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The deadline for submitting news for

the April 2003 AEESP Newsletter is March 1, 2003. Details regarding news submissions are on page 4.

AEESP membership

The AEESP membership application may be downloaded from the AEESP website, <http://www.aeesp.org/org/membership.html>, or requested from the AEESP business office in an email message to joanne@aeesp.org.

President's Letter

Serving on the AEESP Board of Directors has been challenging, inspiring, and rewarding. I have found that the individuals who serve on the Board and on the numerous AEESP committees are driven by a sincere desire to improve the field of environmental engineering and science through research and education. It has been a great pleasure to be a part of this, and it is a great honor now to lead AEESP.

Before looking forward, I would like to reflect on the recent past of this organization. I am fortunate to have been preceded by several wonderful recent presidents, each of whom has made great strides in advancing this organization. In 1997-98, Bruce Logan's initiatives resulted in a change in the name of the organization from AEEP to AEESP, in recognition of the importance of science in the field of environmental engineering. Under Kim Gray's leadership (1998-99), the board made a bold decision to enter into a period of deficit spending so that AEESP could hire a Washington contractor and play a larger role in affecting environmental policy and research funding. Robin Autenreith (1999-2000) followed through with this initiative and because of AEESP's efforts, one of our members, Dick Luthy, was placed on the NSF Advisory Committee in Environmental Research and Education. When Domenico Grasso was president (2000-01), he proposed a fundamental change in the structure of the officers in which there would be a new position of President-Elect. If approved by the Membership, this change will significantly streamline the functioning of the executive committee by providing the President with a year of advance planning. Finally, Mike Aitken (2001-02) has just finished a very active year that included coordinating, together with Phil Byer at the University of Toronto, the AEESP / AAEE conference in August. Mike has also formalized a plan to increase the frequency of our conferences to a biennial cycle, starting in 2005.

Over the past two years that I have spent on the Board, two themes have crystallized as important current issues for AEESP. One is that the field of

environmental engineering has emerged as a well-defined field, inclusive of but significantly beyond the traditional areas of water and wastewater treatment. While we sometimes struggle to define what is environmental engineering, we all agree that it includes all environmental media (including air), all spatial scales (from nano-scale to global scale), and a diverse range of applied sciences (including molecular biology and the geologic sciences). Increasingly, our members are working on research that crosses traditional disciplinary boundaries, and requires collaborative links not only with other scientists and engineers but also economists and policy analysts. *How should AEESP encourage and enable this diversification without fragmenting the community?* I see a number of ways to address this issue. We must encourage participation from individuals in underrepresented areas of environmental science and engineering, such as those who work on air pollution. We can expand our horizons to other conference venues, while maintaining a presence at WEFTEC. (Bruce Logan's initiatives to organize AEESP sessions at ACS are a step in this direction.) We should explore what role AEESP should play in creating a new professional society in environmental engineering. This follows up on a recent NSF-funded workshop to explore whether or not there should be a professional society in environmental engineering. Finally, I will explore the possibility of adopting a journal which would be centrally targeted to AEESP and provide an effective forum for communicating research findings, innovations in education, conference proceedings, and AEESP business.

The second emergent theme is that environmental scientists and engineers must play a leadership role in affecting policies regarding environmental issues and research funding. To a large extent, AEESP is already meeting this need. For the past four years, we have been involved in Congressional Visits Day, largely due to the ongoing participation of Mort Barlaz, Chair of the Government Affairs Committee. This has increased AEESP's profile in

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jfetzn@uiuc.edu

The AEESP Newsletter online:

www.uidaho.edu/aeesp

Washington. AEESP representatives have recently (and in the past) met with NSF officials to continue to deliver the message that engineers play an important role in scientific discovery and in finding solutions to environmental problems. Finally, Nick Clesceri has fostered the development of CLEANER which can serve as a research forum and funding mechanism for field research in environmental science and engineering.

Government Affairs Committee meets with NSF Assistant Directors

On November 13 and 14, Mike Aitken, Mort Barlaz, Dave Dzombak and Catherine Peters met with Dr. Margaret Leinen, who is both the Assistant Director for Geosciences as well as the Assistant Director for Environmental Research and Education at NSF. The meeting was a follow-up to comments submitted by AEESP in August on a draft of NSF's 10-Year Agenda for Environmental Research and Education. (The text of AEESP's comments is available on the AEESP web site.) Dr. Leinen is responsible for the development of this agenda, working with a committee of both internal and external advisers that includes AEESP member Dick Luthy. Also participating in our meeting were Dr. Bruce Hamilton (BES Division Director), Dr. Esin Gulari (Assistant Director of the Engineering Directorate), and Dr. Margaret Cavanaugh (a key NSF representative on the committee that drafted the 10-Year Agenda).

The comments submitted by AEESP were supportive of NSF's overall agenda but expressed concern that the document failed to recognize the role that engineers can play in the translation of scientific discovery into workable solutions for current and emerging environmental challenges. Among the 134 comments received by NSF, AEESP's were one of few submitted by people or organizations that appeared to represent engineering organizations. Based on discussions during the meeting, it appears that the final draft of the 10-Year Agenda will recognize more explicitly the role of engineering as part of a comprehensive strategy for addressing complex environmental issues.

These are activities that as President I plan to support and enable. These, and I am sure numerous other important issues, will make for a busy year as President. I am fortunate to have a great Board of Directors to work with. As always, the Board welcomes your input, and your volunteer service on committees.

Catherine A. Peters
President, AEESP

During the meeting, it was asked how the 10-Year Agenda might be used and it was agreed that the real test of the Agenda would be the resulting budget allocations and requests for proposals (RFPs). The need for RFPs to be written such that engineers have the potential to be competitive was stressed. Also, participation of engineers on review panels was emphasized. The interdisciplinary nature of environmental engineering and science and the fact that many of our members are also members of other scientific societies (e.g., AIChE, ASCE, ASM, AGU, ACS, ASME) was also pointed out.

While these comments were generally well received, the NSF representatives emphasized that in all the RFPs they issue, NSF must be sensitive to their mandate from Congress and must avoid overlap with mission agencies such as DOE and EPA. It is clear that it will be important to continue to remind people in NSF of the important contributions that engineers can make. Catherine Peters will be providing suggestions to both Drs. Leinen and Gulari of AEESP members who would make strong candidates for NSF's external advisory boards.

Dr. Leinen also pointed out that NSF needs the support of its "community" (which includes potential grant recipients). This support includes communicating with program and division directors on initiatives that the community does or does not agree with. Also, elected representatives can be contacted to encourage increased funding for NSF and to highlight the importance of environmental research and education. The key representatives are the chairs of the Science Committee and the Appropriations Committee in both the House and Senate.

President Bush signs NSF Doubling Act into law

At a White House ceremony on December 19, President George W. Bush signed historic legislation to double the budget of the National Science Foundation (NSF) in five years.

The National Science Foundation Authorization Act of 2002 (H.R. 4664) authorizes a budget increase of 105 percent for the NSF, from \$4.8 billion in FY 2002 to \$9.8 billion in FY 2007. The National Council for Science and the Environment (NCSE) worked with other scientific organizations to promote this legislation, which passed Congress on November 15, 2002.

“This is landmark legislation,” said Science Committee Chairman Sherwood Boehlert (R-NY), who championed the bill in the House. “From our nation’s students, to our economy, and to our security, the fruits of this effort will be enjoyed for many years to come.”

Senator Edward Kennedy (D-MA), who sponsored the bill in the Senate, said, “I am pleased the president has signed the National Science Foundation Reauthorization Act of 2002. It is the product of extensive bipartisan and bicameral negotiations. Few people realize how influential the NSF has been on their daily lives.”

“These efforts will pay off in the form of continued scientific breakthroughs that will improve our lives in ways that we can only imagine today,” said Nick Smith (R-MI), Chairman of the House Science Subcommittee on Research.

Rep. Eddie Bernice Johnson (D-TX), Ranking Member of the Science Subcommittee on Research, lauded the bill, “This is truly an historic piece of legislation for science policy in the United States that will have a profound and lasting effect on the future prosperity of our nation... I look forward to working with my colleagues on both sides of the aisle and in the other body to ensure that NSF is fully funded under these new authorization levels.”

“Passage of this bill is a great achievement,” said Rep. Vernon Ehlers (R-MI). “Doubling the NSF budget has been a goal that I have worked on since coming to Congress. The research results, while not clear now, will reap huge benefits in the future.” He added, “I am especially pleased that this legislation incorporates my proposal to develop master teachers with strong backgrounds in math and science.”

The final NSF authorization bill incorporates provisions from four other bills: - National Mathematics and Science Partnerships Act (H.R. 1858) - Technology Talent Act (H.R. 3130) - National Science Education Act (H.R. 100) - Plant Genome and Gene Expression Research and Development Act (H.R. 2051).

An extended version of this article, including a budget table, will be posted at <http://NCSEonline.org/Updates>. For further information, please contact Dr. Craig Schiffries (E-mail: schiffries@NCSEonline.org).

The National Council for Science and the Environment (NCSE) is a non-profit organization working to improve the scientific basis for environmental decisionmaking. NCSE is supported by nearly 500 academic, scientific, environmental, government and business organizations.

2005 AEESP education & research conference

Having just completed another successful conference, AEESP is planning for the next education and research conference. The Board has decided that this will become a more frequent, and regular event — the next conference is scheduled for 2005, and future conferences will be biennial events thereafter. To set the groundwork for the 2005 conference, and for the future regular conferences, a Conference Planning Committee has been established. The committee is chaired by Chuck Haas (Drexel), and members are Kathy Banks (Purdue), Jacimaria Batista

(UNLV), Paige Novak (Minnesota), Dan Oerther (Cincinnati), Bart Smets (Connecticut), Rick Diz (Gannon), Tom Holsen (Clarkson), and Rich Corsi (Texas). Individuals with comments on what future conferences should contain should contact Chuck Haas. In the next few months, the committee will be developing guidelines for proposals from interested host institutions and will then be soliciting proposals from interested universities to host the 2005 meeting.

CLEANER Workshop 2 held in Minneapolis

The second workshop to develop the concept of **CLEANER**, a proposed research funding initiative in the National Science Foundation’s environmental engineering program, was held in Minneapolis, October 20-22, 2002. The workshop was organized under the leadership of an AEESP group, the Path Forward Committee, assembled by Nick Clesceri of NSF, and it was hosted by Patrick Brezonik, Water Resources Center and Department of Civil Engineering at the University of Minnesota. Approximately 55 environmental engineers and scientists from academic institutions across the United States and representatives from several federal science agencies participated in the workshop. **CLEANER** stands for “Collaborative Large-scale Engineering Assessment Network for Environmental Research” and it is proposed as a new approach for doing research on large-scale environmental pollution problems. The approach will take advantage of the rapid developments taking place in sensor technology for a wide array of physical, chemical and biological attributes of environmental systems, as well as advances in data telemetry, cyberinfrastructure, and large-scale modeling and analytical capabilities. Workshop participants heard presentations on these topics and joined in discussions to define the central concept of the initiative: environmental field facilities,

EFFs, which will be networks of highly instrumented sites that will rely on the above-mentioned technological advances to extend our understanding of complicated environmental problems in a more comprehensive manner than possible in the past. These instrumented sites are linked through the main coordinating feature in **CLEANER**, namely, the *Engineering Assessment Network (EAN)*.

The first **CLEANER** workshop was held at Stanford University in 2001, and a third workshop will be held at Duke University in early 2003. AEESP will sponsor a symposium at the University of Minnesota in late summer 2003 that will focus on the scientific and technological developments that are the underpinning for the **CLEANER** concept.

AEESP/A&WMA activity

We would like to inform you of the following AEESP-sponsored event for A&WMA's 2003 annual meeting in San Diego, CA on Tuesday, June 24:

AEESP Newsletter policies

Submissions deadline

The deadline for Newsletter submissions is one month prior to the publication date.

Please keep in mind when submitting items with deadline dates that members receive issues four to six weeks after the submissions deadline. Submissions may be sent electronically to AEESP Newsletter Editor, Amy E. Childress, amyec@unr.edu.

Advertising policy

Any advertisement, including faculty, post-doc or student ads, or other types of announcements submitted by an AEESP member, will be free for the first 250 words (approximately 1/4 page) and then charged at \$1 per word for additional content, if formatted to fit in a column.

Non-members will be charged at the per word rate for any size column-formatted ad. Full page formatted advertisements will be charged at \$500 for members and \$1,000 for non-members. All formatted full page ads will be accompanied by a free web ad.

Photo submissions

Photo submissions to the AEESP Newsletter are encouraged. Please submit your photos electronically (to amyec@unr.edu) in jpeg format at the highest dimension for downsizing to print resolution (preferably less than 750 KB). Also, please include captions with names, locations and dates.

The AEESP/A&WMA Meet-and-Greet Breakfast Lecture will be given by Dr. Richard Corsi, Associate Professor at the Center for Energy and Environmental Resources at the University of Texas at Austin. Dr. Corsi will deliver a lecture on the inclusion of indoor air quality issues in air pollution classes and environmental curricula. (See *Conferences*, p. 14, for more information.)

Letter to the editor

[Editor's note: This statement was submitted in response to Past President Mike Aitken's question, "What is environmental engineering, and why do we need to ask that question?" in the April 2002 Newsletter.]

My environmental engineering experience up until 1973 was primarily in the U.S.; it includes having been a prime founder of AEESP. In this arena I practiced environmental engineering in the American fashion, in other words, in a quite affluent socio-economic system. Since 1973, I have been practicing environmental engineering in the world of relatively poor developing countries. Because of the poverty and few resources (money and skills) available, environmental degradation in the developing countries is huge compared to the U.S. However, developing countries represent the bulk of the world's people and areas, and therefore, environmental engineering as practiced in the developing countries may properly be called global environmental engineering.

My experience in global environmental engineering shows clearly that the doctorate level environmental engineer needs academic training not just in environmental engineering and environmental ecology (biology), but also in environmental sociology and environmental economics. In fact, tackling major environmental issues in the developing countries requires teams comprising all four disciplines. For environmental engineers to work effectively with others, they must have some background training in their fields of expertise.

The way I see it, in the 21st century, American environmental engineers should be broadening their skills to be able to serve as the lead in global environmental engineering. In the 20th century, the type of academic training practiced in the U.S. for doctorate environmental engineers was acceptable. However, it is no longer suitable for the 21st century. The concept of "American isolationism," which has been basic to U.S. operations since 1776, is no longer suitable and must be upgraded to meet 21st century needs. I would urge you and your colleagues to open your eyes to the need for modifying your doctorate programs to meet these 21st century needs so that American environmental engineers can properly play a lead role in guiding the global scenario.

—Harvey Ludwig

2002 AEESP Awards

The 2002 Awards were presented at the Meet-and-Greet Reception and Awards Ceremony, Sept. 30, 2002. For lists of past winners, see www.aeesp.org/news/awards.html. For instructions on submission of nominations for the 2003 Awards, see the following article or the AEESP web site, www.aeesp.org.

AEESP/CH2M Hill Outstanding Doctoral Dissertation Award

Eric M. Vrijen Hoek (advised by **Menachem Elimelech**, Yale University), "Colloidal Fouling Mechanisms in Reverse Osmosis and Nanofiltration"

AEESP/Parsons Engineering Science Outstanding Doctoral Dissertation Award

Charles B. Bott (advised by **Nancy Love**, Virginia Polytechnic Institute & State University), "Elucidating the Role of Toxin-Induced Microbial Stress Responses in Biological Wastewater Treatment Process Upset"

AEESP/Montgomery-Watson-Harza Master's Thesis Award

First Place: Katherine Dombrowski (advised by **Mark J. Rood**, University of Illinois at Urbana-Champaign), "Electro-thermal Regeneration of Activated Carbon Fiber Cloth with Adsorbed Volatile Organic Compounds"

Second Place: Meghna H. Swami (advised by **David L. Freedman**, Clemson University), "Biodegradation of Chloromethane under Nitrate-Reducing and Aerobic Conditions"

2002 Founders' Award

Thomas M. Keinath (Clemson University)

Call for Nominations, 2003 AEESP Awards

[Also see www.aeesp.org/news/awards.html.]

CH2M Hill and Parsons Engineering Science Doctoral Dissertation Awards

Entries are sought for the 2003 AEESP Outstanding Doctoral Dissertation Awards. The deadline for submission is March 15, 2003 for dissertations completed during the 2002 calendar year. Two awards will be given, each consisting of a plaque and a cash prize of \$1000 for the student, and a plaque and a cash prize of \$500 for the faculty advisor. Faculty advisors wishing to nominate a dissertation should send three copies to:

Keri Hornbuckle – Chair (2003)
AEESP Dissertation Committee
Civil & Environmental Engineering
University of Iowa
Iowa City, IA 52242
Keri-hornbuckle@uiowa.edu

2002 Outstanding Publication Award

Menachem Elimelech (Yale University)

Charles R. O'Melia (The Johns Hopkins University)
Kinetics of deposition of colloidal particles in porous media, *Environmental Science & Technology* 24, 1528-1536 (1990)

2002 Malcolm Pirnie/AEESP Frontiers of Research Award

Charles N. Haas (Drexel University)

2002 AEESP/McGraw-Hill Award for Outstanding Teaching in Environmental Engineering and Science

James A. Smith (University of Virginia)

2002 AEESP/Wiley Interscience Award for Outstanding Contributions to Environmental Engineering and Science Education

James R. Mihelcic (Michigan Technological University)

Distinguished Service Awards

Michael D. Aitken – For outstanding service as the AEESP President

Gerald E. Speitel, Jr. – For outstanding service as AEESP Board Member & Treasurer

Lutgarde Raskin – For outstanding service, AEESP Dissertation Committee (2000-2002)

Daniel R. Noguera – For outstanding service, AEESP Thesis Committee (2000-2002)

A cover letter should include the following information: 1) the address, e-mail and phone number for the student and advisor; 2) the date of thesis completion; and 3) a concise statement about the student's intellectual contribution to the work. The copies will not be returned, so inexpensive xerographic copies are recommended. Faculty advisors should limit themselves to a single entry. Self-nominations by students will not be accepted.

A selection committee of three AEESP members will judge the theses based on Scientific and Technical Merit (30 pts), Originality of Research (30 pts), Contribution to the Advancement of Environmental Engineering (30 pts) and Clarity of Presentation (10 pts).

Our thanks to Parsons Engineering Science and CH2M-Hill for their generosity in sponsoring these awards and to mem-

bers of the 2002 Doctoral Dissertation Review Panel: Lutgarde Raskin (Chair), Keri Hornbuckle, and Thomas M. Young.

Montgomery Watson Harza M.S. Thesis Awards

Entries are sought for the 2003 Montgomery Watson Harza Master's Thesis Awards. The deadline for submission is March 15, 2003 for theses completed during the 2002 calendar year. Plaques and cash prizes are awarded for first and second place students and faculty advisors. Currently, the first place award is \$600 for the student and \$300 for the faculty advisor, and the second place awards are \$400 and \$200. Faculty advisors wishing to nominate a student for this competition should send three copies of the thesis to:

Say Kee Ong – Chair (2003)
AEESP Thesis Committee
Civil & Construction Engineering
Iowa State University
490 Town Engineering Building
Ames, IA 50011
skong@iastate.edu

A cover letter should include the following information: 1) the address, e-mail and phone number for the student and advisor; 2) the date of thesis completion; and 3) a concise statement about the student's intellectual contribution to the work. The copies will not be returned, and inexpensive photographic copies are recommended. Faculty advisors should limit themselves to a single entry. Self-nominations by students will not be accepted.

A selection committee of three AEESP members will judge the theses based on Scientific and Technical Merit (46 pts), Originality of Research (15 pts), Contribution to the Advancement of Environmental Engineering (15 pts) and Clarity of Presentation (24 pts).

Our thanks to Montgomery Watson Harza for their generosity in sponsoring these awards and to the members of the 2002 MS Thesis Review Panel: Daniel Noguera (Chair), Say-Kee Ong, and Syed Hashsham.

AEESP Outstanding Paper Award

Nominations are sought for the 2003 AEESP Outstanding Paper Award for a "landmark paper that has withstood the test of time." Nominators should send a copy of the paper and a letter (two pages maximum) to:

Brian A. Dempsey
Chair - AEESP Awards Committee
The Pennsylvania State University
212 Sackett Building
University Park, PA 16802-1479
bad5@psu.edu

The letter should give the citation, the reasons why the paper has been considered a "landmark," and a description of the

influence the paper has had on the practice of environmental engineering. At least one of the authors must be living. All members of AEESP may make nominations, but self-nominations will not be accepted. An author or co-author of a winning paper is ineligible for the subsequent three competition years.

AEESP Founder's Award

The AEESP Founders' Award is given annually to recognize an AEESP member who has made "sustained and outstanding contributions to environmental engineering education and the profession." The award was initiated to honor the founding members of AEESP, as described in "AEESP: 25 Years." Candidates are evaluated based on their contributions to AEESP as well as to the profession at-large. The recipient receives a plaque at the annual AEESP Meet & Greet. To make a nomination for the 2003 AEESP Founders' Award, contact Brian A. Dempsey (address is given above).

Outstanding Educator Awards

The purpose of these awards is "to honor individuals who are making outstanding contributions to the teaching of environmental engineering, both at the individual's home institution and beyond. The deadline for nominations is March 15, 2003. Each award winner receives a plaque and a check for \$1000.

The Outstanding Teaching in Environmental Engineering and Science Award honors an AEESP member who has made substantive contributions through class-oriented teaching and through the development of new pedagogic techniques. Although open to nomination at any rank, the award is intended primarily to recognize a demonstrated commitment to teaching early in a person's career.

The Outstanding Contribution to Environmental Engineering and Science Education Award recognizes an AEESP member who has excelled in the development of innovative teaching methods, the application of these methods in the classroom, and the dissemination of teaching methods to the academic community. This award is open to nomination at any rank.

Nominations can come from former students or from professional colleagues, and should be sent to Brian A. Dempsey (address is given above). Nomination packages should include a resume, tailored to highlight contributions to environmental engineering education. The nominator should enclose other supporting information related to teaching, such as: a) input from undergraduate and graduate students; b) summary teaching evaluations by faculty and/or students; c) supporting letters from colleagues intimately familiar with the nominee's contributions to environmental engineering education; d) demonstrated innovation and success in teaching; and e) demonstrated dissemination of methods to the academic community. Letters from colleagues outside the nominee's home institution documenting application of software, innovative teaching

ideas, textbooks, course notes, mentoring or other significant contributions will be given special consideration.

Malcolm Pirnie /AEESP Frontier Award

The purpose of the Frontier Award is "to honor an individual who has advanced the environmental engineering and science field through recognized research leadership and pioneering efforts in a new and innovative research area." All AEESP members are eligible for this award. The award consists of a plaque and a cash prize of \$1000 to be presented at the WEFTEC Conference in October. Only AEESP members are eligible to nominate candidates. The deadline for nomination is March 15, 2003 for full consideration by the AEESP Awards Committee. Nominations should be submitted to Brian A. Dempsey (address above). Those making nominations must submit a supporting statement plus selected literature citations detailing the nominee's contribution to the new and innovative research achievement for which the nominee is being honored.

Our thanks to the sponsors for these awards and to members of the 2002 Awards Committee: Brian A. Dempsey (Chair), Thomas Harmon, William Nazaroff, Gene Parkin, and Thomas C. Young.

2003 AEESP Distinguished Lecturer

Dr. Philip C. Singer is the Dan Okun Distinguished Professor of Environmental Engineering in the Department of Environmental Sciences and Engineering, School of Public Health, at the University of North Carolina at Chapel Hill. He directed the Water Resources Engineering Program at UNC for 19 years and currently directs UNC's Drinking Water Research Center. He has conducted research on chemical aspects of water and wastewater treatment and on aquatic chemistry for the past 35 years, and has published more than 160 papers and reports in these areas. For the past 27 years, Dr. Singer's research has focused on the formation and control of disinfection by-products in drinking water. In 1993, Dr. Singer was selected for the Freese Lecture by the American Society of Civil Engineers; in 1995, he was given the A.P. Black Research Award by the American Water Works Association; and in 1999, he received the Fuller Award from the North Carolina section of the American Water Works Association. In 1995, Dr. Singer was inducted into the National Academy of Engineering.

Lecture 1. Formation and Control of Disinfection By-Products in Drinking Water. Abstract: Few subjects have captured the attention of the waterworks industry and have been as far-reaching as the issue of disinfection by-products in drinking water. The fact that the addition of chemical disinfectants to water to inactivate disease-causing microorganisms produces compounds that may be harmful to human health has required intense scrutiny on the part of the waterworks industry and

regulatory agencies to examine drinking water disinfection practices. For the past 28 years, a great deal of research has been conducted to examine the occurrence of disinfection by-products in finished drinking water, factors influencing the formation of different disinfection by-products, and treatment technologies and water quality management strategies for the control of disinfection by-products. This presentation will summarize various aspects of the formation

and control of disinfection by-products, highlighting research conducted by the speaker and his students over the past 28 years. Primary attention will be directed at chlorination by-products, specifically the trihalomethanes and haloacetic acids. Observations from controlled laboratory experiments and from field measurements at full-scale water treatment facilities will be presented.

Lecture 2. Regulation of Disinfection By-Products in Drinking Water: Past, Present, and Future. Abstract: Disinfection by-products have been regulated in finished drinking water since 1979. The original regulations dealt only with trihalomethanes, but more recent rules also address haloacetic acids. Compliance with these regulations has traditionally been based on a running annual average of quarterly measurements of disinfection by-products in the distribution system and on concerns about adverse health effects associated with chronic (long-term) exposure to these by-products. More recently, concerns have also been expressed about short-term exposure and acute reproductive and developmental adverse health effects. Additionally, while compliance has previously been based on disinfection by-product levels in samples collected primarily at locations with average distribution system residence times, forthcoming regulations will base compliance on disinfection by-product levels in samples collected at locations with maximum trihalomethane and haloacetic acid concentrations. Moreover, instead of the maximum contaminant levels applying to the annual average of all distribution system samples, the new rules will require that the annual average of the regulated disinfection by-product concentrations at each monitoring location be less than their respective maximum contaminant levels. This presentation reviews the evolution of disinfection by-product regulations and the rationale behind them.



Phil Singer, Professor of Environmental Science & Engineering at University of North Carolina, Chapel Hill, will be the AEESP Distinguished Lecturer for 2003.

Member & Program News

University of Wisconsin, Madison

The environmental science and engineering program at the University of Wisconsin–Madison is pleased to announce that **Dr. Trina McMahon** joined the faculty of the Civil and Environmental Engineering Department as an Assistant Professor in January 2003. Dr. McMahon's research focuses on the application of molecular biology and biochemical engineering to study microbial communities in natural and engineered ecosystems. She earned a B.S. in Civil Engineering (1995) and a M. S. in Environmental Engineering (1997) from the University of Illinois at Urbana–Champaign. More recently, she received her Ph.D. (2002) from the University of California, Berkeley, where she worked with Professors David Jenkins (Environmental Engineering) and Jay Keasling (Chemical Engineering) on the characterization of polyphosphate kinase genes found in wastewater treatment ecosystems performing biological phosphorus removal. During her graduate career, she was an NSF Graduate Fellow and a US EPA Science to Achieve Results Fellow. Dr. McMahon hopes to continue studying the biochemistry of microbes living in wastewater treatment systems, while also developing research projects in the areas of environmental genomics and microbial stress response. Dr. McMahon's arrival at the University of Wisconsin–Madison greatly increases the program's strength in environmental biotechnology and biological processes, and nicely complements other focus areas of the program, such as advanced treatment technologies, environmental chemistry, and water quality.

Michigan Tech

Master's International Program. Michigan Tech's Department of Civil & Environmental Engineering has formed a unique partnership with the U.S. Peace Corps. Graduate students enrolled in the Master's International program in Civil and Environmental Engineering first complete one academic year of graduate coursework at Michigan Tech and three months of cultural, language, and technical training with the Peace Corps. Students then complete two years of service in the Peace Corps, typically working as a water/sanitation engineer while also completing a research project related to their Peace Corps experience. There are currently 23 graduate students enrolled in the program and students are serving and performing research in Mali, Cameroon, Madagascar, Dominican Republic, Jamaica, Honduras, and Panama. Students are trained to not only apply sustainable, appropriate technology to a wide range of engineering projects but are also trained to value service to the global community and consider social, economic, and environmental limitations of engineering projects in the developing world. They also may need to become fluent in French or Spanish, and perhaps an additional language such as Bambara (Mali), Patois (Jamaica), or Nobe (Panama).

Master's International engineers work on a wide variety of projects while serving with the Peace Corps. These projects are typically related to water supply, sanitation, and water resources. Additional information on the program can be obtained at <http://cee.mtu.edu/peacecorps/> or by contacting Dr. James Mihelcic (jm41@mtu.edu).



Master's International student John Simpson assists in the construction of a 10,000 gallon reinforced brick and concrete tank that will serve approximately 900 people in the community of Los Chaguites in the Department of Choluteca, Honduras. The source is a small stream located approximately 3 km from the tank in a protected watershed that supplies the community with up to 80 gallons per minute. To travel to the site, John must take a dusty bus ride that may be followed by a two-hour hike from the community to the water source.

Clarkson University

Clarkson University and its interdisciplinary Center for the Environment are pleased to announce the approval of new M.S. and Ph.D. degrees in Environmental Science and Engineering. These degrees offer interdisciplinary graduate studies that incorporate science and engineering aspects of the environment, as well as economic, policy and communications issues.

The environment is composed of complex, interacting, biological, chemical, physical and social systems. To adequately understand the functioning of this complex system, and how environmental factors are integrated into a comprehensive decision-making process, it is essential that it be studied in an interdisciplinary framework. Therefore, Clarkson University's new Master's and Doctorate degrees in Environmental Science & Engineering span both science and engineering disciplines and include courses that investigate how science or engineering impact, and are affected by the environment in a broader context.

Clarkson University has significant research expertise in three focused environmental areas, including air resources, Great Lakes and rivers, and environmental management. Other areas of research include sustainable energy systems, environmental economics, risk and exposure, water and waste treatment processes, groundwater remediation, and ecology. Clarkson graduates will enter their employment with a broader educational background and will be able to better understand how engineering and sciences impact and inform policy decisions.

The degree provides a flexible framework for developing education programs of courses and research that fit each individual student's interests and needs. Interdisciplinary groups of faculty affiliates associated with the Center for the Environment will advise graduate students.

Details are available at <http://www.clarkson.edu/ese/index.php>. For more information, contact: Susan E. Powers, Director, Center for the Environment (sep@clarkson.edu; 315-268-6542) or Thomas Holsen, Chair, Center for the Env. Grad Committee (holsen@clarkson.edu; 315-268-3851).

Clemson University

FACULTY POSITION IN BIOENVIRONMENTAL ENGINEERING. The Department of Environmental Engineering & Science invites applications for a tenure-track position in bioenvironmental engineering. A Fall 2003 appointment is anticipated, preferably at the Associate or Full Professor level, but exceptional candidates at the Assistant Professor level are encouraged to apply. The successful candidate will preferably have both an undergraduate and an earned Ph.D. in civil/environmental engineering or a closely related engineering discipline, such as chemical engineering. Expertise is sought in the application of molecular biological and biochemical techniques to environmental engineering. Examples include use of molecular techniques to study the ecology of community structures and community dynamics in engineered and natural systems; modeling of environmental processes at the molecular/biochemical level; and use of information from molecular studies to improve the design of engineered systems for treating water, wastewater, or hazardous wastes.

The successful candidate is expected to teach courses at the undergraduate and graduate level, incorporating whenever possible information on application of molecular techniques to engineered systems. Development of new courses will also be encouraged. The candidate will advise M.S. and Ph.D. students and develop a high-quality, sponsored research program in bioenvironmental engineering. Excellent opportunities exist for collaboration with colleagues in the School of the Environment, the Clemson University Genomics Institute, the Department of Biochemistry and Genetics, and the Department of Agricultural and Biological Engineering.

Please send a detailed resume, a statement of teaching and research interests, a graduate transcript, and names, addresses, e-mail addresses and phone and fax numbers of at least three references to: Bioenvironmental Engineering Search Committee Chair, Department of Environmental Engineering & Science, Clemson University, Box 340919, Clemson, SC 29634-0919. Review of applications will commence immediately and continue until March 30, 2003, or until the position is filled.

Clemson University is an affirmative action/equal opportunity employer.

University of Florida

DEPARTMENT CHAIR OF ENVIRONMENTAL ENGINEERING SCIENCES. Applications and nominations are invited for the position of Chair of the Department of Environmental Engineering Sciences at the University of Florida. Candidates are expected to hold a doctorate degree in an appropriate engineering or related field; have a proven record of excellence in research, teaching, and scholarly activities; and have demonstrated administrative experience. The University of Florida is a member of the American Association of Universities. The nationally

prominent College of Engineering recorded over \$76 million in research expenditures in 2001-2002.

The Department of Environmental Engineering Sciences is ranked nationally among the Top 15 in its field. It has 18 full time faculty, enrolls 200 undergraduate and graduate students, and annually grants 30 ABET accredited B.S. degrees, and approximately 35 masters, and 10 doctorate degrees. The Web address is www.ees.ufl.edu.

Submit applications or nominations to Dr. Joseph J. Delfino, Interim Chair, Department of Environmental Engineering Sciences, A.P. Black Hall, Box 116450, University of Florida, Gainesville, FL 32611-6450 (352-392-9377). The Search Committee will begin reviewing applications on December 16, 2002 but **WILL CONTINUE TO RECEIVE APPLICATIONS UNTIL THE POSITION IS FILLED.** The position is available in summer 2003. Applications should contain a current curriculum vitae, and the names, addresses (postal and email), and phone numbers of five references.

The University of Florida is an Affirmative Action, Equal Opportunity Employer and encourages applications from women and minority group members.

Manhattan College

Manhattan College, Environmental Engineering Department invites applications for a tenure-track position in environmental engineering at the assistant professor level beginning August 2003. An earned doctorate degree in environmental engineering or a closely related field is required. Preference will be given to applicants in the following areas: 1) environmental chemistry; 2) water quality modeling; and/or 3) physical/chemical treatment processes. A strong commitment to teaching at both the undergraduate and graduate level, an ability to relate theory to practice, effective oral and written communication skills, scholarly potential, and the ability to work with a diverse student population are essential. The successful candidate is expected to develop an externally funded research program that complements the existing strength of the department.

Applicants should send a letter indicating teaching and research interest, and a resume that includes the names, addresses, and phone numbers of at least three references to Dr. Robert R. Sharp, Chairman, Search Committee, Environmental Engineering Department, Manhattan College, Riverdale, New York, 10471. E-mail to robert.sharp@manhattan.edu. Review of applications will begin on February 1, 2003, and will continue until the position is filled.

Michigan Technological University

WATER RESOURCES ENGINEERING: Michigan Technological University invites applications for a tenure-track faculty position in the Department of Civil and Environmental Engineering beginning August 2003. We are seeking a faculty mem-

Employment Opportunities

ber at the rank of Assistant or Associate Professor, depending on the applicant's qualifications and experience, with interests in any area of water resource engineering, hydrology, or hydraulics. The candidate should demonstrate a strong commitment to excellence in teaching, with ability to teach undergraduate courses in hydraulics/fluid mechanics, open channel flow, hydrology, and water resources design. A doctoral degree in civil or environmental engineering or closely related field is required for employment. Registration or the ability to become registered as a Professional Engineer is highly desirable.

The C&EE Department at Michigan Tech includes 26 faculty, 26 professional staff, 90 graduate students, and 500 undergraduate majors. Research funding exceeds \$4.0 million per year.

Additional information on the position can be found at our web site (www.cee.mtu.edu). To apply, please send a resume, a statement of teaching and research interests, and names of three references to Dr. David Watkins (Search Committee Chair), Department of Civil and Environmental Engineering, Michigan Technological University, 1400 Townsend Drive, Houghton, Michigan 49931. Applications will be reviewed as they are received and will be accepted until the position is filled. Women and under-represented groups are especially encouraged to apply. Michigan Technological University is an equal educational institution/equal opportunity employer.

New Mexico Tech

VISITING FACULTY POSITION – WATER RESOURCES OR GEOTECHNICAL ENGINEERING. New Mexico Tech (New Mexico Institute of Mining & Technology) - The Department of Civil and Environmental Engineering invites applications for full-time non-tenure-track visiting faculty positions in the areas of water resources or geotechnical engineering to support a new B.S. program in civil engineering. The department currently offers B.S. and M.S. degrees in environmental engineering. We are interested in candidates that can teach courses in areas fundamental to civil engineering education, such as structural engineering, construction materials, transportation, and steel and concrete, in addition to their specialty of water resources or geotechnical engineering. The department has well-equipped laboratories for environmental research, and opportunities exist for collaboration with research centers on campus and with nearby national laboratories. The applicant must possess a bachelor's degree in civil engineering and a doctoral degree in civil or environmental engineering, or a closely related field is required. Prior teaching experience is preferred. Starting date is August, 2003. The length of the appointment is expected to be one to three years. Applications should include a cover letter describing the principal expertise of the applicant, a statement of teaching and research interests and experiences, a complete resume, and addresses of three references to: New Mexico Tech, Human Resources, 801 Leroy Place, Wells Hall,

Socorro, NM 87801-4796. Information about the University can be found at <http://www.nmt.edu/>.

Penn State Capital College Harrisburg Campus

ENVIRONMENTAL ENGINEERING PROFESSOR. Assistant Professor tenure-track position in Environmental Engineering program is available for academic year 2003-2004. Preferred candidate must have expertise in biological wastewater treatment. Teaching responsibilities may include introductory water/wastewater unit processes, design, operation, and fluid mechanics at the undergraduate level, and biological treatment theory, wastewater plant design, and process control at the graduate level. Other related environmental courses may also be requested. The successful candidate is expected to develop an externally funded research program for graduate students and to supervise both Environmental Science and Environmental Engineering majors. A Ph.D. is required in a related engineering discipline.

All undergraduate Engineering and Engineering Technology programs in the College's School of Science, Engineering and Technology are ABET accredited. The School offers the Master of Engineering with majors in Electrical Engineering, Engineering Science, Environmental Engineering and Environmental Pollution Control. Also offered at the graduate level are Master of Environmental Pollution Control, Master of Science in Environmental Pollution Control, and the Master of Science in Computer Science. The US EPA Small Public Water Systems Technology Assistance Center and the PA DEP Environmental Training Center are located within the laboratory and teaching facilities of the Environmental Program. State-of-art teaching and research laboratories to support faculty and students are available. Considerable research and teaching collaboration exists between Capital College and University Park faculty. Additional information on the programs, centers, and faculty may be found at the Penn State Harrisburg web page and links at www.hbg.psu.edu/epc.

Applicants should submit curriculum vitae, names of three references, and a research and teaching statement immediately to: Environmental Faculty Search Committee, c/o Mrs. Dorothy Guy, Penn State Capital College, Box AEESP, 777 W. Harrisburg Pike, Middletown, PA 17057-4898. Applicant review will begin on February 15, 2003 and continue until the position is filled. Penn State is committed to affirmative action, equal opportunity, and the diversity of its workforce.

San Diego State University

DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING, SAN DIEGO STATE UNIVERSITY. The Department of Civil and Environmental Engineering at San Diego State University (SDSU) invites applications and nominations for a ten-

Employment / Student Opportunities

ure-track Assistant Professor faculty position with expertise in Geographical Information Systems (GIS) modeling and emphasis in Geotechnical, or Water Resources, or Environmental Engineering effective fall 2003. The successful candidate will have a B.S. degree in Engineering, possess a Ph.D. degree in Civil or Environmental Engineering at the time of appointment, be able to obtain or possess Professional Engineering Registration, and be capable of teaching courses in the area of GIS in Civil and Environmental Engineering. Additional information about the Department can be obtained at <http://www.engineering.sdsu.edu/civil/>. The application materials must include curriculum vitae, research interests, publications, and the names/addresses/telephone numbers of three professional references. The salary is competitive and commensurate with qualifications. SDSU may be virtually visited at <http://www.sdsu.edu>.

The review of the applications will begin on March 3, 2003 and continue until the position is filled. Requests for additional information and/or letter of application should be directed to: Dr. G. Krishnamoorthy, Chair, Civil GIS Faculty Position Search Committee, San Diego State University, 5500 Campanile Drive, San Diego, CA 92182-1324; Tel: 619-594-6291; E-mail: civilgis@mail.sdsu.edu. SDSU is a Title IX, equal opportunity employer and does not discriminate against individuals on the basis of race, religion, national origin, sexual orientation, gender, marital status, age, disability or veteran status, including veterans of the Vietnam era.

Washington University, St. Louis

RESEARCH EXPERIENCES FOR UNDERGRADUATES (REU) IN ENVIRONMENTAL ENGINEERING SCIENCE. Ten summer research positions are available for current undergraduates in the Environmental Engineering Science Program at Washington University in St. Louis. This 10-week NSF-sponsored REU Program gives qualified undergraduates an opportunity to explore their interests in environmental science and engineering by conducting independent research under the guidance of one of our faculty, increase their understanding of research practice by participating in a series of workshops on data analysis and study design, and improve their written and oral communication skills. In addition, REU students will learn about practical applications of environmental engineering by visiting local facilities in which full-scale environmental-monitoring or pollution-control technologies are in operation. Descriptions of potential research topics and application instructions are available at the REU Program web site (www.env.wustl.edu/REU/reu.htm).

The REU Program will provide all participants with:

- a \$4,000 stipend for the 10-week program
- on-campus housing in student residence halls
- up to \$500 for travel expenses to and from St. Louis

Selected students may be reimbursed for travel to present the results of their research at regional or national meetings of pro-

fessional societies that serve the environmental engineering community.

Participants must be U.S. citizens or permanent residents, currently enrolled in an engineering or science program with sophomore or junior standing, and have a minimum GPA of 3.0 on a 4-point scale. Students who will have received their B.S. prior to December 2003 are not eligible. Female and minority students are strongly encouraged to apply. The deadline for application is March 15, 2003.

Utah State University

M.S. AND Ph.D. RESEARCH ASSISTANTSHIPS FOR FIELD RESEARCH IN ENVIRONMENTAL ENGINEERING The Utah Center for Water Resources Research, Utah State University, has research assistantships and immediate openings for M.S. and Ph.D. students in Environmental Engineering. Three specific industrial-supported research projects include: (1) MTBE Natural Attenuation at a field site, (2) Bioremediation of surfactants in soil-plant systems, and (3) Gene probe and biosensor development for contaminated soils. Applicants must have strong communication skills (written and verbal formats), and have a verbal GRE score above 600 (quantitative score above 650). A description of the USU environmental engineering program, the Utah Water Research Laboratory, and the research projects identified above can be found at: <http://www.engineering.usu.edu/uwrl>. USU is an equal opportunity employer and actively seeks students underrepresented in engineering. Interested candidates contact Dr. Ronald C. Sims at ronsims@cc.usu.edu. Interested candidates must also apply to the USU School of Graduate Studies.

Virginia Tech

POSTDOCTORAL RESEARCH POSITION. A postdoctoral position is available in the Environmental Engineering program at Virginia Tech. The primary research assignment will involve studying chemically-induced stress responses in ammonia and nitrite oxidizing autotrophic bacteria relative to responses in an environmental heterotrophic isolate (*Pseudomonas aeruginosa*). Both genomic and proteomic methods will be employed. A second component of the position will involve assisting with use of quantitative PCR to enumerate nitrifying bacteria in drinking water distribution systems that are under the influence of chlorine/chloramine disinfection switching practices. Candidates will hold a Ph.D in molecular biology, biochemistry, engineering with a strong biomolecular emphasis, or a related field. Send letter of application, CV and list of at least 3 references to Nancy Love, Associate Professor, Virginia Tech, Department of Civil and Environmental Engineering, 418 Durham Hall, Blacksburg, VA 24061-0246; VOICE: 540-231-3980, FAX: 540-231-7916, E-mail: nlove@vt.edu. Virginia Tech is an EO/AA employer.

Book Reviews

Biofilms: Investigative Methods and Applications,

Hans-Curt Flemming, Ulrich Szewzyk and Thomas Griebel (Eds.), Technomic Publishing Co., Lancaster, PA, 2000

This book is a compilation of research papers focusing on new and innovative methodology for biofilm research. The impressive list of contributing authors includes many internationally recognized experts.

The book begins with a review chapter, written by Schaule et al., describing standard biofilm sampling and analyses. Destructive sampling techniques and chemical and biological assessment tools are discussed. In a subsequent chapter, Spaeth and Wuertz provide an in-depth review of one important aspect of biofilm development and growth, production of extracellular polymeric substances (EPS). This excellent contribution includes an extensive literature review section and detailed description of current methods for EPS extraction and quantification.

Improved cryosectioning techniques for evaluation of biofilm morphology and populations are described by Flood et al. The authors conclude that cryosectioning, coupled with FISH, will allow for accurate microscopic identification of individual bacterial cells within a biofilm. In another chapter, Kalmback et

al. discuss a new technique, probe active counts, that may be used to assess bacterial viability within biofilms. This technique involves in-situ hybridization using fluorescence-monolabeled oligonucleotide probes, and may be particularly applicable in extremely oligotrophic habitats. A new image analysis approach to be used for quantitative microscopy in biofilms is discussed by Kuehn et al. Evidently, when coupled with autofluorescence, depth resolved profiles of biofilm can be collected using this method.

Two chapters focus on the use of scanning confocal laser microscopy (SCLM) for non-destructive biofilm evaluation. Hau provides an excellent review of the technique, including a discussion of advantages and disadvantages. In addition, Hausner et al. describe a new research approach where fluorescent probes are coupled with SCLM to assess biofilm development and growth. Illustrative data using this method are highlighted in this chapter.

Two chapters focus on biofilm reactor design and operation. Griebel and Flemming describe the operation of rotating annular reactors and highlight data collected from reactor operation under varying conditions. Using different types of assessment tools, Horn reviews the application of oxygen microelectrodes to biofilm research. In addition, a new type of reactor, a biofilm tube reactor, is discussed and experimental data presented from reactor operation.

Characterization of biofilms found in unique environments is highlighted in several chapters. Jan and Nielsen describe a variety of methods for assessment of biofilms found in sewers, and also present data collected using these techniques. Biofilms found in drinking water were assessed by Schwartz et al. using a variety of microscopic techniques. To detect biofouling in water circulation systems, Rege and Sand describe a new microcalorimetric tool for non-destructive evaluation of biofilm development on stainless steel. This method may have application in any system addressing biofouling. Wastewater biofilms are the focus of a lengthy chapter by Wobus et al. Very interesting experimental data on biofilm community structure, including quantification of protozoa and metazoa, are discussed in this contribution.

This collection of research papers provides an excellent review of current methods for biofilm assessment from a variety of environments. *Biofilms: Investigative Methods and Applications* is an excellent resource for new and experienced researchers conducting biofilm experiments.

Hans-Curt Flemming and Thomas Griebel are both at the University of Duisburg and Ulrich Szewzyk is at the Technical University of Berlin.

— Kathy Banks, Purdue University

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Cells, Gels, and the Engines of Life: A New, Unifying Approach to Cell Function, Gerald H. Pollack, Ebner & Sons, Seattle, WA, 2001

For years I had trouble appreciating what today is called poetry. It seemed to me that poetry had to have, at a minimum, lines that rhymed. (“There once was a man from Nantucket....”).

But then it finally dawned on me that not all great poetry had to rhyme, or to follow other artificial conventions. Poetry was in fact the placement of just the right word in just the right order. Consider the poetic description of America the beautiful:

*For purple mountains majesty,
Above the fruited plain.*

Or Emily Dickinson:

*Hope is a thing with feathers,
That perches in the soul,
And sings a tune without words,
And doesn't stop at all.*

Truly great poetry cannot be improved by editing. “Hope is a thing with feathers” cannot be improved upon. Or try to improve upon “Now is the time that tries men’s souls.” If Tom Paine had said instead “Times like these are trying,” or “Soulwise, these are trying times,” we would not be quoting him today. So I have come to the conclusion that poetry is simply good writing, and it is OK if poets write stuff that does not rhyme. They can call it poetry if they wish, since there appears to be no better name for it.

Just the right words can be powerful in creating images and transmitting information, and the selection of just the right word makes all the difference. Or as Mark Twain said, “The right word makes the difference between a lighting bug and lightning.” How about these two famous lines?

*This is the way the world ends,
Not with a bang, but a whimper.*

T. S. Eliot could have chosen something other than “whimper,” but it would not have been nearly as powerful.

Even unattached single words can be poetry — words that have great power and meaning far beyond their dictionary definitions. One word I like is “gentle.” Stop for a minute and think about what the word means, and what it could mean if everyone else thought about it in that way. Another word I like is “harmony.” In music it denotes that combination of tones that when heard together produces a pleasant sensation. I like harmony in music, and still cringe when I hear dissonance used indiscriminately and unnecessarily. I like harmony because it makes me feel good.

There is also harmony in science, and harmony in science gives me the same sense of understanding and satisfaction as in music. If I can use my skills to deduce how something works and if I can then run empirical experiments to convince myself that I am right, then this gives me great satisfaction. But there can also be dissonance in science. A theory can be advanced and it could seem harmonious at first, but then new notes are discovered that do not support the harmony and create a chord that sounds harsh to the mind. Something has to give. Eventually, a new more harmonious theory has to emerge that can fit all the notes into the proper slots.

Harmony is the subject of this wonderful book by Gerald Pollack. The book begins by reviewing the accepted model for how a cell functions, describing how the cell wall is thought to be a restraint keeping the cell together and how the cell wall can transport chemicals through it. Pollack describes how this model of the cell was developed over the years, and then shows how more and more exceptions and problems arose with the model. For example, it seems clear that the cell is able to move hydrated sodium ions through the cell wall but is not able to move hydrated potassium ions, which are much smaller, through the same wall. This dissonance produced the concept of ion-specific pumps that are thought to move the various ions through the wall. The trouble is, if we consider all the ions that could conceivably have to be moved through the wall, the space taken up by the pumps would greatly exceed the volume of the cell. So it cannot be pumps. (Great dissonance here.) Cells also have the power to be drawn asunder and still survive. How can this be? Wouldn't the cell cytoplasm just spill out and the cell die? The idea that the cell wall seals after being punctured and cut is pure speculation, or wishful thinking. So what goes here?

Pollack proposes a way out of this disharmony. Based on the work of Gilbert Ling, he argues that the cell cytoplasm is actually gel-like, and quite different from an aqueous solution. This gel is a matrix of polymers to which water and ions cling, creating a gooey mass. This matrix retains water and ions not because the cell wall keeps it contained, but because of the nature of the water molecules in the cell. Water molecules that are close to a surface reorient themselves and produce a water with very different physical properties from bulk water. In our field, Heukelikian at Rutgers in the 1930s called this water “bound water.” A better name would be “vicinal water” or even “surface water” since it exists only in the presence of surfaces.

Pollack has an undergraduate degree in engineering, and the flow of the argument in this book is familiar and comfortable to engineers and scientists. After debunking the present model, he builds the argument for the new model of cell function with great care, using basic information readily understandable to all. He not only shows how the cell cytoplasm has to be gel-like in nature, but also how the cell actions must be mediated by phase-transition. In the end of the book, he describes some elements of cell energetics.

The figures in the book are wonderfully done, in color and often as humorous cartoons. The book is written for a general educated audience and is readily accessible to environmental engineers and scientists.

What this book does is nothing less than resolve a highly dissonant chord in cell biology and create harmony that is pleasing to the mind. It is a masterful book, easily read in an evening, and powerful in its logic and argument, that can make a world of difference in the way we teach and do research in environmental biology. I cannot offer any higher recommendation than that. Ya gotta get this one!

Gerald Pollack is professor of bioengineering at the University of Washington, Seattle.

—P. Aarne Vesilind, Bucknell University

Biosolids Applied to Land: Advancing Standards and Practices

Committee on Toxicants and Pathogens in Biosolids Applied to Land, National Research Council, Washington DC, 2002

When my kids were little, we used to spend several weeks a year at the North Carolina beaches. Allowing the kids to go into the surf presented dangers and put them in harms way, and as a parent I had to watch out for their welfare. They would of course have been safer not being in the water, but that is not why they wanted to be at the beach. So I devised the “belly button rule.” They could go out into the water only as deep as their belly button. This rule not only allowed the older kids a bit more latitude and kept the younger ones closer to shore, but it presented a compromise between the safety of the beach and the danger of the deep ocean.

I say that the beach is safe, but this is not true of course. One can be lying on the beach and be run over by a beach buggy. There was the case in Raleigh not too many years ago when a fellow was asleep in his bed, and the house was struck by a light airplane, killing the poor slob. In his bed, for heavens sake!

So safety is a relative thing, and we are never totally safe from anything. We are always compromising between having a life and being safe.

The case of pathogens in sludge is a great example of a search for safety. We know and acknowledge that sludge contains pathogens. That’s where they come from, of course, so why would sludge not have pathogens? And pathogens by definition are harmful to us. Bringing the public into contact with pathogen-laced sludge thus has the potential of creating harm, and the potential for this harm to the public is one of the questions considered by the distinguished panel of engineers and scientists who wrote this book.

The book begins with a chapter introducing the problems the committee faced in writing this book, and then discusses the basics of sludge management, including an excellent summary of the EPA 503 regulations. The next chapter discusses the epidemiological evidence of health effects associated with sludge production and application, followed by a review of advances in risk assessment since the promulgation of the 503 regs. The next two chapters evaluate EPA’s approach to setting chemical standards and pathogen standards.

The book is nicely written and lavishly documented. It is a “must buy” for anyone doing research in sludge management and land application. I have to admit, however, that it pains me that the committee (staff?) insisted on using the contrived word “biosolids” in place of “sludge.” There is nothing wrong with the good old Anglo Saxon sludge as long as we are talking about its treatment. If, after it leaves the treatment plant, the municipality wants to call it “biosolids,” then it is their business. It seems to me however that the professional community should not participate in such book burning.

What worries me most about this book, however, is the

conclusions the authors draw on the problems of pathogens in sludge. There is an admission that at no time, over the many years that we have been keeping tabs on sludge disposals and public health, has proper sludge disposal created a public health problem. The book correctly lists all the experiments that have been conducted to try to find the connection between pathogens in sludge and people getting sick, and with no success. But then, in the face of the conclusion that there appears to be no public health problem, the committee recommends that more of EPA’s resources be committed to the “problem” of pathogens in sludge. I agree that there might be some concern with chemical constituents in sludge, particularly endocrine disruptors, but the committee argues convincingly that there appears to be no such problem with pathogens. Nobody is getting sick, so why do the authors then turn around and recommend that we pour more resources into what is only perceived as a *possible* problem?

If this book had been written by a bunch of technical nincompoops, then we could pass it off as more environmental scare literature. But this is not true here. The eminent authors, under the auspices of the National Research Council of the National Academy of Science, are proposing that EPA spend more of their scarce resources on measuring, counting, and reducing pathogens in sludge. Such a strong recommendation cannot help but have influence within EPA and force them to issue new regulations such as requiring all sludge to meet Class A standards for pathogens. This would be a huge waste of money!

What the authors of this book have done is to say, in effect, that the ocean is dangerous and nobody should get into the water, even up to one’s belly button, because they *might* get hurt. The authors cannot show that anyone has ever been harmed by splashing around in the water, but since the ocean is dangerous, playing in the surf *might* also be dangerous, and therefore we cannot allow anyone into the water.

I am sorry that I have to come down so hard on the National Research Council, but if this august body continues to issue publications with spurious conclusions, it will eventually erode its mantle of omnipotence, and this would be tragic. Who else can we then trust? The National Research Council has the moral obligation to be honest and forthright, even if the results of its investigations result in less funded research for interested participants.

— P. Aarne Vesilind, Bucknell University

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2003 Air & Waste Management Association annual meeting

June 22-26, 2003

San Diego, California

The A&WMA annual meeting and exhibition will be held in San Diego, California, June 22-26. The technical program is available on line at www.awma.org/ACE2003. Dr. Richard Corsi of the University of Texas, Austin will be giving the presentation at the A&WMA/AEESP meet and greet breakfast on June 24th. His topic will be the inclusion of indoor air quality issues in air pollution classes and environmental curricula.

Students are invited to participate in the annual student paper/poster contest. All subjects related to air and waste issues are welcome. Abstracts for student papers are due February 28, 2003. Papers for accepted abstracts are due May 9, 2003. Prizes of \$500, \$300, and \$200 will be awarded in each of three categories: undergraduate, masters, and doctoral. Faculty judges are needed for the contest (contact Carrie Hartz chartz@awma.org).

Metals in Environmental Remediation and Learning



MERL (Metals in Environmental Remediation and Learning) is a multimedia CD-ROM that teaches chemical concepts embedded in the story of the accidental discovery, commercialization, and acceptance of a groundwater clean-up technology that is now a leading groundwater remediation method.

The CD-ROM is designed for high school and college level chemistry teachers and students. It has also proven to be of interest to teachers and students in related disciplines (geology, engineering, etc.), environmental engineers, environmental consultants, industry environmental managers, government regulators, and concerned citizens. Copies of MERL are available for FREE (as long as they last) thanks to funding from the Camille and Henry Dreyfus Foundation and EnviroMetal Technologies, Inc. Please email requests to merl@ese.ogi.edu, and be sure to include a complete mailing address. See <http://cgr.ese.ogi.edu/merl/> for additional background, previews, FAQ, and links to supporting information, laboratory exercises, etc.

2003 AAAR PM Meeting



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