2007, ASCE Journal of Environmental Engineering, in review.
3. P. Sahakij, "Multi-objective optimization modeling of biosolids odors and costs at a wastewater treatment plant." Proc., INFORMS annual meeting 2005, San Francisco, CA.
4. S.A. Gabriel, P. Sahakij, M. Ramirez, C. Peot, 2007. "A Multiobjective Optimization Model for Processing and Distributing Biosolids to Reuse Fields," *Journal of the Operational Research Society*, 58, 850-864.
5. S. A. Gabriel, R. Garcia-Bertrand, P. Sahakij, A. Conejo. 2006. "A Practical Approach in Approximating Bilinear Functions in Mathematical Programming Problems by Using Schur's Decomposition and SOS Type 2 Variables," *Journal of the Operational Research Society*, 57, 995-1004.

References

- [1] J. L. Cohon, 1978. *Multiobjective Programming and Planning*, Academic Press, New York.
- [2] S.A. Gabriel, P. Sahakij, M. Ramirez, C. Peot, (2007) "A Multiobjective Optimization Model for Processing and Distributing Biosolids to Reuse Fields," *Journal of the Operational Research Society*, 58, 850-864.
- [3] A.J. Conejo, E. Castillo, R. Mínguez, and R. Garcia-Bertrand. 2006. *Decomposition Techniques in Mathematical Programming. Engineering and Science Applications*, Springer, Berlin.
- [4] P. Sahakij, S.A. Gabriel, M. Ramirez, and C. Peot (2007). "A multi-objective optimization model for processing and distributing biosolids to reuse fields." Proc., 12th European biosolids and organic resources conference, Aqua Enviro, Wakefield, UK.
- [5] P. Sahakij (2008). "Multiobjective optimization models for distributing biosolids to reuse fields." Ph.D. Thesis, Department of Civil and Environmental Engineering, University of Maryland, College Park, MD.
- [6] P. Sahakij, S.A. Gabriel, M. Ramirez, C. Peot, "Multi-objective Optimization Models for Distributing Biosolids to Reuse Fields: A Case Study for the Blue Plains Wastewater Treatment Plant," December 2007, *ASCE Journal of Environmental Engineering*, in review.
- [7] S.A. Gabriel, R.G. Bertrand, P. Sahakij, and A.J. Conejo (2006). "A practical approach to approximate bilinear functions in mathematical programming problems by using Schurs decomposition and SOS type 2 variables." *Journal of the Operational Research Society*, 57: 995-1004.

¹This model and the project work constitute part of the Ph.D. requirements for Dr. Sahakij.

CWEA President Message

Continued from page 3

WEF/MA relationships. CWEA was a recent partner with WEF on the very successful Sustainability Conference at the new National Harbor. I know I have probably left some committees out of this list, and to them I apologize. But please know that your efforts on behalf of CWEA are greatly appreciated. As one of the goals I put forward last year, the efforts of these committees have put CWEA's name in the spotlight. I am sure Aaron Nelson, incoming president, will continue to tell our story to the public and to other water and wastewater profes-

sionals. I know you will join me in wishing Aaron well in his term as CWEA President.

I would like to thank all of you for the opportunity to serve as your President during the past year. It has been a most excellent adventure. Destiny seems to be calling me to next serve as your most recent living past president.

I hope to see many of you at the Tri-Association Conference.

In all affairs it's a healthy thing now and then to hang a question mark on the things you have long taken for granted. – Bertrand Russell (1872–1970)

WWOA President Message

Continued from page 3

many of our committees are committees of one person. Lend a hand, support our incoming President, Lewis Schmidt and the rest of the Executive Board, the Section Boards and all of the various committees set up to provide services to you, the members.

Thanks again for making this a year I'll never forget. Keep in touch. My email is dpotter@metcom.org and my phone number is 1-800 oh wait, I can't give that one out...

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Plant Profile: Salisbury WWTP

—By Chip Wood, Ecoletter Staff

Are you looking for an innovative and unique process for achieving Maryland's BNR and ENR treatment goals? You will find such a creation at the Salisbury WWTP. Founded in 1732, the port of Salisbury, located at the head of the navigable Wicomico River, became a gateway to colonists seeking more land for homesteading. This waterway flowing to the Chesapeake Bay was the sole means of transportation and communication for many early Maryland settlers. Salisbury is the largest city on the Eastern Shore of Maryland and is known as the "Crossroads of Delmarva."



Lime Silo with Primary Clarifier on Right and Oxidic Filter on Left

The Salisbury WWTP serves a total population of about 25,000, including the city itself plus some areas in surrounding Wicomico County. Current average daily flow is about 5 MGD. At times 40 per cent of the influent flow can be high-strength BOD and suspended solids waste from commercial and industrial customers, so the plant process must be designed with flexibility to accommodate widely varying influent waste loadings and flowrates.

Prior to 1955, the city wastewater treatment was raw discharge. In 1955 a new 2.3 MGD secondary plant went into operation, consisting of a single train of primary clarifier, two-stage trickling filter, secondary clarifier, chlorine disinfection and anaerobic sludge digestion. In 1971, a second two-stage train and a primary digester were added to increase the capacity to 6.8 MGD. Phosphorus removal was added in 1988 using chemical addition of ferric chloride and polymer to the primary clarifiers.



Primary Clarifier with 3 Storage Tanks for Ferric Chloride and Polymer

In 1995, a 0.5 MGD pilot plant was started to test fixed media for BNR process. In 1997, a full-scale 1-MGD demonstration plant was constructed. Two of the four existing trickling filters were retrofitted. With one trickling filter, the rock media was removed and replaced with plastic media, which was then flooded with water to make an anoxic zone for denitrification. A second trickling filter was made deeper and filled with random-dump plastic media that has four times the surface area of rock media and has 95 per cent void space. Air fills the void space and thus exposes the liquid undergoing treatment to oxygen transfer. After achieving successful pilot and full-scale demonstration results, the plant started design for upgrading to BNR process and then as MDE regulations changed, the design intent was amended to achieve Advanced BNR and then ENR process goals.

In 2005, construction was started on a combined BNR/ENR liquid process and bio-solids processing upgrade. Phase 1 will increase the plant capacity from 6.8 to 8.5 mgd and Phase 2 will take the plant to 10.2 mgd. Total cost is approximately \$80 million and most of the construction is to be completed. *Continued on page 36*



Top Surface of Oxidic Filter Showing Rotary Distributor Arms

Plant Profile: Salisbury

Continued from page 35



To Surface of Anoxic Filter Showing Effluent Trough

pleted by December of 2008. Key NPDES permit limits for the 8.5 mgd BNR/ENR plant are: BOD 30, SS 30, Total Nitrogen 3 to 4, and Phosphorus 0.3 mg/l. TMDL requirements for the lower Wicomico River will call for lower BOD limits at 10.2 MGD. Annual loading capacity limits, based on parameters in the 2003 County Master Plan, are Total Nitrogen 103,549 lbs/year and Total Phosphorus 7,766 lbs/year. To increase effluent flows without exceeding the annual loading limits, the operators are challenged with producing effluent with lower concentrations. Given the higher-strength, non-domestic wastewater contribution, the "practicable" limit of technology will be evaluated starting summer 2008 when newly constructed plant components come on line.

Although most of the plant consists of dual-train liquid process steps, for purposes of simplification, this article is written as if there is only one process train in operation. After mechanical bar screening, grit removal and primary clarification, the total nitrogen removal process begins by putting the flow thru two bio towers placed in series. Primary clarifier effluent is pumped to the bottom of the first bio tower and then it rises to the top while undergoing an anoxic process. Effluent from the first bio tower is discharged to the top of the second bio tower where it trickles down to the bottom while undergoing an aerobic process and then it flows on for downstream secondary clarification.

To make the two fixed-media bio towers effective, a pumped internal recycle loop is needed. Primary clarifier effluent flows together with effluent from the second (oxic) bio-tower to the "Internal Recycle Pumping" Station where sugar water (corn syrup diluted with water) is added as a supplemental carbon source. Then the mixed flow is pumped to the bottom of the first or "anoxic" bio tower. The flow then trickles up thru the "vertical flow" plastic media. Since the media is always flooded or immersed, an anoxic zone is created for con-

version of nitrate nitrogen to nitrogen gas. During this conversion, additional BOD removal is achieved because BOD is used as a food source. The top surface of the media is exposed to the atmosphere allowing the removed nitrogen gas to escape. A trough in the media at the top of the first bio tower carries the denitrified flow out of the anoxic tower where a connecting pipe takes the flow to four rotary distributor arms situated at the top of the second or "oxic" bio-tower. The liquid then jets out of the nozzles on the four rotating arms and splashes down on the media and trickles down thru the "cross flow" media to the bottom of the bio-tower. While trickling down thru the media, the liquid undergoes an aeration process that removes both residual BOD and suspended solids and converts the ammonia nitrogen to nitrate nitrogen. Effluent from the second bio tower is then divided so that a small portion flows forward to downstream secondary clarification and the majority goes back to the recycle pumping station to be mixed with primary clarifier effluent. Or, in quantitative terms, when the plant raw influent is 1Q, the primary clarifier effluent is 1Q and is then mixed with 3Q of oxic tower effluent to make 4Q of flow as influent to the first (or anoxic) bio-tower. After the 4Q of flow goes thru both bio towers, the effluent of the second (or oxic) bio tower is divided so that 3Q of flow is returned to the recycle pumping station and 1Q is sent on for secondary clarification. Accordingly, this arrangement is called the "300 Per Cent Recycle Loop." Design intent for total nitrogen removal is to take out the majority of it in gaseous form in the anoxic bio tower and then the remainder in the final effluent denitrification sand filter.

Tricking filter technology was selected for Salisbury because of the process's ability to withstand high-strength loadings and widely varying raw influent



Secondary Clarifiers in Foreground, Bio Towers in Background

flowrates and for the potential to realize considerable savings in O&M costs. Electrical energy savings for the two-bio tower process is premised on not employing an aeration tank with energy-hungry blowers and diffusers

to oxygenate the liquid being treated and to keep the mixed-liquor in suspension. Instead, the oxic filter or bio-tower employs a rotary distributor arm of a trickling filter to spray water over plastic media. The liquid drains by gravity thru the media to achieve BOD, SS, removal and nitrification. As the flow drops one vertical foot thru the media, it moves horizontally nine feet, increasing the contact time with the treatment organisms. For denitrification, the flow is reversed and flows up thru a flooded media.

When the amount of energy used for blower-aeration of an activated sludge process is compared to the energy used for pumping Salisbury's combined influent and internal recycle flowrate equal to four times the plant's influent flowrate, there is an advantage given to trickling filters for the Salisbury WWTP. Basically, the largest electrical load at activated sludge plants is often the blowers, whereas at the Salisbury plant it is the internal recycle pumps. Thus, a savings in energy is achieved by pumping liquid water to achieve the head necessary to flow water by pressure up thru the anoxic filter and then letting gravity take the flow down thru the oxic filter. At first glance, the connected electrical kilowatt load (or horsepower) for the Salisbury WWTP looks approximately 50 per cent higher than typical activated sludge plants. However, the Salisbury connected load computation includes pumping units that are operated only at infrequent high-flow conditions and the required redundant spare pumps. With this arrangement, it is expected that the electrical energy costs at the Salisbury plant will be primarily a function of annual average flow rate rather than the influent loading or process mixing requirements that typically affect energy costs at activated sludge plants. Considering the higher-strength influent (BOD and TKN), the Salisbury plant expects to realize significant O&M savings—especially during lower-flow operating years. Moreover, cost-savings calculations are dependent upon influent raw wastewater with high-strength loadings that would significantly affect an activated sludge process more so than a trickling filter process. Design-phase estimates predict Salisbury will achieve an annualized O&M savings in the range of 10–20%.

Phosphorus removal begins with the addition of ferric chloride and polymer to the influent to the primary clarifiers. Subsequently, both ferric chloride and polymer are again added to the influent of the secondary clarifiers to enhance both phosphorus and solids removal. Removed residuals carried in the clarifier underflow go to sludge storage tanks. Lime solution is also added to the primary clarifier influent for alkalinity control.

After secondary clarification, the flow continues to the Secondary Effluent Pumping Station, after which a little bit of sugar water is added for carbon source and



Rectangular Concrete Structure is the Final Effluent Denitrification Sand Filter

the flow is pumped to the top surface of the deep-bed, continuous-backwash, denitrification sand filter. The intent of the final filtering process is to polish out the residual nitrate nitrogen and for further removal of particulate fractions of BOD, solids, nitrogen, and phosphorus. Influent flow to the sand filter must have solid concentrations of less than 30 mg/l and filter effluent must have solids less than 5 mg/l so as to prepare the flow for inline, cross-flow ultraviolet disinfection. Next steps downstream include post aeration and final discharge thru an effluent diffuser into the Wicomico River.

Solids processing for plant starts with the underflow discharge of the two primary clarifiers and three secondary clarifiers to three sludge storage tanks with a total storage capacity of 1.3 MG. Following storage, the primary and secondary sludge can be mixed and pumped to belt filter presses. Incoming sludge to the press is about 1.8 percent solids and outgoing cake is 25 percent solids. At this point, the cake can be taken to a landfill or taken by screw conveyor to an indirect, gas-fired, dryer. The dryer can produce 95 per cent solids cake that can be taken to a landfill, distributed to the public or land applied. The plant expects to achieve MDE certification for Class A biosolids in the future.

Liquid filtrate from the belt filter press process and condensate from the sludge drying process are put in a storage tank where ferric chloride can be added and the settled liquid can be carefully metered into the plant head works. Backwash water from the sand filters is piped to the secondary clarifiers.

Chief Plant Operator, Dave Winslow and plant process design engineer, Bill Meinert assisted the author with preparation of this article.

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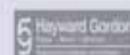
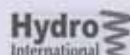
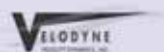
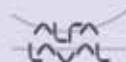
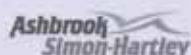
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