The Periodical of the American Academy of Environmental Engineers® Spring 2011 | Volume 47, Number 2

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AEESP Education & Research Conference

The AEESP Education and Research Conference will be held July 10-12, 2011, in Tampa at the University of South Florida. The conference has six theme areas to accommodate presentations on education, research, and practice:

1. Advances that deal with water depletion and degradation
2. Advances that assess and improve air quality and waste management
3. Infrastructure that serves an expanding and urbanizing population
4. Vulnerability and adaptation to climate change
5. Global issues in environmental engineering
6. Energy as a cross cutting theme
7. Integrating sustainability into engineering practice (co-organized with AAEE)

There are workshops and a beach party on Sunday. Technical sessions are held Monday and Tuesday. The AEESP Awards Ceremony will take place on Monday evening at the Florida Aquarium and on Tuesday a AEESP Legacy Dinner (hosted by Wayne Echelberger and Phil Singer) will allow us to celebrate the history of our discipline and those members who made it all happen.

The Quarterly Periodical of
The American Academy of Environmental Engineers®

www.aaee.net

OFFICES
Environmental Engineer is published by the American Academy of Environmental Engineers®. Address all communications on editorial, business and other matters to:

Editor-in-Chief,
Environmental Engineer®
American Academy of Environmental Engineers®
130 Holiday Court, Suite 100
Annapolis, Maryland 21401
410-266-3311

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1-866-985-9782 • FAX 1-866-985-9799
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Managing Editor: Terry Ross
Design/layout: Stacia Harrison
Advertising Coordinator: Lauren Campbell

ENVIRONMENTAL *Engineer*

Spring 2011 | Volume 47, Number 2

FEATURES

DEPARTMENTS

by Brian P. Flynn, P.E., BCEE, *BFlynn4290@aol.com*

Membership in AAEE

Q. ***Let's get right to the point. Why should someone join the American Academy of Environmental Engineers?***

A. I'm going to do something that is uncharacteristic for me - digress!

Q. ***Huh?***

A. All of our members spend their careers selling ideas. It isn't just the consultants, who have to sell their services to clients. If you work for a water utility, you have to 'sell' the next capital improvement project; if you are a regulator, you have to 'sell' that change in regulation as being effective, enforceable, and implementable.

Q. ***OK.***

A. When you are selling ideas, there is a concept and a brand sale. An example is this: do you want to go to Austin, Miami Beach, or Banff for vacation? This is the brand sale. The underlying concept sale is this: Do you want to go on vacation? The really interesting thing is that if you sell the concept, your brand will likely be selected. The idea of Academy membership is a concept sale.

Q. ***Interesting. What is the concept?***

A. Simple. Do you want a nationally recognized independent authority (AAEE) to acknowledge you as being competent in a particular branch of environmental engineering?

Q. ***Why is this important?***

A. Employers, clients, and the general public want to know that when something as important as environmental engineering is being practiced, that the individual(s) involved actually know what they are doing. Unfortunately, environmental engineering (and engineering in general) is not thoroughly professionalized in the US. By this, I mean that advanced education beyond the bachelor level and licensure are not prerequisites for practicing engineering (unlike medicine and law). Even if you have a PE license, many states do not grant one in Environmental Engineering and environmental engineering is such a broad field, nobody can be competent in all its branches.

Q. ***How does AAEE certification tie in?***

A. We review the experience of applicants and test them in their field of specialization. We can certify someone as competent in their environmental specialty be it water/wastewater, air pollution control, environmental sustainability, whatever.

Q. ***So what does this mean to a potential applicant for AAEE membership?***

A. Our certification carries a lot of weight in employment decisions; it helps engineers sell their services to others who need it, and is a mark of credibility when dealing with the public.

Q. ***Any other benefits to AAEE membership?***

A. There are many. It is a great network. I've moved twice in the past 15 years, and each time, I immediately plugged into the network of local AAEE members in order to get acquainted and orientated. No member has ever refused to see me. Just 'call 'em out of the blue!' We also run a great environmental projects competition complete with awards and press coverage. More and more, we are putting on seminars, sessions at conferences and many other things. (See the table, Benefits of AAEE Membership).

Q. ***Anything else?***

A. Environmental engineers are essentially 'homeless.' Sure, there are plenty of organizations to which you can belong, but none of them caters exclusively to environmental engineers except one: AAEE. Come home! Even if you are not ready for certification, you can join as a "Member" while you are on the road to certification!

Q. ***If there is one thing you could ask our members to do to help with recruitment, what would it be?***

A. Help your colleagues in your organization (and outside of it) to become Board Certified by AAEE. Identify five of them at a minimum! The Academy has plenty of recruiting materials available on our website at w*ww.aaee.net.* Recruiting is not just a springtime rush – it is a year-round commitment. EE

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Benefits of AAEE Membership

	*E	*I	*C
1. Can recognize expertise of potential hire or employee.			
2. Demonstrates capability to new employer or client.			
3. ABET Accreditation program assures consistency in quality of graduates (i.e. out of school hires).			
4. Excellence in Environmental Engineering competition provides recognition of high quality projects and programs.			
5. *Who's Who* identifies Members, BCEEs, and BCEEMs for hire by company or client.			
6. Optional listing in *Environmental Engineering Selection & Career Guide* provides visibility for firm in the marketplace.			
7. A career and marketing advantage versus non-AAEE members.			
8. Expertise has been Board Certified (independently testified).			
9. Acknowledged competency in any of 8 fields of Environmental Engineering.			
10. 10% higher earnings on average.		BCEEs & BCEEMs	
11. Your interests as an Environmental Engineeer are represented by the Academy.			
12. *Environmental Engineer* magazine provides technical and managerial knowledge.			
13. 50% discount on BCEE/BCEEM application and exam fees.			
14. Networking with Academy Members provides broader access to career opportunities.			
15. Opportunity to work and learn from other environmental engineering professionals by working on Academy committees.			
16. Use of BCEE/BCEEM credential by clients is promoted by AAEE.			
17. Can obtain marketing edge with some clients through consideration of the BCEE/BCEEM.			
18. Provides additional expert criteria for environmental litigation work.			
19. Academy provides information to assist in preparing for BCEE/BCEEM exam.			

*Notes: E = Employer Benefit; I = Individual (Members, BCEEs, BCEEMs) Benefit; C = Client Benefit

by Joseph S. Cavarretta, CAE

AAEE Meetings & Activities

The Academy developed several new activities last year. Your *AAEE Member Value Report,* mailed to you in April along with your Board of Trustees voting ballot, gives you a clearer picture of 2010 events.

In 2011, the Academy is offering insightful educational events along with opportunities for you to become involved. Don't be surprised if your state representative calls on you to assist in a local event. Please do your best to participate. These are great opportunities to learn, build your network, and derive new business. Here is what's in store over the next few months. All events are updated in the monthly electronic *Highpoints* newsletter.

- *May 1-4 - Florida Water Resources Conference.* The 2011 Florida Water Resources Conference at the Gaylord Palms Resort and Convention Center, Kissimmee, Florida, includes an AAEE breakfast meeting organized by Dr. Wayne Echelberger, Jr., on Monday, May 2. The topic is *Global Partnerships that Demonstrate the Importance of Service for Engineers*, by Dr. James R. Mihelcic, BCEEM; Professor of Civil and Environmental Engineering and State of Florida 21st Century World Class Scholar at the University of South Florida. To register, go to *www.fwrc.org.*
- *May 9 - AAEE full-day Workshop on Water Treatment in Marcellus Shale Exploration & Production.* New Jersey Water Environment Association Annual Conference May 9 - 13, 2011 at Bally's Hotel in Atlantic City, NJ. *(Sell-out expected - register early).* The workshop features Hunter Nolen, President, Industrial Services Group, CDM; Pete Miller, Director of Water Resources, Range Resources Corporation; Tim Weston, Attorney, K&L Gates; Adam M. Kushner, Director of Civil Enforcement, U.S. Environmental Protection Agency; Bill Muszynski, Coordinator of Special Projects and Programs, Delaware River Basin Commission; Somnath Basu, Executive Director, Water and Urban Development, AECOM; Dr. Terry Engelder, Professor of Geosciences, the Pennsylvania State University; and Bob Kimball, Technical Director Produced Water Treatment, CDM. CEUs/PDHs are available for NJ, NY, PA, and other states. To register, go to *www.njwea.org.*
- *May 10 - AAEE W. Wes Eckenfelder Breakfast* will be held 7:00 am at NJWEA's Annual Conference and features William J. Muszynski, PE, Manager, Water Resources Management Program, Delaware River Basin Commission, Marcellus Shale Gas - Water Resource and Quality Protection in the Delaware River Basin (PDHs). AAEE will also be exhibiting at this event and volunteers are needed. To volunteer, email *jsolmo@aaee.net.* Registration information is available on the *www.njwea.org* website.
- *May 24 - AAEE Short Course: Carbon Footprint Workshop,* 8:00 am - 12:00 pm at 2011 World Environmental & Water Resources Congress, May 22 - 24, Palm Springs, CA, featuring Wayne McFarland, PE, DEE, CEM, CRM, LEED AP; GHD, Inc. For details, download the form at *http://content.asce.org/files/pdf/EWRIPreliminaryProgram.pdf* and scroll to page 13. Scroll to page 26 to register.
- *June 15 - AAEE/AIDIS/AWWA Luncheon at ACE 11.* Register now to hear Washington Aqueduct General Manager Thomas Jacobus discuss *The Success of Washington Aqueduct's Modernization under the Constraints of the National Historic Preservation Act,* from 11:30 am to 2:00 pm at the ACE11 Conference, Washington, DC. Early registration is recommended. To register ($50), go to *http://apps.awwa.org/EbusMain/Default.aspx?TabID=177&ProductId=2416,* and scroll to the June 15 portion of registration. AAEE will be exhibiting at the Conference, June 12-16 and needs volunteers. Please email *JCava@aaee.net* to volunteer. (Organized by Steven Quail.)
- *June 21-24 – A&WMA Conference,* Disney Coronado Springs Resort & Convention Ctr., Orlando - AAEE speakers will be present in many sessions - in particular, Tuesday June 21 (T-13-07), Fostering Professional Development Students & Young Professionals; and June 23 (T07-10) A Sustainable CWA: The Role of Environmental Engineers. AAEE will be exhibiting at the Conference June 21-23, and needs volunteers. Email *JCava@aaee.net* to volunteer. (Organized by Gary Gasperino.)
- *July 13-17 – NSPE Annual Meetings,* JW Marriott, Las Vegas Resort & Spa at Summerlin. AAEE will have a tabletop exhibit. AAEE will have an opportunity to address the NSPE Board of Directors. If you are attending the NSPE Annual Meeting and are willing to assist at the tabletop exhibit, please email *jcava@aaee.net.*

- *August 1 - AAEE ½-day Workshop, Nutrient Management Strategies for the Chesapeake Bay* at the NCER Conference *(http://conference.ifas.ufl.edu/NCER2011/index.html)*, August 1-5, Baltimore, Maryland, featuring Rip Copithorn, PE, BCEE, GHD, Inc.; Richard Batiuk, EPA Chesapeake Bay Program Office; Cy Jones, Water Resources Institute, and others TBA. AAEE will be exhibiting here and needs volunteers. Email *JCava@aaee.net.*
- *August 23-25, WASTECON 2011, Nashville.* TBA
- *September 20 - AAEE Breakfast,* 7:00-8:15 am, at APWA International Public Works Congress & Exposition, September 18-21, Colorado Convention Center. Topic: *An Approach to Addressing Climate Variability in Roadway and Bridge Design.* Speaker TBA. AAEE has an exhibit at this event and is looking for volunteers to assist the Academy. Email *Jcava@aaee.net.*
- *September 22 - AAEE Dinner & Networking Seminar,* Orange County Water District: 5:30-8:30 pm, OCWD HQ, 18700 Ward St., Fountain Valley, CA, 92708. Speakers: Mike Markus, General Manager, Orange County Water District; and Jim Herbert, Assistant General Manager, Orange County Sanitation District: GMs Pioneer Recycled Water Use in Southern California. To register, email Sylvia Williams: *swilliams@lacsd.org.*
- *October 17, AAEE Breakfast,* 7:00-8:30 am, WEFTEC, October 15-19, Los Angeles Convention Center. Keynote speaker Brian P. Flynn, P.E., BCEE, AAEE President of the Board of Trustees. AAEE has an exhibit at this event and is seeking volunteers for booth duty. To volunteer, email: *kuchenritherr@bv.com.* (Organized by Dick Kuchenrither.)

International Events

- *May 2-5 - Wasser Berlin International Trade Fair and Congress Water and Wastewater: KNOW H_2OW.* AAEE has secured an exhibit and is seeking volunteers who are attending this event to assist in arranging and distributing materials and spreading the word about AAEE. If you are planning to attend the conference and are willing to assist the Academy, please email *JCava@aaee.net.* For details on the Trade Fair and Congress, go to *www.wasser-berlin.de/englisch/.*
- *October 9-11, International Conference on Drinking Water Safety, Security and Sustainability,* Zheijing University, Hangzhou, China. AAEE activity TBA.

Get Your AAEE-Centric Events Listed

Are you interested in organizing an opportunity for AAEE in your area, or have you already organized such an event? Please email *JCava@aaee.net,* to get your event listed and promoted. Please submit the date, title, event, speaker(s), location, link, and event details. EE

On the Move

Craig A. Close, P.E., BCEE, has been appointed Senior Vice President of HDR Engineering, Inc. (San Diego, California). Mr. Close has been board certified in Water Supply and Wastewater Engineering since 2002.

Michael C. Kavanaugh, Ph.D., P.E., BCEE, has joined Geosyntec Consultants as a Principal in their Oakland, California, office. Dr. Kavanaugh has been board certified in Water Supply and Wastewater Engineering since 1983, and Environmental Sustainability since 2010.

EDITOR'S NOTE:

There was an error in the Winter 2011 issue of Environmental Engineer: Applied Research and Practice article Sustainability and the Phosphorus Cycle: Inputs, Outputs, Material Flow, and Engineer by David A. Vacarri, Ph.D., P.E., BCEE.

On page 38 under the heading, Environmental Impacts of the Phosphorus Cycle, 0.5 mg P/L should read 0.05 mg P/L.

In Memoriam

Joseph A. D'Emidio, P.E., BCEE, of Falls Church, VA, passed away June 3, 2010. Mr. D'Emidio, a Life Member, had been board certified in Sanitary Engineering since 1967.

Kenneth Kells, P.E., BCEE, passed away October 23, 2010. Mr. Kells, a Consulting Engineer in Ivoryton, CT, had been board certified in Water Supply and Wastewater Engineering since 1993.

Jack Lauber, P.E., BCEE, of Latham, NY, passed away December 18, 2010. Mr. Lauber, a Life Member, had been board certified in Air Pollution Control since 1970.

Charles O'Melia, Ph.D., P.E., BCEE, passed away December 16, 2010. Dr. O'Melia, Abel Wolman Professor of Environmental Engineering and Professor Emeritus in the Department of Geography and Environmental Engineering at the university's Whiting School of Engineering, was a Life Member and had been board certified in Water Supply and Wastewater Engineering since 1987.

James R. Simpson, P.E., BCEE, of Annandale, VA, passed away October 10, 2010. Mr. Simpson, a Life Member, had been board certified in Sanitary Engineering since 1956.

Vyron A. Smiley, Jr., P.E., BCEE, of Lexington, KY, passed away October 10, 2010. Mr. Smiley, President of Howard K. Bell Consulting Engineers, was a Life Member and had been board certified in Water Supply and Wastewater Engineering since 1984.

Klaus D. Timmerhaus, Ph.D., P.E., BCEE, of Boulder, CO, passed away February 11, 2011. Dr. Timmerhaus, Retired Professor at University of Colorado at Boulder, was a Life Member and had been board certified in Water Supply and Wastewater Engineering since 1975. EE

Officer Nominees for 2012

The Academy's Nominating Committee is chaired by Past President Cecil Lue-Hing. Its members include Pasquale S. Canzano, Tapas K. Das, Brian P. Flynn, Jeffrey H. Greenfield, Howard B. LaFever, James Mihelcic, Michael W. Selna, and Sandra L. Tripp. The committee recommends the following slate of candidates for 2012.

President Elect

- Pasquale S. Canzano, P.E., BCEE

Vice President

- Christian Davies-Venn, Ph.D., P.E., BCEE
- Howard B. LaFever, P.E., BCEE

Trustee at Large

- Kristin Morico, P.E., BCEE, CSP, FASCE, CHMM
- Ronald D. Neufeld, Ph.D., P.E., BCEE
- C. Hunter Nolen, P.E., BCEE
- James W. Patterson, Ph.D., BCEEM

PRESIDENT ELECT

Pasquale S. Canzano P.E., BCEE, has 46 years of engineering experience predominantly in public service. He is currently the Chief Executive Officer of the Delaware Solid Waste Authority (DSWA), which is recognized nationally and internationally as a leader and innovator in solid waste management. DSWA is responsible for implementing a Statewide Solid Waste Management Plan for Delaware, which has recently been updated to incorporate 'Zero Waste' recycling principles.

Mr. Canzano earned a B.S. degree in Chemical Engineering from Northeastern University in 1965 and an M.S. degree from The Polytechnic Institute of Brooklyn in 1971. He is a registered Professional Engineer in Delaware since 1974. In 2009, the Delaware Engineering Society selected him Delaware's Engineer of the Year. He has authored papers on the topics of solid waste management and sludge recycling and has presented nationally and internationally on these subjects. He also taught a course on introductory fluid mechanics at Wesley College. He currently serves on the University of Delaware's External Advisory Council for the Department of Civil and Environmental Engineering. He has patented developments in chemical adsorption/desorption processes, low-pressure gas regulating valves, and organic based Rankine power cycles for solar and waste heat recovery applications.

Mr. Canzano has been active as a Diplomate since 1990 and has served on various committees. Also, he recently completed serving on the Board of Trustees as the representative for AIChE as a sponsoring organization. He is an active member of AIChE, SWANA, ISWA and DAPE.

Mr. Canzano strongly supports the Academy and certification within his organization and externally. As Vice President, he will work to continue to improve the image of the professional engineer, value and prestige of Board certification as priorities.

VICE PRESIDENT

Christian Davies-Venn, Ph.D., P.E., BCEE, is Vice President and Chief Engineer of PEER Consultants with 34 years experience in environmental engineering. He received his B.S in Civil Engineering from the University of Sierra Leone and M.S. and Ph.D. degrees in Environmental Engineering from the University of Cincinnati and the University of Arkansas, respectively. He is a registered Professional Engineer in Maryland, Virginia, District of Columbia, Michigan, Tennessee, and Florida. He is also an Adjunct Faculty at Johns Hopkins University, Whiting School of Engineering.

Dr. Davies-Venn was certified as a Diplomate of the Academy in 1996. He has served as Assistant Treasurer, Treasurer, and Chair of the Finance Committee. He has also served on several committees including Chair of the Ad Hoc Working Group sub-committee on Examination Eligibility, the Ad Hoc Working Group on membership classifications and requirements for certification and re-certification, and on the Strategic Planning Committee. Since 2005, he has served as the Academy's representative to the Council of Engineering and Scientific Specialty Boards (CESB). In this capacity, he has served on the CESB's Executive Committee, the Accreditation and Admissions Committee, the Nominating Committee, and currently as Chair of the Committee on Professional Engineer Specialty Certification and the Committee on Graduate Engineer Certification.

Dr. Davies-Venn is also active in several sponsoring organizations and other professional organizations including the Water Environment Federation, the National Society of Professional Engineers, the American Society of Civil Engineers, the American Water Works Association, the Chesapeake Water Environment Association, the Water Environment Research Foundation, the Mid-Atlantic Biosolids Association, and the Federal Water Quality Association. He has been actively involved in mentoring young professionals and implementing the strategic mission of the Academy.

Howard B. LaFever, P.E., BCEE, is currently a Principal at GHD Inc. (f/k/a Stearns & Wheler, LLC), a global engineer-

ing, architectural, and environmental consulting company working out of the Cazenovia, NY, office. He has served the company for 39 years, with a specialty in wastewater, solid waste, and pipeline infrastructure. His recent emphasis has been in the area of 'Sustainability.' Mr. LaFever earned a B.S. in Civil Engineering from Clarkson University in 1968 and a M.S. in Sanitary Engineering from Cornell University in 1973. He became a Diplomate in 1982 in the Water/Wastewater specialty and recently received certification in the Environmental Sustainability specialty from AAEE.

Mr. LaFever has been a strong supporter and advocate of the Academy at his company by incorporating AAEE certification as part of the professional development track for young professionals. He served on the Academy Board of Trustees for 6 years representing the American Public Works Association (APWA), and is currently serving in his third year as Treasurer and Chairman of the Finance Committee. He previously served on the Finance, Audit, Membership, Awards, and Executive Committees.

Mr. LaFever has just recently been elected as Vice Chairman for the newly formed Institute for Sustainable Infrastructure (ISI) formed by ASCE, ACEC, and APWA, and currently serves on the APWA Center for Sustainability. He strongly believes that the Academy can play a vital role in the education, training, and certification of professionals leading the way to sustainable solutions to rebuild our aged infrastructure.

He strongly supports the importance of certification and enhancing the range of the environmental profession. He will work hard through strong leadership to strengthen the growth in membership, implement the strategic plan, and gain more involvement from the younger members and students.

TRUSTEE AT LARGE

Kristin (Kris) Morico. P.E., BCEE, CSP, F.ASCE, CHMM, currently serves as the leader of several successful programs for GE CEP including GE's Global Water, EPCRA, PRTR Chemical Management Programs and the new Environmental Excellence initiative. Additionally, Kris leads the team associated with GE's 4th ecomagination commitment – 25% absolute water reduction by 2015 – and co-leads a Process Safety Management (PSM) Task Force. She is responsible for the development and implementation of all associated programs globally across GE and works closely with GE's business segments to advance activities.

Kris began her career working in the municipal water sector as a process engineer for the Regional Water Authority in New Haven, CT, and over the past 27 years (8 in an executive capacity), she has assumed leadership positions of increasing responsibility. Kris has excelled in a variety of positions across several Fortune 500 companies including Clairol, Inc., Malcolm Pirnie, Inc., Environmental Compliance Officer for ABB/Combustion Engineering, Director of Global Environmental Programs and EHS Governance at Pratt and Whitney (Division of UTC), and was Director of Environmental Programs at Tyco International located in Princeton, NJ.

Kris possesses a B.S. in Biology from Fairfield University, M.S. Civil Engineering from the University of Connecticut, MEM Environmental Management from Yale University, and an EMBA from the University of Connecticut. She is a licensed Professional Engineer, Board Certified Environmental Engineer in the AAEE, Certified Safety Professional, and Certified Hazardous Materials Manager. She also possesses a Class IV Water Treatment Plant Operators License issued by the State of Connecticut Department of Public Health and is an Environmental Laboratory Director through the same agency. She is active in several professional EHS organizations and was elected to the status of Fellow in the ASCE and presently serves on the advisory board for the University of Connecticut School of Civil and Environmental Engineering. A member of AAEE since 1999, Kris serves on the sustainability, K-12 and membership committees.

Recently, Kris was appointed lecturer at the Yale School of Forestry and Environmental Studies where she will be teaching an evening professional course entitled Fundamentals of Environmental Leadership and Management. This year, Kris will be inducted in the 2011 Academy of Distinguished Engineers at the University of Connecticut School of Engineering.

Ronald D. Neufeld, Ph.D., P.E., BCEE, is a Professor of Civil and Environmental Engineering at the Swanson School of Engineering, University of Pittsburgh and has been on the faculty for 37 years. He was a Senior Fulbright Scholar (1983-84) teaching Environmental Engineering participating in research looking at water and waste issues relating to oil shale development. Dr. Neufeld is a licensed Engineer in Pennsylvania, and holds a Ph.D. (Civil/Environmental Engineering) from Northwestern University, M.S. from Northwestern, and B.E. from The Cooper Union.

Dr. Neufeld is a member of the AAEE Education Committee (1992-present), and the Academy User Outreach Committee. He also serves AAEE as an ABET Program Evaluator for University Environmental Engineering programs seeking accreditation. He is appointed to the Pennsylvania State Board for Certification of Sewage Treatment Plant and Waterworks Operators, is Vice-Chair of the PA-Department of Environmental Resources Cleanup Standards Science Advisory Board, and Past-chair and member of the ASCE Energy Division Executive Committee. He is an Associate Editor of the ASCE Journal of Energy Engineering, and member of the Water Environment Federation Industrial Waste Committee and WEF Program Committee.

Dr. Neufeld's interest is focused on generating excitement for and the development of young environmental engineering professionals. He teaches both graduate and undergraduate environmental engineering courses within the Pitt Department of Civil & Environmental Engineering. In addition, along with his students, he has contributed over

150 archival papers, proceedings and presentations with a general emphasis on process innovations and fundamentals associate with industrial and municipal wastewater treatment technologies.

Dr. Neufeld's awards include the PA Water Environment Association Professional Research Award, ASCE Outstanding Service Award, Roy F. Weston Award, a William Kepler Whiteford Professorship and listing in Who's Who in America.

C. Hunter Nolen, PE, BCEE, is a Senior Vice President and 25-year veteran of CDM, a global consulting, engineering, construction and operations firm. He is in charge of its Industrial Services Group, providing CDM's services to industry throughout the world. Mr. Nolen's technical specialties include development and execution of large-scale environmental programs, as well as design and construction projects requiring the integration and coordination of management, technical, community and financial issues. He has a Master's in Environmental Engineering from Montana State University, a Bachelor's in Aquatic Biology from the University of Texas at Austin, and a Certificate of Completion from the Executive Education Program at the University of Texas McCombs School of Business.

Mr. Nolen's experience includes analysis, design and construction of solutions in water and wastewater treatment, storm water management, air pollution control, and groundwater and soils treatment. He has provided these services to a wide range of clients in industry, municipalities, state regulatory bodies and federal agencies.

Mr. Nolen engages in numerous special assignments, committee memberships, consultancy and responsibilities on behalf of CDM, clients, and for the American Academy of Environmental Engineers. For the Academy, Mr. Nolen is a member of the Planning Committee, and in this role, he supported the development of the Academy's Strategic Plan. He also is developing and facilitating the Academy's pre-conference workshop at this year's joint New Jersey Water Environment Association/WEF Industrial Wastewater Conference.

Mr. Nolen is pursuing an at-large position on the Academy's Board of Trustees so he can assist the Academy in engaging the environmental engineering community within the industrial sector, resulting in increased awareness and participation in Academy membership and activities.

James W. Patterson, Ph.D., BCEEM, is an internationally recognized expert on industrial pollution control. He is Principal of Patterson Environmental Consultants, Inc., which specializes in industrial waste management. Dr. Patterson previously served as Professor and Chairman of the Pritzker Department of Environmental Engineering at the Illinois Institute of Technology (IIT) in Chicago for 20 years, and as Director of the EPA-sponsored Industrial Waste Elimination Research Center of Excellence at IIT for 8 years. He received his Ph.D. in Environmental Engineering in 1970 from the University of Florida, and his B.S. and M.S. degrees in 1964 and 1967 respectively, from Auburn University.

Dr. Patterson is the author of two books on industrial wastewater treatment, editor of a three-volume series on industrial pollution prevention, co-editor of a nine-volume series on water quality management, and has authored more than 100 other book chapters and technical papers. He was Chair of the WEF Journal Water Environment Research Board of Editors. He has served as an international consultant and advisor to numerous industries and government agencies, including the U. S. Congressional Office of Technology Assessment, the USEPA, Department of Defense, and Department of Justice, the Illinois Pollution Control Board and Illinois EPA, the Kentucky Department of Natural Resources, the New York State Hazardous Waste Center, and the Ohio EPA.

During 1983-84, Dr. Patterson served as Executive Director of the State of Illinois Hazardous Wastes Task Force. He has served as Chair of the International Joint Commission Expert Committee on Engineering and Technological Aspects of Great Lakes Water Quality, and as Chair of the State of Illinois Effluent Standards Advisory Panel. Dr. Patterson was appointed a Charter Member of the USEPA National Advisory Council for Environmental Technology and Policy. In addition, he chaired the Fourth International Conference on Environmental Engineering Education, sponsored by AEESP. EE

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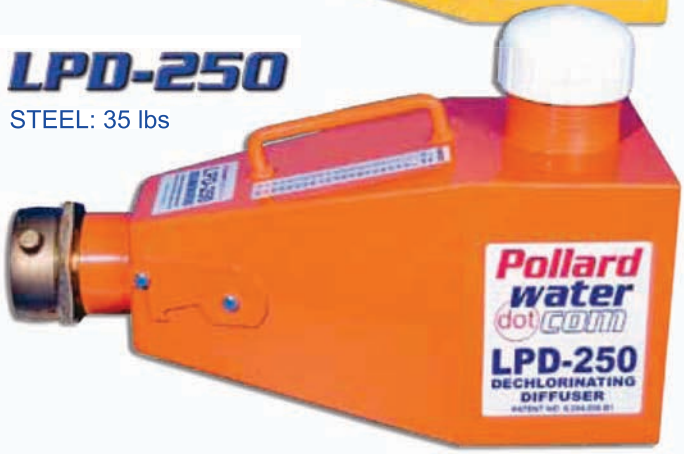

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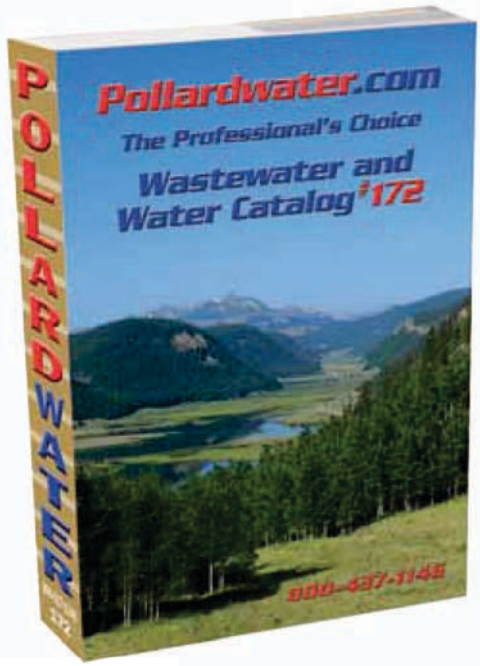

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The American Academy of Environmental Engineers Honorees

2011 Gordon Maskew Fair Award Recipient

Hillel I. Shuval, D.Sc.hc, P.E., BCEE

This award is presented to an individual for substantial contributions to the status of the engineering profession, the quality of the world's environment, and the Academy.

Hillel Shuval was born in Washington, DC in 1926. He studied Water Resources and Environmental Engineering at Cornell University and the University of Missouri. In 1948, Dr. Shuval settled in Israel, where he served as Chief Environmental Health Engineer, Ministry of Health until 1965. He received his graduate training in Public Health/Environmental Engineering at the University of Michigan, Ann Arbor.

In 1965, he was appointed Professor of Environmental Sciences at Hebrew University of Jerusalem and founded its Division of Environmental Sciences. He was also appointed visiting Professor at Michigan, Harvard, and MIT. He published 250 scientific papers and 8 books on various aspects of environmental engineering.

Dr. Shuval acted as a consultant on environmental engineering/environmental health with special interest in global aspects of water recycling and reuse in developing countries to the WHO, the World Bank, EU, UNESCO and the United Nations Environment Program. He also served as a consultant to governmental agencies, consulting engineers, and industries in Chile, Peru, Argentina, Mexico, India, Australia, Thailand, Egypt, France, Greece, Italy, England, Holland, USA, Switzerland, and People's Republic of China.

The WHO considers his most important scientific contribution to be the pioneering development of the Quantitative Microbial Risk Analysis (QMRA) method for determining the rational basis for health guidelines for water reuse which have been used in the revision and liberalization of the World Health Organization's 2006 health guidelines. These have provided beneficial global impact on policy and practice in water conservation and agriculture.

Dr. Shuval is a Life Member and Fellow of the American Public Health Association and ASCE as well as past vice-president of the International Water Association. In April 2003, he was awarded an Honorary Doctorate in Science from the University of Michigan for scientific accomplishments in environmental research and initiatives in promoting peace in the Mid-East. In 2008, the President of Israel presented him with the Life Time Accomplishment Award for his contribution to protecting the environment of Israel and promoting peace with Israel's neighbors through scientific dialogue and cooperation. Dr. Shuval is currently Head, Division of Environmental Health Sciences-Hadassah Academic College and Kunen-Lunenfeld Emeritus Professor of Environmental Sciences, The Hebrew University of Jerusalem.

2011 Edward J. Cleary Award Recipient

Richard F. Lanyon, P.E., BCEE

This award is presented to an individual who displays superior administrative and technical skills and public service in the conduct of environmental protection programs.

Richard Lanyon retired from his position as Executive Director of the Metropolitan Water Reclamation District of Greater Chicago at the close of 2010, a position that he was appointed to in June 2006. As Executive Director, he directed the day-to-day operations of the MWRD, which included 2,100 employees and an annual budget of approximately $1 billion. Mr. Lanyon's career at the MWRD spanned nearly 48 years. Before his appointment as Executive Director, he was Director of Research and Development for 7 years.

As you may know, the MWRD is one of the largest wastewater collection and treatment agencies in the world, serving five million people in Cook County and the industrial equivalent of another four million people. The District also provides stormwater management and other related services to protect the environment.

Among his awards, Mr. Lanyon received the American Society of Civil Engineers' National Government Civil Engineer of the Year Award in 1999 and Distinguished Alumnus of the Department of Civil and Environmental Engineering at the University of Illinois at Urbana-Champaign (UIUC) in 2003. He is also a past President of the Illinois Section of the American Society of Civil Engineers and holds Bachelors and Masters of Civil Engineering degrees from the UIUC. He has been involved in a variety of technical activities for ASCE, the Water Environment Federation (WEF) and the National Association of Clean Water Agencies (NACWA).

He serves as the Chair of the Steering Committee of the National Biosolids Partnership, a collaboration of the USEPA, NACWA, and WEF to further the beneficial reuse of biosolids, and the past-Chair of the WEF Sustainability Community of Practice, an effort to enhance sustainable practices by industry and government to better protect the environment.

Mr. Lanyon served on the Evanston Public Library Board of Directors from 1984 through 1989 and one term as Alderman of the 8th Ward on the Evanston City Council from 1989 through 1993. He and his wife Marsha reside in Evanston, and he continues to be an advocate for sensible and sustainable water management in the urban environment.

2011 Stanley E. Kappe Award Recipient

Sandra L. Tripp, P.E., BCEE

This award is presented to an individual for performance of extraordinary and outstanding service contributory to the advancement of Academy objectives.

Congratulations to the 2011 AAEE Honorees!

Sandy Tripp received her B.S. in Civil Engineering and MS in Environmental Engineering from Michigan State University. Following graduation in 1982, she began her consulting engineering career with Boyle Engineering Corporation and worked in the Washington, DC area for 12 years. She moved to North Carolina in 1994 and soon after joined CDM, where she served numerous municipal clients and led myriad water and wastewater assignments from planning through design and construction. In 2008, Ms. Tripp joined Stearns & Wheler, LLC, which recently became GHD, Inc., and continues to serve municipal clients while actively training and developing junior engineers and project managers. A registered engineer in several states, Ms. Tripp has published many professional papers at both the state and national levels.

In addition to her duties as a consulting engineer, Ms. Tripp has contributed substantially to both national and state professional organizations. An active member of the Academy since 1993, she has served on the Eminence Committee, Awards Committee, Nomination Committee, Membership Committee (past-chair), several ad-hoc work groups, and currently chairs the Admissions Committee and the Seminars & Workshops Committee. Ms. Tripp is serving her second elected term as Trustee-at-Large on the AAEE Board of Trustees. She has also been active at the state level for both WEF and AWWA, serving on and chairing both technical and educational committees for both organizations and receiving the Outstanding Service Award from the North Carolina section of AWWA-WEA in 2003.

In 2010, Ms. Tripp's consulting career brought her to Cape Cod, Massachusetts, where she is rediscovering the beauty of winter.

2011 Honorary Member

Clifford W. Randall, Ph.D., Dis.M.ASCE

This individual is elected in recognition of position of eminence in the environmental engineering field, and sustained contributions to the advancement of environmental engineering.

Dr. Randall is a native of Kentucky, has two Civil Engineering degrees (B.S. and M.S.) from the University of Kentucky, and a Ph.D. in Environmental Health Engineering from the University of Texas, Austin. His more than 50 year water pollution control career has included positions as an operator, designer and modeler of wastewater treatment processes, university professor, founder and director of a large watershed and water supply monitoring program, water supply and pollution control project director and consultant in developing countries for NGOs and WHO, and researcher and developer of innovative nutrient removal wastewater treatment processes.

He has served on numerous advisory committees for governmental entities, including the USEPA Chesapeake Bay Program, several Virginia departments and agencies, the States of Maryland and North Carolina, the City of Atlanta, New York City, and Washington, DC. He has authored more than 300 scientific and technical articles, books, reports, and manuals. Professionally active, he has served as President of the Association of Environmental Engineering and Sciences Professors and the Virginia Water Pollution Control Association, as Chairman of the USA National Committee of the International Water Association, and Committees of the Environmental Engineering Division of ASCE. Further, he has extensive experience as a national and international municipal and industrial wastewater treatment consultant, including activity in South Korea, China, Japan, Mexico, Puerto Rico, Costa Rica, Columbia, Canada, and South Africa. Dr. Randall is currently Professor Emeritus at Virginia Tech. EE

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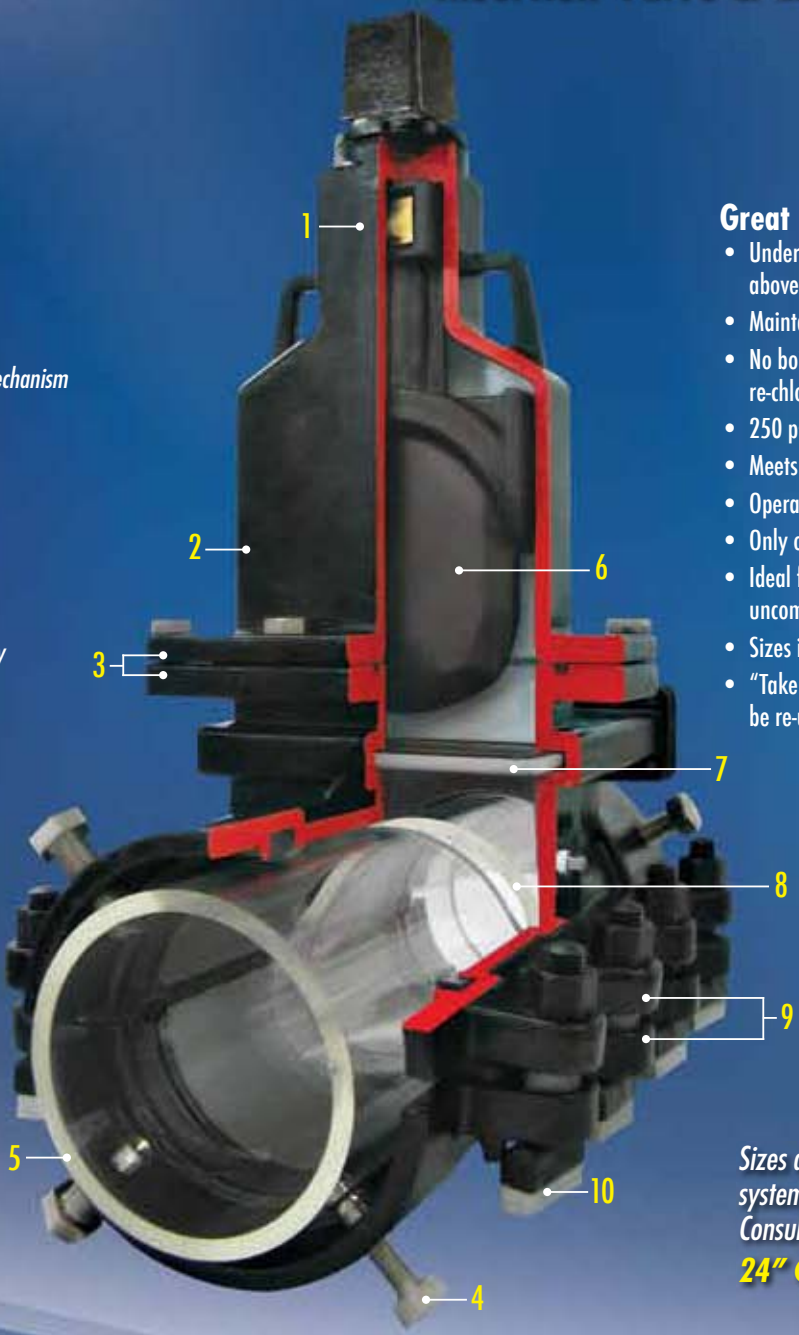

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DRY INJECTION OF SODIUM SORBENTS FOR AIR POLLUTION CONTROL

By Yougen Kong, Ph.D, and Michael Wood, SOLVAir Solutions/Solvay Chemicals, Inc.

Introduction

Coal-fired boilers in the utility power plants or process industry emit air pollutants, such as SO_2, SO_3, hydrochloric acid (HCl), hydrofluoric acid (HF) and Mercury. Ever stricter environmental regulations around the world demand efficient removal of these air pollutants.

One popular SO_2 control, or flue gas desulfurization (FGD), technology is wet scrubbing. In a wet scrubber, a liquid sorbent is sprayed into the flue gas in an absorber vessel. Most wet FGD systems use alkaline slurries of limestone or slaked lime as sorbents. Sulfur oxides react with the sorbent to form calcium sulfite and calcium sulfate.

While wet scrubbers are often used at large boilers due to their high SO_2 removal efficiency (> 95%), their high capital and O&M costs make them uneconomical for small utility boilers (i.e. < 250 MW), industrial coal-fired boilers, and waste-to-energy boilers. The majority of these boilers have neither enough physical space nor the capital funding necessary for wet scrubbers. Another drawback of a wet scrubber is that it makes SO_3 more visible as blue plume.

A good alternative air pollution control technology is dry injection of sodium sorbents (trona or sodium bicarbonate). In a dry sorbent injection system, sodium sorbent is injected into the hot flue gas duct and reacts with SO_2, SO_3, HCl, HF and some NO_x. Due to its low capital cost and ease of operation, dry injection of sodium sorbents is being used at more and more boilers,

Figure 1

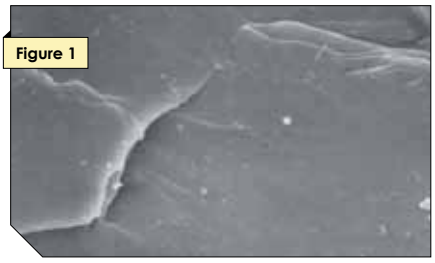
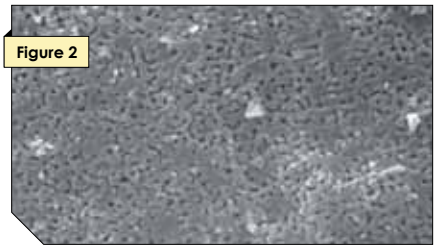


Figure 2



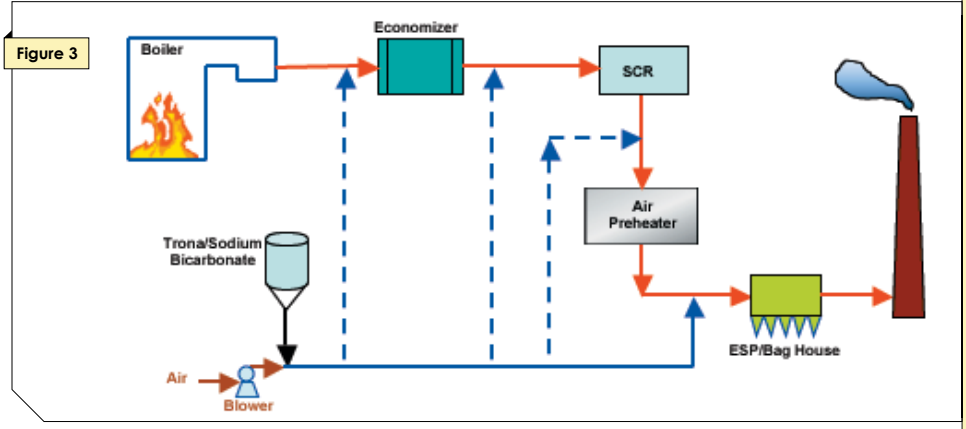
and is able to remove up to 95% of SO_2 and nearly all SO_3, HCl and HF.

With increasing implementation of Selective Catalytic Reduction (SCR) for NO_x control, there are higher concentrations of SO_3 in the flue gas. In addition to forming blue plume after exiting the stack because of condensation of the resultant H_2SO_4, SO_3 can react with NH_3 slip to form sticky NH_4HSO_4 (ammonium bisulfate or ABS) that can plug up the air preheater. Furthermore, SO_3 can pose serious corrosion problems to air preheater, electrostatic precipitator (ESP) and any downstream equipment. Among various SO_3 mitigation technologies, dry injection of sodium sorbents, such as trona, has been proven to be very effective and cost-competitive.

Principles of Dry Injection of Sodium Sorbents

In a dry sorbent injection (DSI) system, a fine powder, such as trona (Na_2CO_3 • $NaHCO_3$ • $2H_2O$) or sodium bicarbonate ($NaHCO_3$), is injected into the flue gas duct. After injection, either sodium sorbent is calcined into porous sodium carbonate (Na_2CO_3), which reacts with acid gases, such as SO_2, SO_3, HCl and HF. The resulting products (Na_2SO_4, NaCl and NaF) are collected by the particulate control device, such as an Electrostatic Precipitator (ESP) or bag filters. Figure 1 shows raw sodium bicarbonate under a microscope.

Figure 3



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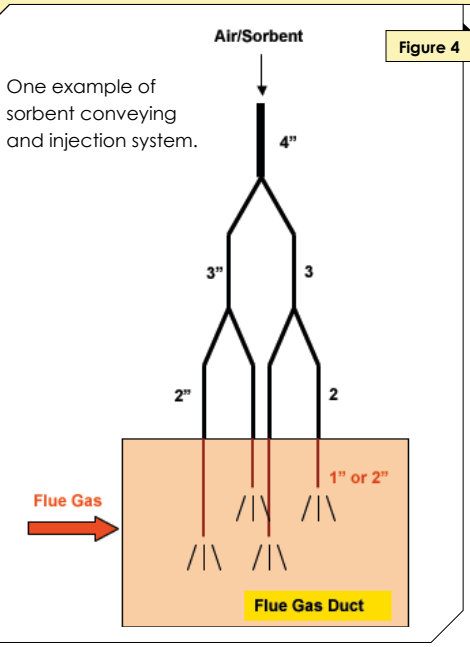


Figure 4

One example of sorbent conveying and injection system.

After being injected into hot flue gas (> 275°F), sodium bicarbonate or trona is calcined into sodium carbonate (Na_2CO_3), as shown in the following equations:

- $2NaHCO_3$ Æ $Na_2CO_3 + H_2O$ (gas) + CO_2(gas)
- $2Na_2CO_3 \bullet NaHCO_3 \bullet 2H_2O$ Æ $3Na_2CO_3 + 5H_2O$ (gas) + CO_2(gas)

The release of water vapor and CO_2 in the above calcination process creates numerous micropores inside the sorbent, a phenomenon called the "pop-corn" effect. The BET specific area of calcined sorbent is approximately 10 m^2/g. This relatively high surface area enables fast reactions between sodium carbonate and acid gases, such as SO_2, SO_3, HCl and HF. The photo of calcined sodium bicarbonate under a microscope is shown in Figure 2.

The overall reactions between calcined sodium sorbents and acid gases are as follows:

- $Na_2CO_3 + SO_2 + 1/2\ O_2$ Æ $Na_2SO_4 + CO_2$
- $Na_2CO_3 + SO_3$ Æ $Na_2SO_4 + CO_2$
- $Na_2CO_3 + 2HCl$ Æ $2NaCl + H_2O + CO_2$
- $Na_2CO_3 + 2HF$ Æ $2NaF + H_2O + CO_2$

The sorbent can be injected at almost any location of the flue gas duct, as shown in Figure 3, as long as the flue gas temperature is above 275 °F.

No supplemental water injection is needed when using sodium sorbents, unlike when using lime or hydrated lime. A simple blower delivers the sorbent into the duct through injection lances.

The efficiency of Dry Sorbent Injection (DSI) system depends on many factors, such as:

- Sorbent particle size: Finer particles result in better performance.
- Sorbent residence time in flue gas stream: Longer residence time gives more time for mixing and chemical reactions, thus better performance.
- Sorbent penetration and mixing with flue gas: Better sorbent penetration into flue gas and mixing gives higher removal efficiencies.
- Particulate control device used (ESP or Baghouse): Since sorbents can build up on the fabric filters of the bag house and provide a layer of sorbent for further reactions with acid gases, baghouse filters have higher efficiencies.
- Temperature at injection site: The minimum flue gas temperature at the sorbent injection should be at least 275 °F. Higher temperatures normally result in better performance. The recommended maximum temperature is 1500 °F.

The key of good DSI system design is to distribute the sorbent evenly in the flue gas so that the sorbent and acid gases will be well mixed. The desired design guidelines are as follows:

- Residence time: > 1 second
- Flue gas temperature: 275 ~ 1500 °F
- Conveying air: < 140 °F

Sodium Sorbents: Trona and Sodium Bicarbonate

The trona is produced in Green River, Wyoming. It is a naturally occurring mineral with a chemical formula of $Na_2CO_3 \bullet NaHCO_3 \bullet 2H_2O$ and its typical physical properties are:

- d_{50}: ~ 30 µm
- d_{90}: ~ 160 µm
- Bulk density: 49 lb/ft^3

Since it is produced as a fine powder, it is not necessary to mill trona. Although milling can increase the removal efficiency, the additional cost of equipment and maintenance have discouraged most users from using mills.

Sodium bicarbonate is produced in several locations in the US and its typical physical properties are:

- d_{50}: ~ 110 µm
- d_{90}: ~ 250 µm
- Bulk density: 68 lb/ft^3

Raw sodium bicarbonate is too coarse to be injected directly. Therefore, an air-classifying hammer mill or pin mill needs to be used. At one power plant, the particle sizes of milled sodium bicarbonate were d_{50}=12 µm and d_{90}= 30 µm.

Performance of Dry Injection of Sodium Sorbents

Both trona and sodium bicarbonate are effective in removing SO_2, SO_3, HCl and HF. In order to compare the performance of different dry sorbent systems, Normalized Stoichiometric Ratio (NSR) is used to represent sorbent feedrate. The NSR is expressed as:

"A GOOD ALTERNATIVE AIR POLLUTION CONTROL TECHNOLOGY IS DRY INJECTION OF SODIUM SORBENTS (TRONA OR SODIUM BICARBONATE)."

- mass of sodium injected
- mass of acid gas entering system
  NSR = mass of sodium theoretically needed to react with a unit mass of acid gas

(a) SO_2

Figure 5 and Figure 6 show the SO_2 removal rates vs. Normalized Stoichiometric Ratio (NSR) using trona or sodium bicarbonate, respectively.

The curves in Figures 5 and 6 were created with the application data of numerous systems over the last 20 years. Sodium bicarbonate is more efficient than trona in removing SO_2. However, the increased efficiency comes at a higher sorbent price. Several factors need to be evaluated to determine which sorbent is best for a specific application. Some of those factors include the level of SO_2 removal required, particulate control device used, injection location and flue gas temperature, plus many more. Generally speaking, trona should be used if the SO_2 removal rate is lower than 50%, and sodium bicarbonate should be the choice if over 70% of SO_2 must be removed. Anything in between requires a careful study of all factors in order to select an economical sorbent.

(b) SO_3

The vast majority of sulfur in coal is oxidized into SO_2 during combustion but a small portion – typically 1% to 2% – is further oxidized to sulfur trioxide (SO_3) in the boiler. If there is a SCR system for NO_x control, a small fraction of SO_2 is oxidized to SO_3 by the SCR catalyst. The amount of SO_2 oxidized in the SCR catalyst can vary from 0.3% to around 2%, with the current market driving toward 0.1% oxidation.

Although a wet scrubber is effective in removing SO_2, it can remove only some of the SO_3. Typically, the amount of SO_3 removed is marginal to perhaps as high as 30%. As the flue gas is rapidly cooled by the sprays of liquid in the wet scrubber, the vaporous sulfuric acid undergoes a shock condensation process that produces very fine sulfuric acid aerosol particles. These aerosol particles are, for the most part, too small to be effectively captured in the scrubber and are emitted into the air as a sulfuric acid mist, which forms a blue plume and causes opacity issues.

Figure 5

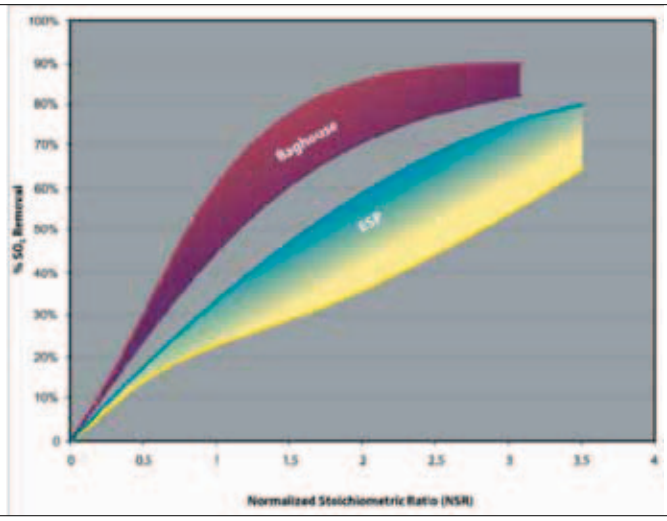
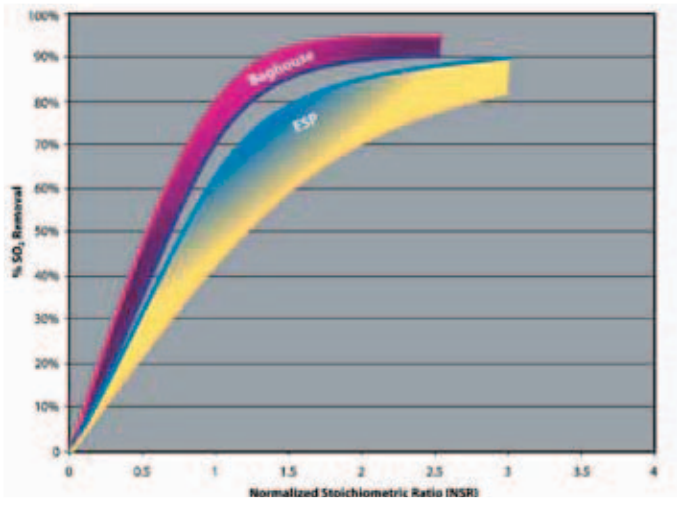


Figure 6



In addition to the blue plume, SO_3 can cause the following problems:

- Formation of ammonium bisulfate (ABS) in the SCR system. Depending on its concentration, SO_3 can also react with NH_3 under the catalytic conditions that exist in the SCR system at temperatures in the range of 530 °F to 630 °F. ABS is a sticky solid that can foul the SCR catalyst and air heater.
- Formation of ammonium bisulfate (ABS) in the air heater. SO_3 and ammonia (NH_3) will react to form ABS in the air heater if SO_3 is present in molar concentration in excess of the molar concentration of NH_3 and when the flue gas in the air heater cools to between 350 °F and 420 °F.
- Increased air heater fouling. Fouling of a regenerative air heater becomes serious when the flue gas temperature is below the SO_3 dew point and acid condensation occurs. The SO_3 dew point increases with SO_3 concentration.
- Increased corrosion to the downstream equipment.

Trona is very reactive with SO_3. At one power plant, trona was injected between the air preheater and ESP. The SO_3 was measured upstream of the trona injection ports and downstream of the ESP. Figure 7 shows one example of SO_3 removal performance with trona. Since the SO_3 concentration is

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Table 1

REMOVAL OF HCL AND HF BY TRONA AND SODIUM BICARBONATE				
	HCl at Stack (lb/MBtu)	HCl Removal Rate %	HF at Stack (lb/MBtu)	HF Removal Rate (%)
Trona	0.0011	98.8	0.0008	78.4
Sodium Bicarbonate	0.0013	97.8	0.0002	88.0
Permit Limit	0.0072		0.0026	

Figure 7

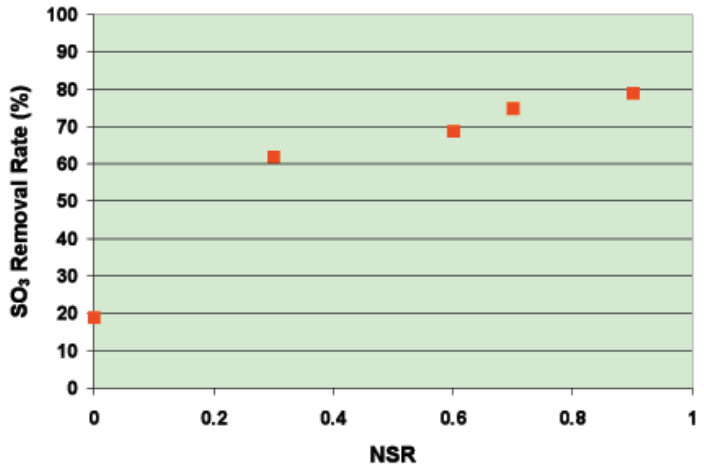
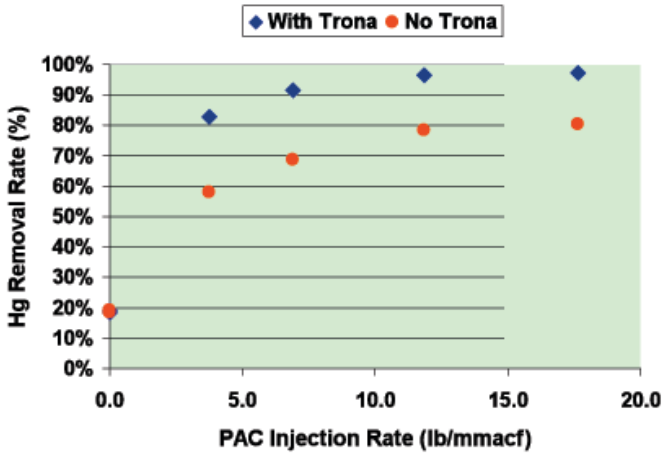


Figure 8



much lower than SO_2, high efficiency removal (i.e. > 95%) requires good mixing between trona and flue gas. In other words, the SO_3 removal efficiency is limited by the mass transfer, not the reactivity between SO_3 and trona.

Sodium bicarbonate is as reactive with SO_3 as trona. However, since sodium bicarbonate is also very reactive with SO_2, some injected sodium bicarbonate can be consumed in reacting with SO_2, which could result in higher operation cost if SO_2 is to be mitigated with other lower-cost methods.

(c) Mercury

As noted earlier, SO3 in flue gas can adsorb onto the fly ash and injected activated carbon, thus in competition with mercury for the active adsorption sites. Therefore, injecting trona to remove SO3 will greatly enhance mercury removal by fly ash and activated carbon. Figure 8 shows the effect of trona injection on the mercury removal by Powdered Activated Carbon (PAC). It was a 340 MW boiler with SCR and cold-side ESP. Trona was injected before the air preheater and powdered activated carbon was injected between the air preheater and ESP. Without trona, no more than 80% of the mercury was removed even at very high PAC feedrates. With trona injection at a NSR of 0.1 (based on SO2), high mercury removal rates (> 90%) were achieved even at low PAC feedrates. The SO3 at the SCR outlet was around 3 ppm. After trona injection, there was no measurable SO3, which was the key to the high mercury removal.

(d) HCl and HF

Trona and sodium bicarbonate are also very reactive with HCl and HF. Table 1 shows the HCl and HF removal performance of trona and sodium bicarbonate where the sorbent was injected upstream of the air preheater of a 100 MW coal-fired boiler. Around 98% of HCl and HF can be removed by injection of trona or sodium bicarbonate.

In addition to mitigating air pollutants, sodium sorbents are able to improve the performance of electrostatic precipitators. Some fly ash has high resistivity, which makes the capture of fine particulate material difficult with electrostatic precipitators. Injection of low-cost sodium sorbent, such as trona, is able to lower the resistivity of fly ash, and consequently improve the performance of ESP.

Conclusion

The high removal efficiencies of SO_2, SO_3, HCl and HF with trona and sodium bicarbonate have been demonstrated at many power plants over the last 20 years. Its low capital cost makes dry sorbent injection even more attractive in today's difficult economic environment. EE

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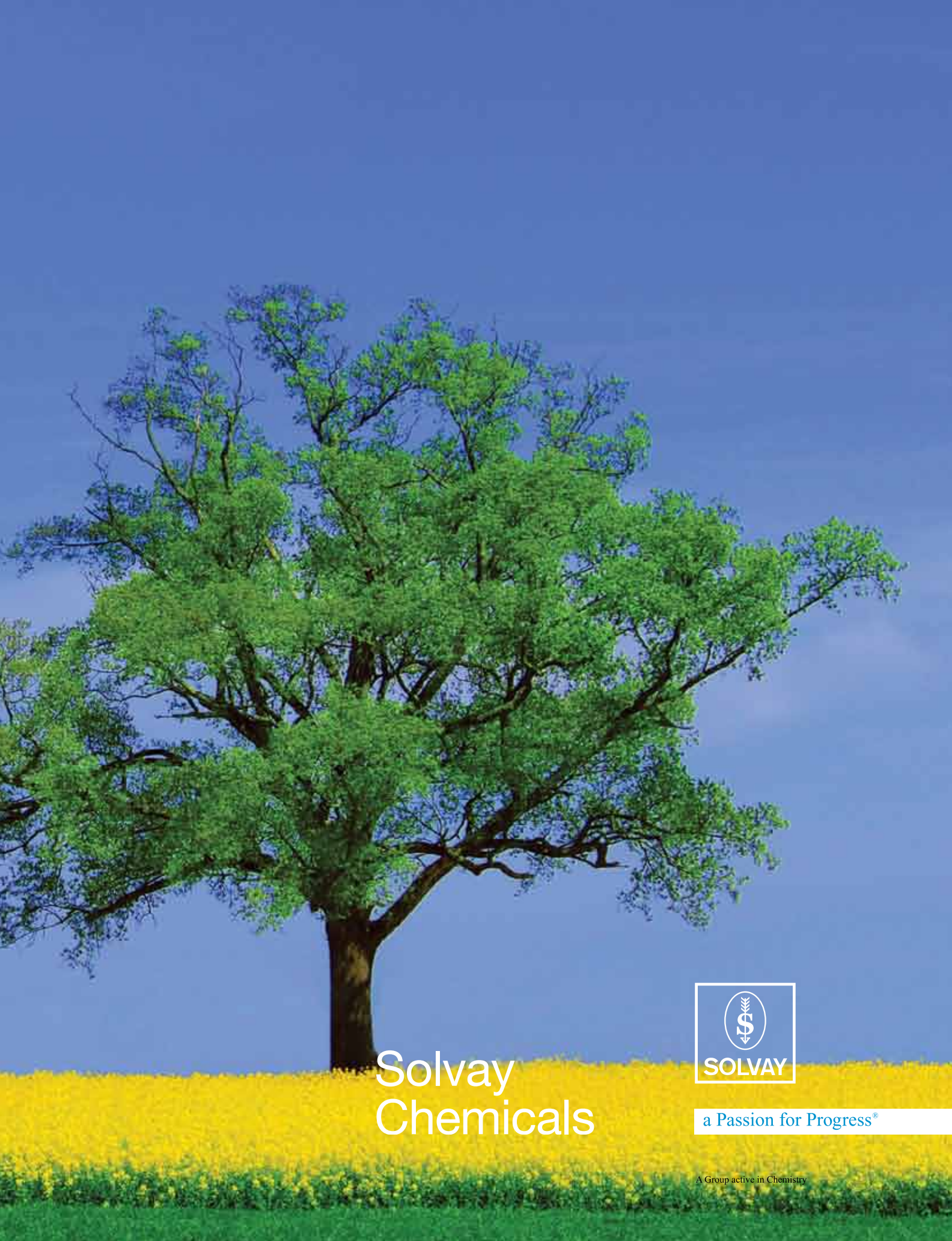

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The Excellence in Environmental Engineering® competition of the American Academy of Environmental Engineers seeks to identify, reward, and promote projects which typify quality in all facets of environmental engineering practice. Since being launched in 1989, the E3 competition has singled out projects and programs for recognition that testify to the genius of mankind and demonstrate a commitment to quality, comprehensive, and revolutionary solutions to real-world problems which improve human life and the environment they serve.

Thirty-five projects were submitted for the 2011 E3 Competition. An independent panel of distinguished judges scrutinized and selected the best of the best. Entries were received in the categories of Design, Environmental Sustainability, Operations/Mananagement, Planning, Research, Small Projects, and University Research. Each entry is judged based on five criteria:

- The demonstration of a comprehensive, integrated approach to the problem that considers all environmental media (i.e., air, water and land) in its solution.
- Quality as evidenced by the degree of user satisfaction and proven performance as established by written documentation.
- Originality and innovation, representing the application of new knowledge, a new application of existing knowledge or an innovative mix of old and new knowledge.
- The complexity of the problem or situation addressed.
- The extent the project contributes to or offers the prospect of contributing to social and economic advancement.

The judges awarded 18 awards: 1 Superior Achievement, 7 Grand Prizes, and 10 Honor Awards. Profiles of the winning entries are on the following pages. To view full profiles of the winning entries, visit *www.aaee.net* and click on *Excellence in Environmental Engineering Competition.*

AAEE would like to thank the 2011 panel of judges for their time and expertise in analyzing the 2011 Excellence in Environmental Engineering Competition:

- Lizette Chevalier, Ph.D., P.E., BCEE, D-WRE, F-ASCE
- Roa Chitikela, Ph.D., P.E., BCEE
- Nick Cooper, P.E., BCEE
- Tapas K. Das, Ph.D., P.E., BCEE
- Douglas H. Eckmann, P.E., BCEE
- Thomas Gillogly, Ph.D., P.E.
- John S. Hadfield, P.E., BCEE
- Jay M. Herskowitz, P.E., BCEE
- Frank D. Hutchinson, P.E., DEE
- Ashok Kumar, Ph.D., P.E., BCEE
- Nancy J. Manley, P.E., D.WRE, BCEE
- John T. Morris, P.E., BCEE
- James Newton, P.E., BCEE
- Walter R. Niessen, P.E., BCEE
- Jurek Patoczka, Ph.D., P.E., BCEE
- Dannie J. Pollock, P.E., BCEE
- Momo Savovic, P.E., DEE, CCM
- Jerry K. Snyder, P.E., DEE
- Jay M.K. Stone, P.E., BCEE

Superior Achievement Award

Talking Water Gardens

Albany, Oregon

ENTRANT: CH2M Hill
ENGINEER IN CHARGE: Mark Madison, P.E.

The Oregon Department of Environmental Quality recently adopted total maximum daily load (TMDL) limits for temperature to limit the impacts to cold-water fisheries in the Willamette River caused by high river temperatures. Discharge from the Albany-Millersburg Water Reclamation Facility was discovered to be too hot to meet the new temperature TMDL limit. In addition, local industry was required to relocate its point of discharge from a tributary stream to the river, which would require construction of an outfall diffuser and cooling towers. Instead of a typical engineering approach, the cities of Albany and Millersburg took a "value-focused" approach that resulted in using natural systems that provided solutions for both the municipalities and industry - and produced greater environmental, economic, and social benefits for the area.

Assisted by CH2M Hill, the cities teamed with ATI Wah Chang to create the Talking Water Gardens, a water treatment and reuse project that is the first public/private engineering project of its kind in the United States.

The 50-acre site has 37 acres of an integrated wetlands system that is designed to provide cooling and additional natural treatment before water is discharged to the Willamette River. The 13 acres of perimeter landscaping provides the opportunity to reuse effluent for irrigation to support more diverse habitat. The site, previously occupied by two abandoned lumber mills, sits between a railroad switchyard and a 200-acre environmental preserve bounded by creeks, a backwater river channel oxbow, and the Willamette River.

The functional wetland system is being developed as a public park designed to facilitate recreation and educate the community about the region's water systems. Kurisu International Landscape Architects specifically designed the waterfalls and special landscape features to encourage the public to walk the trails and discover the overlooks and habitat niches of the site - while experiencing the sounds and views of waterfalls that are passively cooling and treating water while soothing and calming the senses.

Constructed and currently growing plants to maturity to provide treatment, Talking Water Gardens will treat effluent in 2011 and be open to the public in spring 2012.

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PHOTOS AND CAPTIONS

1. *The total cost of the project is $12.9 million with $8 million coming from stimulus funds.*

2. *The existing native Oregon White Oak savannah was supplemented and expanded with 200 new trees to preserve habitat diversity.*

3. *The aerial view of the Talking Water Gardens site during construction clearly shows its strategic location on the Willamette River greenway at the edge of Albany and how Talking Water Gardens provides an ecosystem buffer between the railroad yard and the natural riparian zone.*

4. *The Lumber Mill Wetlands fill from this turbulent rapid designed to mix ATI Wah Chang water with Albany/Millersburg water.*

5. *Old growth logs recovered from the log pond are reused as habitat for pond turtles and amphibians.*

6. *Two miles of trails through the wetlands lead visitors to key features – to learn, relax, and enjoy.*

Grand Prize - Design

Arlington County Water Pollution Control Plant Upgrade and Expansion

Arlington, Virginia

ENTRANT: Malcolm Pirnie, the Water Division of ARCADIS
ENGINEER IN CHARGE: Nicholas O. Rodzianko, P.E., BCEE

For decades, in an effort to reverse high levels of pollution in the Bay and its harmful effects on plants and animals, the Chesapeake Bay Program has been working towards reducing nutrient discharges from wastewater facilities. In 2005, the Virginia State Water Control Board adopted more stringent regulations to limit nutrient discharges in the watershed.

An upgrade to achieve 'limit of technology' treatment at the Arlington County Water Pollution Control Plant (WPCP) will enable the facility to meet these environmental goals. The multi-year, $568 million upgrade and expansion of the 73-year-old facility, engineered by Malcolm Pirnie, was part of a massive capacity expansion that also enhances the plant's ability to handle significant wet weather flows.

Virtually every process and structure in the plant was renovated, expanded or upgraded. Treatment capacity was boosted from 30 million gallons per day (mgd) to 40 mgd. To upgrade the plant's existing biological nutrient removal process to ENR, existing polishing filters were replaced with innovative deep-bed denitrification filter technology, achieving levels for total effluent nitrogen and total phosphorus as low as 3 mg/L and 0.18 mg/L, respectively; this will significantly reduce the discharge of nutrients into the Four Mile Run stream, a tributary of the Chesapeake Bay.

Other improvements include new and upgraded equalization tanks to allow balancing flows and ensuring optimum treatment during wet weather peaks, when flows can increase up to fourfold. Creative design approaches overcame challenges of a tight site surrounded by homes, roads and waterways; multiple construction packages, creative logistics and staging, including a round-the-clock concrete pour, helped maintain uninterrupted operations during construction. Existing tanks and systems were retrofitted to provide new facilities, achieving sustainability goals.

As one of the first major wastewater treatment plants in the Chesapeake Bay watershed to achieve ENR treatment quality, the Arlington plant is a major contributor to the Bay's environmental quality goals, protecting this valuable resource for future generations.


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PHOTOS AND CAPTIONS

1. *Virtually every process and structure in the plant was renovated, expanded or upgraded. As a result of these improvements, the plant now provides enhanced biological nutrient removal for both total nitrogen and total phosphorus. Aerial view of the completed project showing the Washington, DC area in the background. Arlington County is now a major contributor to the Chesapeake Bay's environmental quality goals.*

2. *Construction of flow equalization tank FEQ2. Flow equalization improvements included two new concrete tanks which added 11.6 million gallons of storage capacity for a total of 14 million gallons of storage plus new pumps to manage wet weather peak flows that can be fourfold higher than average plant flows.*

3. *Construction of equalization tanks. Highly creative logistics and staging, including this round-the-clock concrete pour, helped maintain uninterrupted treatment plant operations during construction. To maintain flow while existing facilities were demolished to make room for new facilities, the engineers constructed two temporary 72-in-dia pipes under the new aeration basins.*

4. *Plant effluent discharges into Four Mile run. This view from the top of the De-Nite Filters shows how this project preserves the environment. A bike path runs adjacent to the plant and Four Mile Run.*

Honor Award - Design

Lake City Army Ammunition Plant

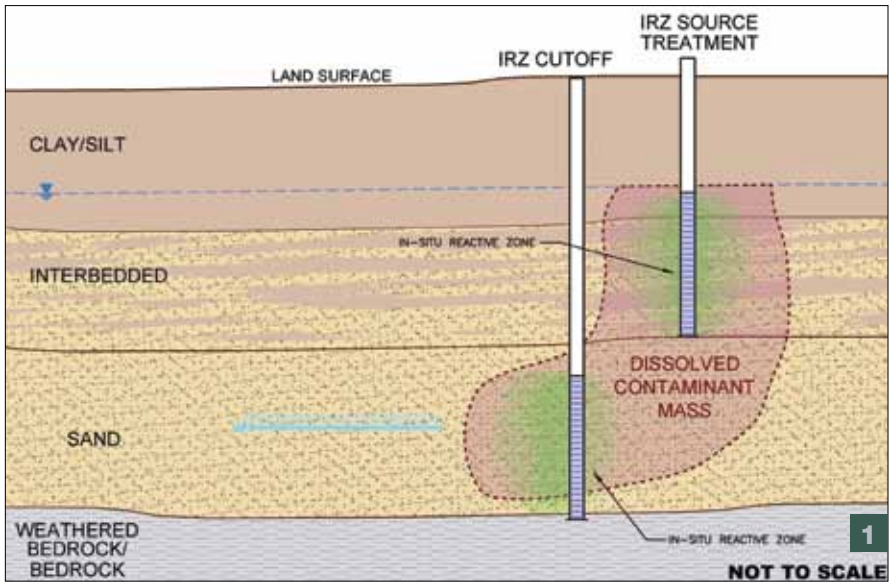
Independence, Missouri

ENTRANT: ARCADIS U.S., Inc.
ENGINEER IN CHARGE: Eric Matthew Panhorst, P.E.

ARCADIS was awarded a guaranteed, fixed-price remediation contract at the Lake City Army Ammunition Plant (LCAAP), a CERCLA site with significant soil and groundwater contamination. Aided by technical experts nationwide, ARCADIS developed innovative strategies to clean up over a million pounds of materials contaminated with chlorinated solvents, metals, petroleum hydrocarbons and explosive chemicals from abandoned disposal pits, firing ranges, and lagoons at the site. Thirty-three areas of concern were covered by the complex project, and offered significant challenges related to ongoing operations at the active plant.

One primary goal of the remediation systems was to change the dynamic of remediation at the site from energy-demanding groundwater extraction to a more sustainable injection process through the use of IRZ (in-situ reactive zone) technology.

Remediation at similar Superfund sites had historically been a lengthy process, taking many years to get through the various regulatory and administrative steps. ARCADIS managed to complete all activities, including remedial investigations, feasibility studies, Records of Decisions, Proposed Plans, remedial designs, and final remedy-in-place, within four years of the contract award.



PHOTOS AND CAPTIONS

1. *ARCADIS' patented in-situ reactive zone (IRZ) technology for chlorinated solvent treatment has been incorporated into the remedial actions in all three OUs at the Lake City site. IRZs are an energy efficient alternative to the existing groundwater pump and treat system for chemical containment of the dissolved-phase plumes associate with each source area. The IRZs allow for the incremental replacement of the high-energy pump-and-treat system with natural in situ bioremediation.*

2. *Fifteen years after the LCAAP was named a Superfund site by the U.S. Environmental Protection Agency, very little of the more than 1,000,000 pounds of mixed-waste solvent and petroleum hydrocarbon disposed at the site had been actively cleaned up. The U.S. Army, looking for innovation in design and implementation of complex remedial systems, turned to ARCADIS' Guaranteed Remediation Insurance Program (GRiP®) to provide the cost and schedule certainty coupled with world-class design. This alternate project delivery method promoted value-added thinking and the development of innovative and integrated solutions that has met the U.S. Army's aggressive schedule and cost goals for the LCAAP project.*

Honor Award - Design

Lower Baker Adult Fish Trap Upgrade

Concrete, Washington

ENTRANT: CDM/R2 Resources, Inc.
ENGINEER IN CHARGE: Frank Postlewaite, P.E.

PSE partnered with CDM and R2 Resource Consultants, Inc. to enhance fish populations in the Skagit watershed and to be compliant with the new Baker River hydroelectric relicensing requirements mandated by FERC.

R2 served as the design engineer and negotiator with government fisheries agencies to get PSE's FERC relicense approved. CDM designed and constructed new automated features to improve the capture and transport of the migrating adult salmon. The automated lift and sorting system was incorporated to sort the various species of fish into different pools, and/or to route certain fish species to a sampling station for classification and analysis; the electronic data management systems for collecting biological information about captured fish, and the new 'fish taxi' loading system, allowed for mechanized loading of fish into water filled trucks for transport upstream past the Baker dams.

Upon its completion in June 2010 (ahead of schedule and in compliance with relicensing conditions), a record fish count were captured and counted at AFT.

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PHOTOS AND CAPTIONS

1. *The upgraded facility features a modernized fish trap elevator and automated sorting facility. Designs are being implemented at additional hydroelectric facilities for Tacoma Power and PacifiCorp. Pictured is the exterior of the completed facility on the Baker River.*

2. *The improved water system, which pipes water from above the facility to below it, simulates a moving body of water to encourage fish to swim into the entrance and holding pools.*

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Grand Prize - Environmental Sustainability

Clayton County Water Authority Sustainable Water Supply Project

Morrow, Georgia

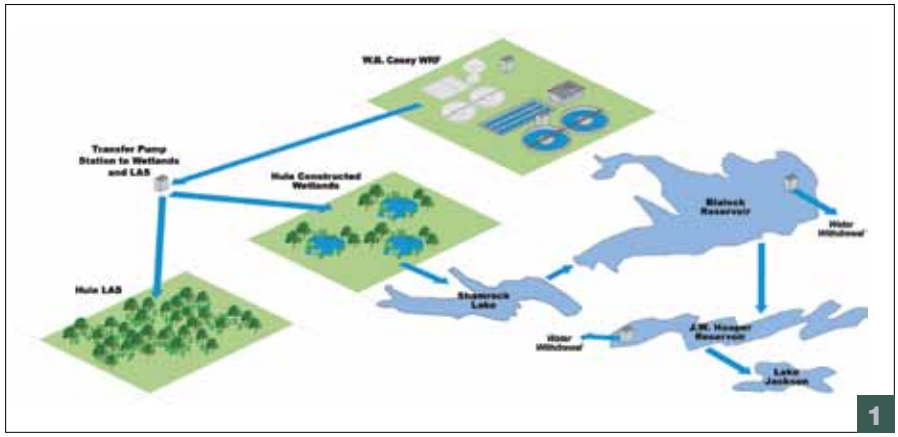
ENTRANT: CH2M Hill
ENGINEER IN CHARGE: Wayne D. Murphy, P.E.

Very few indirect potable reuse treatment systems are found in the United States, and most involve injection of treated wastewater into groundwater aquifers following intensive biological and chemical treatment. Clayton County Water Authority, in response to the need for increased wastewater treatment capacity and despite having limited available surface or groundwater supplies, partnered with CH2M Hill in developing a sustainable water supply through the use of constructed wetlands for recycling treated wastewater and recharging surface waters.

CCWA operated two land application systems – or spray irrigation fields – for wastewater treatment and disposal for almost 30 years. As the county matured into a densely developed urbanized area, additional large tracts of land for irrigation system expansion became limited. CH2M Hill assisted CCWA in identifying the use of constructed wetlands as a land-efficient, reliable, and sustainable option for both water treatment and water supply augmentation. Constructed wetlands are also proven to require much less energy and maintenance than land application systems because of the reduced need for pumping.

Throughout the conversion process into constructed wetlands, CH2M Hill provided engineering services during design and construction of all phases. The design component included the demolition and removal of existing irrigation piping, layout and grading of the wetland cells and associated structures and piping to allow for gravity flow, and layout of mains to convey the treated effluent into the constructed wetlands. CH2M Hill's services during construction included a full-time onsite inspector to guide construction, review submittals, act as a liaison between the contractor and CCWA, and monitor progress.

During the 2009 annual bird survey on CCWA properties, a total of 205 species of birds were observed. Of these, 142 were migratory species of songbirds, raptors, woodland birds, waterfowl, and shorebirds. A pair of nesting bald eagles at one of the reservoirs produced three eaglets during the 2009 nesting season.



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PHOTOS AND CAPTIONS

1. *This diagram shows how the man-made wetlands and existing reservoirs treat and supply CCWA's water system.*

2. *The much larger E.L. Huie Jr. Constructed Wetlands were developed in several phases and farther north of the Panhandle Road Wetlands. This photo shows the Huie wetlands during construction in October 2007.*

3. *The new constructed wetlands, such as the Panhandle Road wetland here, have enhanced bird habitat in the area.*

4. *The final phase of the Huie Constructed Wetlands was completed in September 2010, providing a total of 17.4 million gallons per day of water recycling.*

Honor Award - Environmental Sustainability

Asheville Sustainability Management Plan
Asheville, North Carolina

ENTRANT: CDM and Asheville, North Carolina
ENGINEER IN CHARGE: Jeffrey F. Payne, P.E., BCEE

CDM partnered with Asheville, NC, to create a sustainability management plan that provides an integrated approach for resource management to reduce the city's greenhouse gas (GHG) emissions by 2% each year until an 80% reduction is achieved.

The outcome of the plan was a consensus-based set of sustainability goals, a comprehensive list of action items, and an implementation plan for moving forward. This flexible strategy is helping Asheville reduce fuel consumption from commuting, city fleet vehicles, and mass transit; water consumption and energy use for water treatment and distribution; and waste production in city facilities and the larger community.

The plan has been awarded the 2010 Sustainability Award from the North Carolina Chapter of the American Planning Association and has also positioned the city to successfully secure funding through several federal grants totaling $1.6 million.

PHOTOS AND CAPTIONS

1. *Downtown Asheville can be seen from Town Mountain, part of the surrounding Blue Ridge Mountains. To protect the surrounding environment, the community is looking beyond energy and GHG reductions to create best practice recommendations to improve sustainable government and community operations.*

2. *Early reduction results create positive momentum. Since 2007, the city has surpassed its 3-year goal of a 6% GHG emission reduction by delivering an 8.42% reduction. This forecast compares the city's current GHG emission growth rates with its 2% annual reduction goal.*


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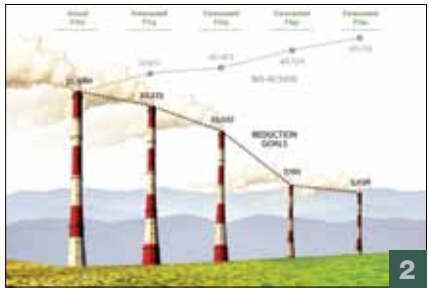
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Honor Award - Environmental Sustainability

Catawba County EcoComplex and Resource Recovery Facility Program
Newton, North Carolina

ENTRANT: CDM and CATAWBA
ENGINEER IN CHARGE: Joseph Wiseman, P.E., BCEE

CDM partnered with Catawba County, NC to create the Catawba County Regional EcoComplex and Resource Recovery Facility program. It involves multiple components including a landfill, a biosolids processing facility, a university research center, and businesses that reuse each other's waste products as energy sources or raw materials.

Its foundation is a biosolids processing facility that will dry biosolids from 10 local wastewater treatment plants with waste heat recovered from engines that convert Blackburn landfill gas into electricity, generating a product that will become fertilizer. Liquid waste will be injected back into the landfill to enhance waste decomposition and generate additional electricity. The wood gasification energy facility will use wood waste from an adjacent lumber processing company and pallet manufacturer to generate electricity for EcoComplex partners, nearly doubling the amount of green electricity generated from the landfill gas.

The EcoComplex has been featured on CNN and received several awards, including the Alliance for Innovation's Thomas H. Muehlenbeck Award for Excellence in Local Government.

PHOTOS AND CAPTIONS

Program recovers resources and maximizes renewable energy. The Catawba County Regional EcoComplex Resource Recovery Facility includes several existing and future elements, such as a landfill, a biosolids processing facility, biodiesel research center, and wood gasification energy facility. Geographic proximity allows partners to use each other's waste products – either as an energy source or raw material to produce their own products.

Grand Prize - Operations/Management

Recovery and Treatment of Construction Stormwater, Peace River Manasota Regional Water Supply Authority

Desoto County, Florida

ENTRANT: AECOM
ENGINEER IN CHARGE: Roberto Gonzalez, P.E.

Suffering from a continuing drought in Southwest Florida and facing high construction costs for its reservoir, the Peace River Manasota Regional Water Supply Authority (PRMRWSA) and AECOM developed a unique approach that saved an estimated $10 million in construction costs, yielded approximately 1.5 billion gallons of additional water supply during a drought and eliminated the greatest possibility for off-site environmental impacts.

To build the $171 million dollar reservoir, 800 acres of improved pasture, palmetto prairie and shallow herbaceous wetlands would be disturbed. Significant volumes of surface water were expected from stormwater runoff and groundwater seepage collected by an extensive shallow rim ditch system. This water would need to be pumped continuously to keep the reservoir site dry enough to be workable. The large site required continuous dewatering for 16 months with dewatering volumes approaching 10 mgd during July and August 2008. Project team members realized the challenge of managing stormwater runoff from such a large site in a manner to avoid environmental impacts and possible construction halts from excessively wet conditions. However, Southwest Florida was undergoing an extensive drought that was taxing both surface and groundwater systems alike and every possible water source was being considered. Recovery of this stormwater by treating it in the water plant became the best option. Turbidity in this stormwater runoff often exceeded 2,000 NTU. When combined with a diesel fuel spill the team was left to scramble to remove dozens of portolets from the site during named hurricanes.

"This project stands as a model to be emulated by regional water supply resource projects in the future."

This project reflects a successful conglomeration of ingenuity, innovative planning and hard work of many dedicated engineers, regulatory personnel and, most importantly, operations staff who tirelessly overcame the difficulties signified with implementing this project that this project stands as a model to be emulated by regional water supply resource projects in the future.


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PHOTOS AND CAPTIONS

1. *Bench-scale jar testing confirms full-scale treatability alum dosage for construction water runoff.*
2. *Successful treatment of construction water runoff recovers 1.5 BG.*
3. *The site was circled with a 4 mile long, 5 foot high containment berm to eliminate any potential for offsite discharges.*
4. *November 2009 - no lingering effects of the muddy construction water.*

In Pursuit of Excellence in Drinking Water Quality Management.

The Blue Drop Certification programme is an incentive-based regulation approach that monitors municipal drinking water quality performance against a set of stringent criteria, to ensure the supply of safe tap water continuously.

In Pursuit of Excellence in Wastewater Service Management

The Green Drop Certification Programme is an incentive-based regulation approach that monitors municipal wastewater services and enforces a set of stringent criteria to ensure responsible wastewater collection and treatment.

At Work to Ensure that the Quality of Drinking Water is Not Compromised

It takes up to 65 operations and management steps to continuously adhere to before the prestigious Blue Drop Certified status is obtained.

Green Drop refuses to allow Excellence to be flushed down the sewer

It takes up to 86 operations and management steps to continuously comply with to qualify for the prestigious Green Drop Certified status.

Blue Drop = Excellence^3 =
Excellent Operations × Excellent Management × Excellent Tap Water Quality

It is expected that a water supply system achieves a score of 95% when measured against the set criteria before a Blue Drop is awarded. However failure to meet this score does not necessarily mean that the tap water is of an unacceptable quality. Gain information on your tap water quality on the 'My Water" webpage.

The Quest to Protect the Environment from Our Waste

It is expected that a wastewater system achieves a score of 90% when measured against the set criteria before a Green Drop is awarded. The criteria includes various international best practice components in addition to legislated requirements to ensure that a new paradigm of excellence is created for the South African wastewater sector.

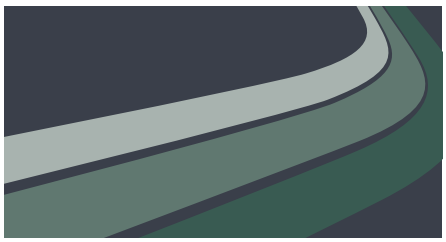
water affairs

Department:
Water Affairs
REPUBLIC OF SOUTH AFRICA

blue drop CERTIFICATION
drinking water quality REGULATION

green drop CERTIFICATION
waste water service REGULATION

www.dwa.gov.za/mywater



Honor Award - Operations/Management

Green and Blue Drop Certification for Incentive-Based Regulation in the South African Water Sector

South Africa

ENTRANT: Department of Water Affairs: Water Service Regulation (State Department)
ENGINEER IN CHARGE: Leonardo Manus

The most important determinants to public health and environmental integrity is the provision of safe drinking water and effective wastewater services. In South Africa, local municipalities are responsible for water services delivery. Regulatory and custodian of water resources, the Department of Water Affairs, was increasing concerned about the non-compliance of a high number of water and wastewater treatment works and the lack of public access to the required information regarding the status in their area.

The introduction of the Blue Drop (BD) and Green Drop (GD) incentive-based program rectified this gap. The certification processes assess, verify and recognize the excellence in the water (Blue) and wastewater (Green) industry and encourages municipal wastewater practitioners to work towards the achievement of Certification in acknowledgement of their state of excellence in wastewater services.

Since its first BD assessment in 2008/2009, a steady improvement in water purification management and water quality has been noted. Since its first GD assessment in 2009, preliminary results show that 52.5% of plants have progressed.

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PHOTOS AND CAPTIONS

1. *Hard at work. Blue Drop assessments in Mopani.*
2. *Blue Drop Certification.*
3. *Green Drop Certification.*

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Grand Prize - Planning

Town of Chatham MA Comprehensive Wastewater Management Planning (CWMP) Project

Chatham, Massachusetts

ENTRANT: GHD Inc. and Town of Chatham
ENGINEER IN CHARGE: William R. Hall, Jr., P.E., BCEE

The Town of Chatham (Massachusetts) is a small coastal community of approximately 7,000 year-round residents whose median income is less than the state average and relies on its fishing and tourist/vacation economies. Chatham has experienced large residential growth and environmental impacts due to the use of individual septic systems on small properties. These water quality problems were addressed through the Comprehensive Wastewater Management Planning (CWMP) Project. GHD Inc. was selected to complete this project.

It integrated a Town-wide CWMP Project with an environmental impact analysis and wastewater evaluations with estuarine and pond water quality evaluations, and evaluations of the Towns public water supplies. It is the first CWMP prepared to meet the new non-point-source watershed-based nitrogen TMDLs that are being developed for the coastal estuaries in southeastern Massachusetts.

"The capital cost was made affordable by spreading the project over all property owners in Town with the justification that all Town property owners will benefit from improved water quality."

Chatham is the first town to receive nitrogen TMDLs for the four estuaries that surround it on the elbow of Cape Cod. The TMDLs were developed by Massachusetts DEP and USEPA because nitrogen discharge from individual on-site septic systems was moving with the groundwater to the estuaries and causing eutrophication (over-production of algae) of the estuaries and endangered fishing, swimming, and boating activities.

The project also documented impacts to the Town's drinking-water supplies and fresh-water ponds from the septic systems and integrated solutions to these impacts into the CWMP. The plan calls for sewer extension over a 30-year period to collect and treat wastewater from these septic systems and meet the nitrogen TMDLs. It also calls for an expansion and upgrade of the wastewater treatment plant.

The capital cost was made affordable by spreading it over all property owners in Town with the justification that all Town property owners will benefit from improved water quality. The project also made excellent use of USDA and State grants, and low interest loans.

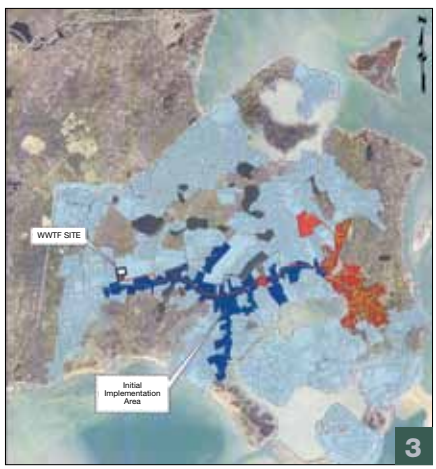
PHOTOS AND CAPTIONS

1. *Coastal beach and the outlet of the Bucks Creek/Sulphur Springs Estuary.*

2. *Aerial view of WWTF construction in November 2010 illustrating the major structures.*

3. *Initial Implementation Area illustrating:*
   - *The WWTF site location*
   - *Existing sewered area in red*
   - *Phase 1 sewer extension area in light blue*
   - *Initial implementation area in dark blue*
   - *Existing sewer lines in red and yellow*

4. *Phase 1 and 2 Sewer Expansion Areas illustrating the Phase 1 sewer extensions needed to meet the TMDLs and the Phase 2 sewer extensions to extend sewers to the rest of the Town. The individual sewersheds of both areas are also illustrated.*



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Honor Award - Planning

Surprise, Arizona Integrated Water Master Plan

Surprise, Arizona

ENTRANT: Malcolm Pirnie, the Water Division of Arcadis
ENGINEER IN CHARGE: Timothy Francis, P.E., BCEE

The City of Surprise, Arizona, recognized that its water resources could not meet the demands of projected extreme population growth. The role of reclaimed water and uncertain future development complicated the decision-making process in the water-short region.

Partnered with Surprise consultants and leaders, Pirnie developed an Integrated Water Master Plan that allowed for the simultaneous development of water, wastewater and reclaimed water resources. Pirnie developed two innovative decision-making tools to simulate and evaluate water resource needs for various development and service area scenarios and compare them to available water supplies.

These tools, The Demand Module and The Water Resource Model, were used interactively in a workshop where City oversight committees developed and conducted a range of 'what-if' water demand/supply scenarios to support high-level policy decisions about future water supply strategies. The Plan provided a defensible basis for managing growth, establishing a sustainable balance between water demands and supplies and enabling the City to live within its water means and fully utilize valuable reclaimed water resources.


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PHOTOS AND CAPTIONS

1. *Pirnie/ARCADIS's approach included workshops, study materials and simplified presentations. At this workshop participants are immersed in water resource planning inside the Decision Theater at Arizona State University, which developed techniques to help visualize the complexities of water resources planning. During the workshop, City oversight committees ran numerous real-time 'what if' water demand/supply scenarios and multiple combinations of critical water supply planning variables.*

2. *The City already uses reclaimed treated wastewater for non-potable purposes. The use of "purple pipe" within the City will increase as more direct delivery of reclaimed water is implemented as recommended in the Integrated Water Master Plan.*

Grand Prize - Research

Patented & Innovative Cost-Saving Control Device for Facility-Generated Volatile Organic Compound (VOC) Emissions, Marathon Refinery

Garyville, Louisiana

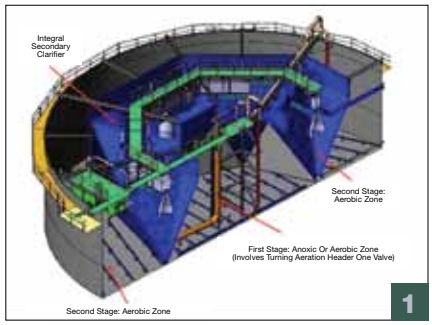
ENTRANT: ENVIRON International Corporation
ENGINEER IN CHARGE: Dr. Carl E. Adams, Jr., P.E., BCEE

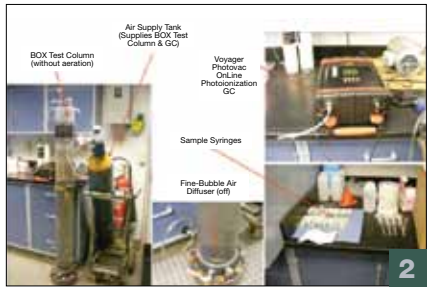
ENVIRON's innovative and cost-effective volatile organic chemical (VOC) biodestruction technology protocol will help refineries, organic chemical plants and pharmaceutical manufacturers meet air quality requirements with their patent-pending VOC BioTreat™ solution. ENVIRON's work in developing the protocols and resulting solutions was led by Dr. Carl E. Adams, Jr., ENVIRON's Global Practice Leader for Industrial Wastewater Management.

BWON, or Benzene Waste Operations NESHAP (National Emission Standards for Hazardous Air Pollutants), is a regulatory requirement for the refining industry requiring 98% removal of benzene or 95% total volatile organic compound (VOC) removal from air emissions. The bench-scale BOX testing and full-scale confirmation of the ENVIRON protocols exceeded regulatory requirements for benzene removal. The ENVIRON protocols and patent-pending testing devices likely can qualify most well-designed and properly functioning activated sludge systems as a cost-effective alternative control device. Initial results were achieved with benzene, although the protocols and procedures apply to any biodegradable regulated VOCs. Initial testing of this research was completed at Marathon Petroleum Company-Garyville Refinery in Garyville, LA.

Typically, benzene removal required significant capital investment in an activated carbon or incineration system. Refineries and chemical industries with a current activated sludge system that meet certain criteria would be strong candidates for ENVIRON's new VOC BioTreat™ approach. The application of the ENVIRON VOC BioTreat™ approach greatly reduces capital investment and long-term operational costs as compared to other approved technologies.

Currently approved by the Louisiana Department of Environmental Quality, other states may require localized testing and approvals. Each solution must be custom designed and engineered to meet the specific biological challenge at each site to ensure compliance with USEPA standards.





PHOTOS AND CAPTIONS

1. AIS Bioreactor Rendering.

2. Box Test Setup.

3. Photo of Core Column Simulation Setup in Field.

4. Full-Scale AIS System at MPC-Garyville.

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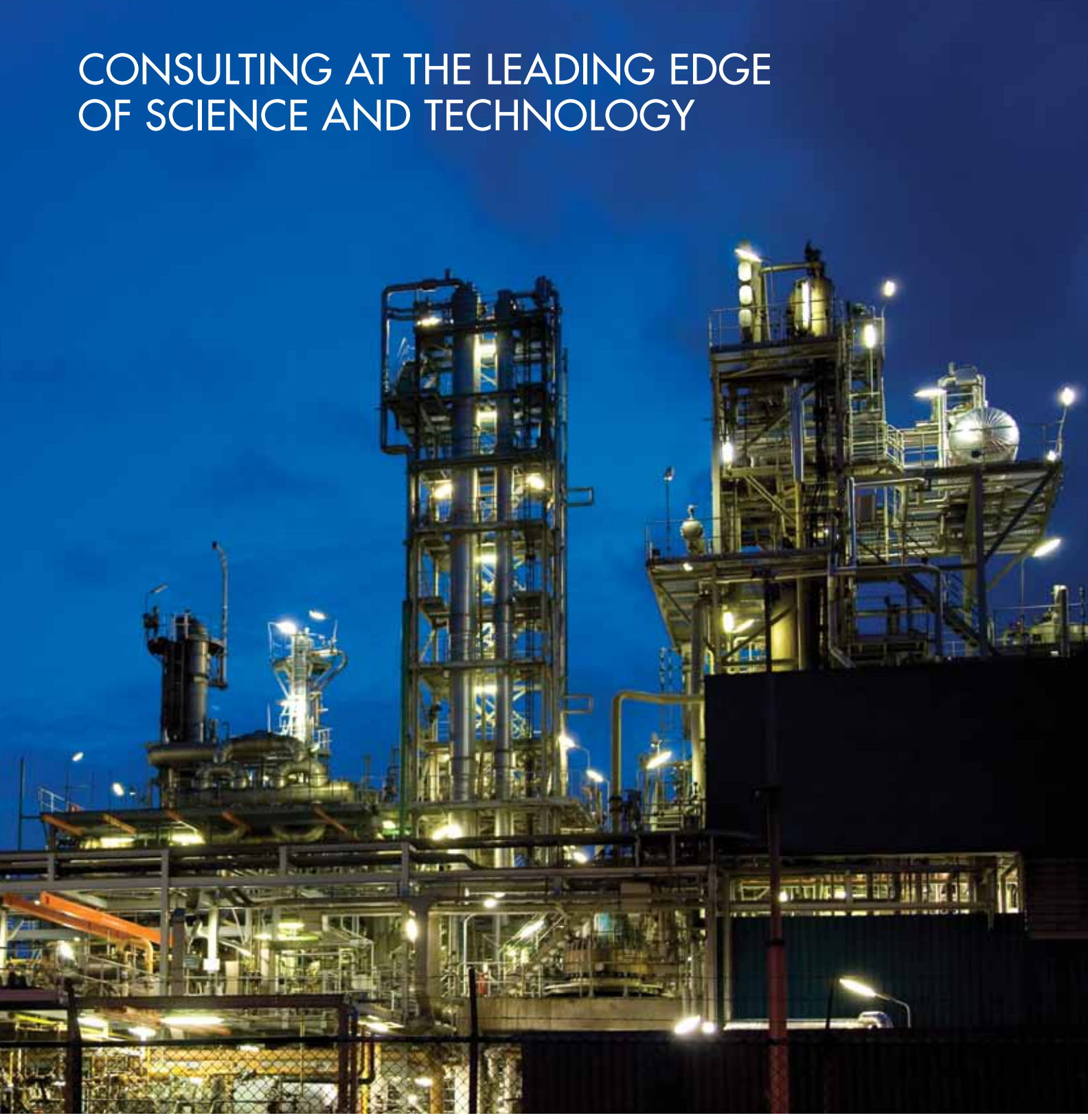
CONSULTING AT THE LEADING EDGE OF SCIENCE AND TECHNOLOGY



ENVIRON's groundbreaking VOC BioTreat™ technology garners 2011 AAEE E3 Grand Prize in Research.
ENVIRON congratulates Dr. Carl Adams and his team on this coveted accolade, which testifies to the firm's long-standing commitment to creative technical and scientific excellence and to client-focused service that advances the state of the industry. Clients around the world benefit from our unique ability to bring clarity to issues at the intersection of science, business and policy. Visit www.environvoc.com for more information on this patent-pending technology.

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ENVIRON

Honor - Research

Comparison of Parallel IFAS and ASP Reactors: Oxygen Transfer and Uptake, Nutrient Removal, Carbon and Energy Footprint

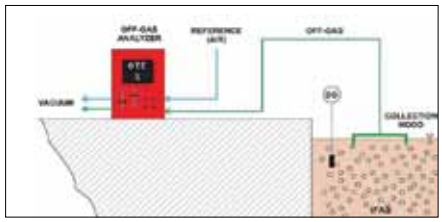
McLeansville, North Carolina

ENTRANT: Hazen and Sawyer, P.C.
ENGINEER IN CHARGE: Alan Stone, P.E.

The T.Z. Osborne Water Reclamation Facility, Greensboro's largest wastewater treatment plant, discharges 40 mgd to the Haw River, a tributary of Jordan Lake, and has a history of producing a high-quality effluent. The City is facing modifications to this facility in order to meet the Jordan Lake Nutrient Rules. Innovative testing was conducted on the City's Integrated Fixed-Film Activated Sludge (IFAS) pilot, a technology implemented at the facility in 2007 to determine its feasibility as a full-scale nutrient reduction strategy. The testing was performed as a collaborative effort between the City, Hazen and Sawyer, and Dr. Diego Rosso, an Assistant Professor at the University of California.

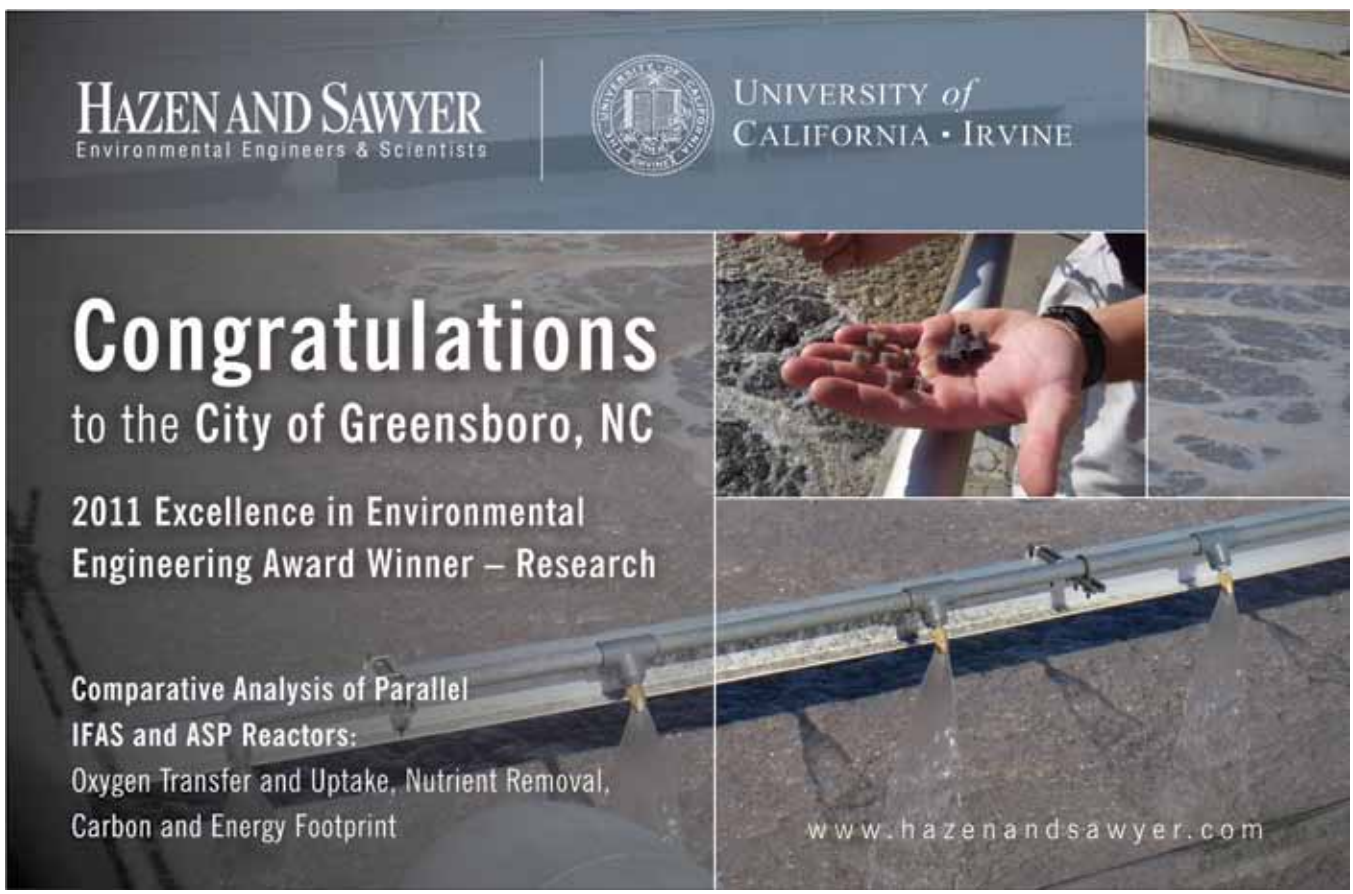
"The T.Z. Osborne Water Reclamation Facilty discharges 40 mgd to the Haw River"

The work, entitled Comparative Analysis of Parallel IFAS and ASP Reactors: Oxygen Transfer and Uptake, Nutrient Removal, Carbon and Energy Footprint, sheds light on the overall efficiency of the process. Identification of the oxygen transfer efficiency, air use, and oxygen uptake within the IFAS basin is important when considering the City's overall objective: identify the best process alternative that minimizes cost and energy consumption while meeting treatment objectives.



PHOTOS AND CAPTIONS

This figure shows the off-gas testing layout. This non-invasive testing method allows the concurrent measurement of the actual oxygen transferred to the water (oxygen transfer efficiency [OTE, %], oxygen transfer rate [OTE, kgO2/h], and oxygen uptake rate [OUR, mgO2/L/h].



Grand Prize - Small Projects

Catalytic Hydrogen Peroxide Treatment System

Hopewell Junction, New York

ENTRANT: IBM East Fishkill Environmental Engineering
ENGINEER IN CHARGE: Linda N. Daubert

In 2003, IBM East Fishkill (EFK) began an initiative with the New York State Department of Environmental Conservation to significantly reduce total dissolved solids (TDS) in the site's final effluent discharge to a small receiving stream. Over the next six years, IBM EFK investigated alternative technologies to remove sources of TDS from our manufacturing wastewaters and wastewater treatment processes, including the treatment of hydrogen peroxide. The largest quantity of hydrogen peroxide in site wastewater is present in the ammonia/hydrogen peroxide wastewater from semiconductor manufacturing. The former and existing treatment scheme includes the hydrogen peroxide removal process followed by an ammonia separation step, in which the wastewater is distilled for ammonium hydroxide removal. Through the end of 2009, the peroxide removal process was the industry standard: sodium bisulfite reduction, followed by sodium hydroxide neutralization. Both of these chemicals contributed high levels of TDS to our wastewaters and final effluent discharge, and were becoming increasingly expensive.

In early 2009, a catalytic enzyme process was qualified to replace the existing sodium bisulfite process to remove peroxide from the ammonia wastewater. This process uses a small quantity of enzyme to catalyze the decomposition of peroxide waste into water and oxygen, without contributing TDS to the site final effluent discharge and at a fraction of the cost. The design incorporated existing building equipment as much as possible, and was flawlessly integrated into the existing treatment system. Design and construction of the full-scale peroxide treatment system was completed in the second half of 2009 at a cost of $550,000. This new treatment process eliminates all use of sodium bisulfite and the subsequent sodium hydroxide for acid neutralization. IBM was assisted by CH2M Hill for detailed design, and Whiting-Turner Corporation for construction management.


1


2


3

PHOTOS AND CAPTIONS

1. *The former system used over 645,000 gallons/year of inorganic and hazardous chemicals. The new enzyme treatment is biodegradable, is derived from a renewable source, and uses only 200 gallons/year.*

2. *The IBM East Fishkill Facility is a world class leader in semiconductor chip and packaging development and manufacturing. The continual innovations in technology require equally rapid and innovative environmental solutions. The Facility's environmental group is responsible to support the site's multiple 24/7 manufacturing processes while providing comprehensive solutions to meet the corporation's policies.*

3. *The ammonia/peroxide wastewater was identified as having one of the largest contributors of TDS, through hydrogen peroxide treatment, which is followed by an ammonia separation step, in which the wastewater is distilled for ammonium hydroxide removal. Through the end of 2009, the peroxide removal process was the industry standard: sodium bisulfite reduction, followed by sodium hydroxide neutralization.*

Honor - Small Projects

Wainwright Short Range Radar Station Interim Removal Action

Wainwright, Alaska

ENTRANT: Jacobs Engineering Group, Inc.
ENGINEER IN CHARGE: Todd Kasteler, P.E.

Jacobs Engineering Group Inc. collaborated with the U.S. Army Corps of Engineers, Alaska District, with input from the US Air Force and State of Alaska regulatory agencies, to investigate and remediate a remote Short Range Radar Station Cold War Ear landfill along Alaska's Arctic Slope.

The Wainwright Short Range Radar Site (SRRS) Interim Removal Action (IRA), completed during the 2010 winter field season, successfully removed 4,500 tons of fuel and PCB-contaminated soil from an eroding landfill. Over 350 tons of scrap metal, 30 tons of tires, and 1600 pounds of batteries were transported off site and recycled. Potentially hazardous materials, liquid waste and source materials including asbestos material, paint, partial lead acid batteries, alkaline batteries, lubrication oil, insulation resin, oil filters, transformers, and capacitors were all successfully removed.

Despite numerous challenges, the project was accomplished under budget and ahead of schedule.

PHOTOS AND CAPTIONS

1. *Sea ice staging areas and access routes were used to facilitate the Wainwright Short Range Relay Station landfill interim removal action. Over twice the quantity of contaminated soil was discovered requiring a continuous 24-hour work schedule in order to complete the project before the spring thaw and ice route disintegration.*

2. *Jacobs field staff mobilize to eroding landfill site on the Arctic Ocean to conduct a two-month long winter removal action.*

Grand Prize - University Research

The Hydrogen-Based Membrane Biofilm Reactor: A Versatile Platform for Oxidized Contaminants Removal

Tempe, Arizona

ENTRANT: Arizona State University, Center for Environmental Biotechnology & School of Sustainable Engineering and the Build Environment
ENGINEER IN CHARGE: Bruce E. Rittmann, Ph.D., NAE, FAAAS

Dr. Bruce Rittmann, Director of the Swette Center for Environmental Biotechnology in the Biodesign Institute at Arizona State University, has created the hydrogen-based membrane biofilm reactor (MBfR) device that combines microbiology with membrane technology.

The MBfR delivers H_2 gas to bacteria that accumulate naturally on the outer surface of a gas-transfer membrane. The bacteria extract electrons from the H_2 and use the electrons to reduce one or many water contaminants to harmless forms. The contaminants that can be removed in the MBfR include nitrate, perchlorate, selenate, chromate, and trichloroethene (TCE). Except for nitrate, these contaminants are emerging – meaning there is no reliable and cost-effective treatment technology yet available.

The key to the success of the MBfR is that it delivers H_2 directly to the biofilm by its diffusion through the wall of the gas-transfer membranes. This makes H_2 delivery nearly 100 percent efficient and virtually self-regulating. In essence, the bacteria in the biofilm "pull" the H_2 through the membrane wall when they consume H_2.

The MBfR technology has been extensively tested at bench-, pilot-, and field-scale for its effect on many contaminants individually or in mixtures. It is a versatile platform technology that can be used in many water-treatment settings: drinking-water sources; ground or surface waters that must be cleaned up; industrial and agricultural wastewaters; and municipal wastewater. It is licensed and being commercialized by APTwater, Long Beach, California.

PHOTO AND CAPTION

1. A pilot-scale MBfR at La Puente, CA for nitrate and perchlorate removal. The pilot-scale MBfR simultaneously reduced nitrate (~ 25 mg N/L) and perchlorate (60 µg ClO4-/L) to 0.5 mg N/L and 4 µg ClO4- /L. respectively.

Honor - University Research

Organic Gas Capture for Effective Reuse or Disposal

Champaign, Illinois

ENTRANT: University of Illinois
ENGINEER IN CHARGE: Mark J. Rood, Ph.D., BCEEM

Mark J. Rood, with his research group and collaboration with K. James Hay and Byung J. Kim of ERDC-CERL, has successfully integrated environmental engineering principles, material science properties pertaining to activated carbon fiber cloth (ACFC), and heat and mass transfer principles to develop innovative and high quality electrothermal swing adsorption (ESA) systems to capture and recover or effectively dispose of organic vapors before they are emitted to the atmosphere.

Many organic vapors that are emitted to the atmosphere do not have sufficient economic value for recovery, so a second innovative ESA system to dispose of the organic gases in a more effective manner than was previously possible is now available.

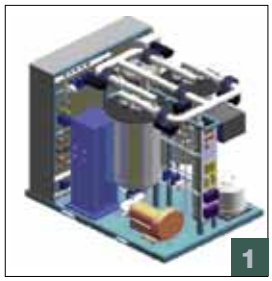
These ESA systems solve challenging problems because of the complexity of capturing very dilute multicomponent organic gases from air streams at high volumetric flow rates while providing for reuse of the organic vapors or effective disposal in an energy efficient and competitive manner. These systems are highly selective for organic gases, provide results that are encouraging for long-term applications in realistic industrial settings, and show economically competitive promise.

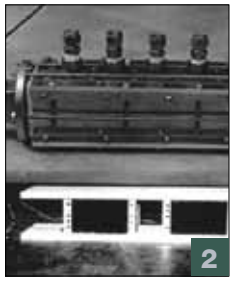
PHOTOS AND CAPTIONS

1. Schematic of pilot scale VaPRRS.

2. First Prototype of bench-scale VaPRRS adsorber with flat plate ACFC.

3. Second prototype of bench-scale VaPRRS with cylindrical ACFC cartridges.





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Honor - University Research

Pilot Plant Development for Fungal Value-Adding to Low-Value Ethanol Plant Co-Product

Ames, Iowa

ENTRANT: Iowa Energy Center and Center for Crops Utilization Research, Iowa State University with MycoInnovations
ENGINEER IN CHARGE: J. (Hans) van Leeuwen, Ph.D., P.E., BCEE

Iowa State University researchers have developed a process on pilot scale that will make the production of ethanol from corn more economical. This process converts liquid leftovers from corn fermentation and distillation into a high-quality animal feed that can potentially be used to make human food or dietary supplements.

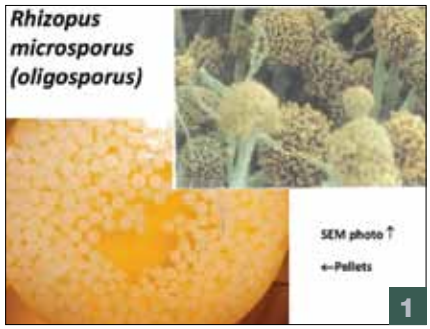
Unlike flash evaporation, the energy-intensive process used to create the less-nutritious syrup, this process harvests Rhizopus microsporus. Rhizopus microsporus is a food-grade fungus containing essential amino acids important in animal nutrition. The team also reports that the fungal process purifies the thin stillage, facilitating greater opportunities for recycling the water recovered internally in the ethanol production process.

Professor Hans van Leeuwen wants to ultimately develop the product further for human nutrition and believes it to be a valuable supplement with the potential to alleviate malnutrition in developing companies. He reported that various visitors to the fungal research facilities have sampled and tasted the fungal product. Full-scale implementation of the research could stimulate the economy by making ethanol production more profitable and creating hundreds of additional jobs in Iowa.

PHOTOS AND CAPTIONS

1. SEM Photo.

2. Iowa State University and MycoInnovations.



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Initiated by the U.S. Army Corps of Engineers, U. S. Geological Survey, and the Natural Resources Conservation Service, this nationally attended program entails five days of presentations in eight program tracks, workshops, poster sessions, field trips and coffee-house discussions dedicated to current topics in ecosystem restoration.

Several sponsorship levels are available. Platinum, Gold and Silver sponsors receive complimentary registrations and exhibit space for one or more 10'x10' exhibit booths where you can demonstrate equipment and showcase services before attendees from governmental, private, non-profit, and contracting organizations.

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—Timothy D. Feather, Ph. D.
Vice President, CDM, Carbondale, IL
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