



President's Letter

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How many times have you wished that you could only say no? I know that this is something I have difficulty in doing. I constantly remonstrate myself that next time I will remember the finite nature of time before I volunteer for another thing I don't really have time to do. And yet, there are just so many actions that "should" be taken, and so many interesting projects that "must" be tackled, and so many good opportunities that "need" to be pursued....

I am very thankful that AEESP is full of people similarly afflicted by the eager and enthusiastic urge to volunteer. And I am also grateful that most are able to juggle and balance the many demands on their time far better than I am capable. Our organization almost completely functions on the volunteer activities of its members. Over the last year AEESP has made extraordinary progress as a result of the extraordinary efforts of its members.

The Research Conference at Penn State University in early August is an excellent example of collective effort and exceptional results. Bruce Logan and Fred Cannon organized an extremely interesting meeting that provoked and stimulated our thinking about research, teaching, the future, and new opportunities for AEESP. For two days we heard what others thought about the frontiers of environmental research and on the morning of the third day most of the 170 conference participants gathered in breakout sessions to discuss what their thinking was about these frontiers. The outcome of the meeting and discussions is a detailed articulation of the research challenges facing our community. The proceedings from this ambitious program will be widely distributed to each of our members and beyond. It is our hope that it will continue to stimulate discussion and inspire action.

Before the conference officially began, over 100 people attended one of four pre-conference workshops. Kurt Paterson and the Electronic Communication Committee organized a 2-part session on web-based learning tools in which participants learned to construct their own web pages and then observed hands-on demonstrations of educational tools others have devised. Based on what I saw, AEESP is blessed with some very creative and innovative volunteers. Simultaneous to this was a panel discussion lead by Robin Autenrieth, Steve Dentel, Nancy Hayden, and myself, exploring the many issues that surround "balance and accepting differences" in academic life. My spouse noted with a certain irony that we had to make rather elaborate child-care arrangements in order to talk about the hassles of making child-care arrangements. Aarne Vesilind closed this session with a thoughtful paper on mentoring.

As if the pre-conference workshops and the conference itself were merely a warm-up, a number of current and past board members stayed on beyond the conference to discuss the future of AEESP. Dick Luthy, Charlie O'Melia, and Aarne Vesilind shared their thoughts with many of the current board members about the purpose and strategic goals of AEESP. We drafted a statement of our Mission and Goals. This is included in the newsletter and will be submitted for your approval in the fall (see *Board Highlights*, p. 8).

Our Strategic Planning meeting serendipitously coincided with the release of the National Science Board's Interim Report, *Environmental Science and Engineering for the 21st Century: The Role of the National Science Foundation*. The full text of this very important, if very long, report can be found on the web at <<http://www.nsf.gov/nsb/tfe>>. The report makes twelve recommendations on how NSF can help provide leadership on environmental science, engineering and education issues, and calls for an additional \$1 billion dollars in funding over the next 5 years to complement NSF's existing support which totals approximately \$600 million. The report

(continued on page 2)

**December 1,
1999
is the
submissions
deadline for
the
January
2000**

AEESP News

makes specific mention of the need to enhance research in the area of environmental technology and increase investments in interdisciplinary and long-term research. Although the published report from the AEESP Frontiers Workshop was cited in the NSB document, we have been concerned all along that the contributions and role of environmental engineering have been overlooked in the formulation of this research agenda.

It is imperative that we work together to make certain the NSF is successful in its request of increased funding for environmental research and education. We must also work to ensure that engineering, most notably environmental engineering, is a principal focus of many of the new environmental initiatives that will emerge in the coming years. To this end, Dick Luthy, Bruce Logan, and I, on the behalf of AEESP, have sent a letter to the chair of the National Science Board endorsing the strategy outlined in the report and outlining how we can assist them. In the words of Dick Luthy, "Environmental engineers have a unique set of problem-solving and integrative skills that play a key role in characterizing risk, restoring the environment, protecting ecological integrity, and in sustaining human activities with natural cycles and processes." We have asked and received the support of almost all our NAE members and have sent the letter to a wide distribution list within NSF.

Mort Barlaz, the chair of the Legislative Affairs Committee, has sent an e-mail to all AEESP members urging each of you to read the report and send a comment to NSF (TFE@nsf.gov). The Legislative Affairs Committee has also drafted a white paper that summarizes the Frontiers Report and describes the past, present, and future of environmental engineering (see p. 4). Please feel free to use this for lobbying within your own university and with your state and congressional representatives. The board is exploring other ways to heighten the profile of environmental engineering and AEESP in Washington. We have applied for membership in the American Association of Engineering Societies and are discussing ways to be highly effective in urging Congress to approve NSF's request for increased funding. We want AEESP to provide the leadership, in collaboration with other fields, on defining the role engineering will play in environmental research and education.

This brings up an interesting question, though. What is the role of AEESP among other engineering disciplines? Traditionally, our membership has come from Civil Engineering Departments; should this continue? This was also a topic of lively discussion at the Strategic Planning Meeting. Despite frequent calls for a "Professional" organization, it was decided that our strength is in staying a specialty organization made up of primarily faculty within engineering schools. With the help of the Membership Committee, newly chaired by Craig Adams, we hope to devise a way to increase membership among Chemical, Mechanical, Industrial, and other engineers who are conducting research primarily in the environmental area. Craig will be sending out a survey asking you about your opinions and what types of activities you think AEESP should be providing its members.

The results from a survey on Publications conducted last year paved the way for the preparation of a new Processes Lab Manual. Susan Powers, a board member and Publications Committee chair, is marshalling a battalion of fearless volunteers in this endeavor. I, for one, am looking forward eagerly to this product, as I still use parts of the Unit Ops Manual published in the late 1970s.

Another renewed committee that has gotten off to an impressive start is the Education Committee, chaired by Mike Switzenbaum. In May, members of this committee (Kim Hayes, Steve Dentel, Bob Baillod, and Robin Autenrieth) met with some members of AAEE to discuss accreditation (see *Board Highlights*, p. 8). A great deal of progress was made last spring on ironing out a number of issues swirling around the accreditation process of both undergraduate and graduate programs. Hopefully, clarification of these issues will serve us all well as we face future visits from ABET.

In an effort to guard against charges of exploitation, we are going to offer two new awards in recognition of excellence among our members. The board voted to accept the recommendations of the Awards Committee, exemplarily chaired by Marc Edwards, and establish a Frontiers Award and an Educator's Award. Watch for the announcement requesting nominations.

In this, my last letter as President, I want to thank each and every one of you who make AEESP a vital and exciting organization. Thank God we have so many active members who stifle the well-reasoned and disciplined reflex to decline and instead say yes to our many requests. Although I have sometimes felt over the last year that I operate a triage unit instead of

Format for *Newsletter* submissions...

Please note that the preferred file formats for electronic newsletter submissions are MS Word format for text (.doc) and tif format for photos (.tif). Photos should be scanned at 300 dpi resolution. Please identify and provide names of all subjects in photographs. Submissions should be sent to Roger Ely, Newsletter Editor, roger.ely@yale.edu.

a well-oiled research program, I have also felt that my efforts have been well received and acted upon with enthusiasm. I hope to continue to "volunteer" for duty in AEESP as we move into an exciting era of challenging initiatives, new partnerships, and greater resources. I only hope that we have succeeded in making the platform for this activity a little sturdier.

Kimberly A. Gray
Northwestern University
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ABET Program Criteria for Env Eng

In the August issue of the *Journal of Environmental Engineering* [125(8): 685-686], you will find an editorial by Bob Baillod explaining the recently developed ABET criteria for programs in environmental engineering. This article provides background information, an interpretation of the criteria, and suggestions for future needs.

--Robin Autenrieth

Members meet with NSF Director

On June 15, AEESP members Bruce Logan, Dick Luthy, and Perry McCarty met with Dr. Rita R. Colwell, Director of the National Science Foundation. The purpose of the meeting was to talk about the status of environmental engineering at NSF, and the opportunity for NSF to assume a greater leadership role for environmental engineering research and problem solving. This meeting was a follow-up to an NSF-sponsored workshop on environmental engineering research frontiers convened by the AEESP in January 1998. The AEESP representatives also met with several heads of environmentally-related divisions and programs at NSF.

An important view expressed during the meeting with Dr. Colwell was a desire on her part to triple NSF's budget. She will push for an increased budget to support new activities in: 1. information technologies (which has sustained our economic boom in the the '90s), 2. biocomplexity, and 3. science education (particularly K-12 and for the disadvantaged and minorities).

The biocomplexity initiative embraces all things related to the environment, but emphasizing complex environmental systems. Examples are the interaction among organisms in the environment, biodiversity, sustainability, human-environment interactions, science and engineering applied to environmental problems, water infrastructure needs for the 21st century, etc. The key point is the complexity of the environment and that focusing on one small part will not address important questions.

Dr. Colwell recognizes the importance of environmental engineering, and that this should entail better integration of

science and engineering, and that the NSF should provide leadership in environmental engineering. She asked that our organization respond to the National Science Board's task force on the environment, which has issued a report on July 29, 1999 on NSF's role in environmental science and engineering for the 21st Century. Dick Luthy, Kimberly Gray, Bruce Logan, and Robin Autenrieth are preparing a response on behalf of the AEESP. The letter will be posted on the AEESP web site. Dr. Colwell welcomed the support of the AEESP in promoting her initiatives to Congress.

The NSF web site for the National Science Board's report on Environmental Science and Engineering for the 21st Century is <http://www.nsf.gov/nsb/tfe>.

AEESP members, send your news!

One of the goals of AEESP is to provide a forum for networking among its members. With our own conferences occurring only every ~3 years, the AEESP Newsletter is an excellent way of filling the intervening time with news of our membership. The "Comings & Goings" section features new appointments, promotions, awards, retirements, etc. News describing and promoting new programs, research institutes, etc., at your university will be included in the "Programs & Places" section. Please help us spread your news by sending your contributions to "Comings & Goings" and "Programs & Places." "Comings & Goings" news should be a short 1-3 sentence blurb. "Programs & Places" can be 1-2 paragraphs. Submissions should be sent to Roger Ely, Newsletter Editor, roger.ely@yale.edu.

[Below is a statement of AEESP future research challenges written by Mort Barlaz and Kimberly Gray for the purpose of educating people as to our role in environmental research and for lobbying purposes.]

The Past, Present, and Future of Environmental Engineering Research

Environmental engineering is a branch of engineering concerned with protecting the environment from the potentially deleterious effects of human activity, protecting human populations from the effects of adverse environmental factors, and restoring environmental quality for ecological and human well-being. Traditionally, the environmental engineer has analyzed environmental systems and designed plans, criteria, and technologies for the use of air, water, and land.

Currently, environmental engineering research is focused on the fundamental and dynamic factors influencing the detection, transformation, fate, and transport of contaminants in both natural and engineered environments. Environmental engineers are involved in a myriad of activities such as quantifying trace levels of chemicals in complex matrices, characterizing microbial communities, identifying key microbial populations and elucidating their functions, developing a broad suite of biological, chemical and physical treatment technologies to meet stringent regulations, and modeling biogeochemical phenomena at various scales and in multiple phases. In addition, environmental engineers, with their understanding of contaminant behavior in the environment, play a key and leading role in the characterization of risk and thus, in the design of effective strategies and regulations to manage residuals.

In looking to the future, environmental engineers will continue to search for creative and economical ways to limit the release of contaminants into the environment, to develop highly sensitive techniques to track pollutants once released, and to find effective methods to remediate spoiled resources. Environmental engineers will also continue to be the vital link between scientific discovery, technological development, and the societal need for protecting human health and ecological integrity.* The emphasis of their work, however, will shift from managing wastes after they are generated to minimizing the release of residuals by altering production processes and capturing the resource value of wastes through recovery, recycling, and reuse. Environmental engineers will be critical members of manufacturing teams where the design and

production of goods are developed in full consideration of their environmental impacts during production, use, and at the end of their useful life.

At the heart of environmental engineering research, past, present, and future, is the study of biocomplexity.** Since exclusive reliance on technology will not provide the extensive range of protective solutions needed, environmental engineering research will find strategies that reintegrate and synchronize human activities with natural cycles and processes. Environmental engineers have the unique set of multidisciplinary skills to find ways that allow for coordinated industrial and economic development, urban redevelopment, and ecological preservation and restoration. Since this set of skills rests on the detailed study of environmental phenomena, environmental engineering research promises to uncover new means of material production, to improve the efficiency of engineered processes, and to reveal more savvy ways of managing carbon and utilizing energy. These advances will involve greater use of molecular tools, tools that environmental engineers are helping to adapt and apply to environmental conditions.

Historically, it was the sanitary and civil engineer who made cities livable for large populations by designing drinking water, wastewater and solid waste management systems. A crucial future need is to find ways to make both developing and post-industrial cities sustainable. Despite uncertainty, the formulation of responsible public policy for all inhabitants of a region will evolve with essential input from environmental engineers. Environmental engineers will be a part of the team of researchers that seeks to determine and minimize the cumulative risks associated with exposure to chemicals and pathogens in air, water, and soils. Advances in environmental engineering research will lead the way to the integrated management of resources that support sustainable development and assure human and ecological health for generations to come.

*For complete discussion of future research challenges in Environmental Engineering, please see: Logan, B. E. and B. E. Rittmann, 1998, *Environ. Sci. Technol.*, 32, 21, p.502A-507A.

**Biocomplexity – The complex interdependencies among living organisms and the environments that affect, sustain, and are modified by them.

A call for authors and reviewers:

AEESP's new *Environmental Engineering Processes Laboratory Manual*

AEESP is undertaking a project to write a new *Environmental Engineering Processes Laboratory Manual*. The manual will be written by AEESP members as a document that provides a tool for students and a time-saver for faculty. The manual will also serve as a means of publishing our efforts to develop relevant and meaningful laboratory experiences for our students. The manual will undergo a full peer-review process and contributors will be considered authors of chapters in a book.

The manual is being designed as an inclusive document to meet the needs of a broad range of needs. It will cover a wide spectrum of environmental processes, well beyond the standard water and wastewater unit operations that are included in the present manual (see the draft Table of Contents). Other concepts that have been integral in the design of the manual include:

- "Experiments" will include laboratory and computer exercises.
- Design examples and problems using the experimental results will be included where appropriate.
- Experiments will be designed with options to be generally applicable to graduate or undergraduate levels and to include a range of equipment requirements. This means that both "cookbook" type labs and open-ended labs would be appropriate.
- The manual will be published in a modular form--CD or custom printing--so an instructor can pick and choose sections of interest.
- A full peer review process will be used to ensure quality and consistency of the chapters and adequate recognition for the authors.

The development of the manual will be led by five editors (Table 1). They will be responsible for defining the criteria and quality for each chapter, organizing authors and reviewers for their section, and ensuring that the project is completed within a reasonable time frame. At this point, AEESP members who are interested in contributing to this project as either an author or reviewer are being sought. The proposed time line suggests that

the authors and organization of each section be defined by the end of the fall semester with contributions to be submitted by early next spring. It is expected that a "beta" version will be available for Fall 2000 classes and the manual completed by Fall 2001.

Please contact any of the editors if you wish to volunteer your efforts as a reviewer or author or if you have any questions or comments on the draft table of contents. **We request that all potential authors submit a 1-2 page overview of the lab you wish to be considered to any one of the editors by October 31, 1999.** We look forward to working with AEESP members on the completion of this project.

Environmental Engineering Processes Laboratory Manual (DRAFT)

- 1.0 Transport and Mass Transfer
 - 1.1 Fluid flow
 - residence time distributions (CSTR, PFR, non-ideal reactors)
 - fluid flow in porous media (Darcy's Law)
 - 1.2 Phase equilibria
 - partitioning
 - sorption isotherms
 - 1.3 Mass transfer separation processes
 - air stripping
 - scrubbers
 - membranes
 - ion exchange
 - carbon adsorption
- 2.0 Chemical Processes
 - 2.1 Reaction kinetics
 - 2.2 Acid - base equilibria
 - pH control
 - 2.3 Oxidation/reduction
 - photooxidation
 - chlorination
 - corrosion
 - 2.4 Precipitation
 - lime softening
 - heavy metals removal
- 3.0 Biological Processes
 - 3.1 Aerobic growth and kinetics
 - 3.2 Anaerobic growth and gas production
- 4.0 Particle Interactions
 - 4.1 Dynamics
 - coagulation/flocculation
 - colloid transport in porous media
 - 4.2 Separation processes
 - filtration
 - electrostatic precipitation
 - sedimentation
 - sludge thickening

Table 1. Editors of new processes manual.

Susan Powers Overall Editor Clarkson University sep@clarkson.edu	Paul Jennings Transport and Mass Transfer Florida Inst. Technology jennings@fit.edu
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Jim Bisogni Chemical Processes Cornell University jjb2@cornell.edu	

In Memoriam...

Werner Stumm



Werner Stumm

We mourn with sorrow and loss the death of Werner Stumm on April 14, 1999. The environment has lost one of its most creative and effective protectors; we have lost our leading scientist and teacher. Here I write a few inadequate words about his life and his legacy.

Let us begin with some biographical details. Werner Stumm received his doctorate in chemistry from the University of Zürich in 1952. His first position was as a research chemist at the Swiss Federal Institute for Water Supply and Water Pollution

Control (Eidgenössische Anstalt für Wasserversorgung, Abwasserreinigung und Gewässerschutz, EAWAG). In 1954 he spent a postdoctoral year at Harvard University and then went back to the EAWAG. He returned to Harvard University in 1956 as Assistant Professor of Applied Chemistry, advancing to Associate Professor and then to Gordon McKay Professor. In 1970 he returned to Switzerland as Director of the EAWAG and as Professor of Chemistry at the Swiss Federal Institute of Technology in Zürich. He retired from these positions in 1992. After his retirement he came to Johns Hopkins University as a Visiting Professor for a month each year until his health prevented his travel. Included among his many honors are three from AEESP: 1981 Distinguished Lecturer and the 1983 and 1984 Outstanding Publication Awards. Other honors include the 1963 Publication Award from AWWA, the 1976 Monsanto Prize for Pollution Control from the ACS, the 1985 Albert Einstein World Award for Science, the 1986 Tyler Prize for Environmental Achievement, the 1998 V. M. Goldschmidt medal from the Geochemical Society, and honorary doctorates from the University of Geneva, the Royal Institute of Technology in Stockholm, the University of Crete, the Technion, and Northwestern University. He was elected to the U.S. National Academy of Engineering in 1991. With his long-time colleague and friend, Jim Morgan, he shared the 1999 Stockholm Water Prize.

Werner Stumm was an environmental chemist of unsurpassed creativity and productivity. A major part of his contribution to our environment is his research and that of his students and colleagues. At the heart of this work is surface complexation, described by Werner with the "Swiss cheese model" because of its theoretical shortcomings. Two of his former students at EAWAG, Bernhard Wehrli and Gerhard Furrer, have written that Werner promoted the surface complex as the center of a chemical universe "where iron corrodes, mountains dissolve, and sedimentary particles precipitate." From his doctoral dissertation on ion exchange to perhaps his most recent effort, a paper on corrosion ("Corrosion of Metals in Aquatic Systems, an Introduction," *Schriftenreihe der EAWAG* Number 15, 1998), complex formation and, particularly, surface complex formation, provide the conceptual framework for a remarkable array of scientific and technological contributions to environmental

science and engineering. Examples include coagulation and filtration processes, adsorption of cations and anions, acid rain and fog, acid mine drainage, the cycling of iron and manganese in aquatic systems and their removal in potable water treatment, geochemical weathering, calcium carbonate precipitation and dissolution, corrosion, and the biological availability of trace metals.

Werner Stumm developed models and made measurements at the molecular level and used these insights to understand and manage local, regional, and global environmental problems. He was among the first persons to recognize the importance of phosphorus in manmade or cultural eutrophication. With Jim Morgan he linked phosphorus inputs to eutrophication and also provided the scientific basis for technological processes to remove phosphorus from wastewaters. Over the years he introduced ecotoxicology to EAWAG and into his writings. He worked vigorously for an ecosystem approach to environmental systems.

Werner Stumm was the dominant figure in the establishment of environmental chemistry as a core discipline for limnologists, oceanographers, ecologists, soil scientists, and environmental engineers. This was done through his research and teaching and especially through the seminal book he co-authored with Jim Morgan and titled *Aquatic Chemistry, An Introduction Emphasizing Chemical Equilibria in Natural Waters*. Werner introduced the term "Aquatic Chemistry" to the vocabulary of environmental scientists and engineers in 1967. The first edition of *Aquatic Chemistry* appeared in 1970, the second in 1986 and the third in 1996. These books defined and developed a new field of environmental science.

My own choice of Werner Stumm's major contribution to environmental protection is not his extensive personal accomplishments or the remarkable text *Aquatic Chemistry* co-authored with Jim Morgan. It is Werner Stumm as teacher and mentor. It is the students and colleagues who have studied aquatic science and engineering with him and who have, through his example, developed concerns for humanity and our environment, formulated an optimistic and realistic spirit about our possibilities for success, and who have learned and applied the rigorous science needed to achieve that success. At the core of these students and colleagues are the 10 doctoral students who worked with Werner at Harvard University and the 33 doctoral students who worked with him at the EAWAG: Steven Banwart, Madeleine V. Biber, Markus A. Boller, Gianluca C. Bondietti, Paul Busch, Robert L. Champlin, Yi-Shon Chen, Felix Dalang, Yiwei Deng, Dieter Diem, Georg Furger, Gerhard Furrer, Hermann H. Hahn, Chin-Pao Huang, Slavica Ibric, Steven R. Jenkins, Robert Kummert, Bruno Kunz, James O. Leckie, Albert Losher, Christina A. Matter-Müller, James J. Morgan, Michael Ochs, Gertrud K. Osman-Sigg, Dieter Raab, Martin Reinhard, Adrian Ruf, Hansruedi Siegrist, Christophe Siffert, Laura Sigg, Philip C. Singer, Jürg Sinniger, Daniel Suter, Norberg Svoboda-Colberg, Mark W. Tenney, Markus Thüer, Jürg Tschopp, Hans-Jakob Ulrich, Bernhard Wehrli, Ulrich Weilenmann, Paul Wersin, Erich Wieland, and Bettina Zinder.

We members of AEESP feel his loss. We are instruments in his legacy to our planet.

Charlie O'Melia
Johns Hopkins University

In Memoriam...

Paul L. Busch

Paul L. Busch, Ph.D., P.E., D.E.E., and chairman, president and CEO of Malcolm Pirnie, Inc. died July 27 in Boston of complications from non-Hodgkin's lymphoma. He was 61. His contributions to environmental engineering education and practice spanned a broad spectrum of activities and reflected his commitment and devotion to environmental protection.

Paul was well known and a good friend to many of us in AEESP. We knew him as president of the American Academy of Environmental Engineers (AAEE) and chairman of the Board of the Water Environment Research Foundation (WERF), and as a member of the National Research Council's Water Science and Technology Board and the Board on Environmental Studies and Toxicology, the Executive Committee of the Water Environment Foundation, and the U.S. EPA's National Advisory Council for Environmental Policy and Technology. His election in 1996 to the National Academy of Engineering, one of the highest professional distinctions bestowed upon an engineer, acknowledged his "outstanding contributions to the practice, professionalism, and pedagogy of environmental engineering."

Paul began his engineering career at the Massachusetts Institute of Technology where, as an undergraduate, he earned dual bachelor's degrees that combined his love of history and philosophy with the study of civil engineering. After earning his Master's degree in sanitary engineering at MIT in 1959, he entered MIT's doctoral program. He took a brief hiatus from his graduate studies in 1961 and went to work for Malcolm Pirnie. He returned to graduate school in 1963, switching over to Harvard University where he worked with Werner Stumm on the subject of bioflocculation, and received his Ph.D. in 1966.

Returning to Malcolm Pirnie where he spent his entire consulting engineering career, Paul made significant technical contributions in the areas of industrial waste treatment for the pulp and paper, chemical, and pharmaceutical industries and where he pioneered the use of single and two-stage nitrification, activated carbon, and high purity oxygen for wastewater treatment. Relying on his innate imagination and vision, and being the consummate team player, Paul was instrumental in guiding the firm to become one of the world's largest environmental consulting firms with a staff of over 1,100 headquartered in White Plains, New York, with 40 offices worldwide. He was named a vice president in 1970 and was elected president in 1988 and CEO in 1990.

Paul was a good friend to environmental engineering education. Passionate about the education of tomorrow's engineers, he was a visiting professor at the University of North Carolina, a mentor to the Masters of Engineering Program at Cornell University, a member of the Visiting Committee for the Department of Civil Engineering at the University of Texas and for the Department of Civil and Environmental Engineering at MIT, a member of the Advisory Council to the School of Engineering at Rice University, the School of Engineering at the

Polytechnic Institute of New York, and the School of Civil and Environmental Engineering at Cornell University, and was a trustee of the Dibner Institute for the History of Science and Technology at MIT. He was the "practitioner" to whom many of us in academia turned for advice when it was necessary to seek external guidance with respect to our educational mission and our interface with professional organizations.

His concern for the education of environmental engineers and the practice of environmental engineering also led to his organizing the AAEE/NSF Conference on "Environmental Quality and Industrial Competitiveness" and his serving as co-chair of the 1990 ASCE Environmental Engineering Conference. In 1990, he was selected by AAEE to be the first Kappe Lecturer, whereby he visited more than a dozen universities to deliver a series of lectures and meet with students and faculty

to discuss professionalism and environmental engineering education. Over the course of his career, Paul presented more than three dozen invited lectures on university campuses. He was an ardent champion of voluntary certification of environmental engineering specialists and of life-long learning programs.

Among his many other professional honors, he was recognized in 1991 as the recipient of the AAEE's Gordon Maskew Fair Award for his contributions to the world's environment, and in 1998 with ASCE's Simon W. Freese Lecturer Award.

While Paul's presence and his sense of humor and infectious smile will be missed, his many contributions will serve as a legacy for future generations of environmental engineers.

Philip C. Singer
University of North Carolina



Paul L. Busch

Board Highlights

AEESP Mission Statement and Goals

Recently the AEESP board convened a Strategic Planning meeting. With the help of Past Presidents Dick Luthy, Charlie O'Melia, and Aarne Vesilind, the current board and officers discussed the mission of our organization. The outcome of this discussion is presented below in a proposed formal Mission Statement and set of goals.

Mission Statement

The mission of AEESP is to assist its members in the development and dissemination of knowledge in environmental engineering and science. AEESP seeks to strengthen and advance the environmental field through cooperation among academic and other communities.

Goals

1. To provide networking opportunities that foster a supportive environment for the professional development of its members.
2. To develop long-range plans concerning education in environmental engineering, science, and related fields, and to implement these plans by working with professional scientific societies and fellow professionals in the public and private sectors.
3. To assist its members in matters relating to the development of academic and research programs at individual institutions.

AEESP Members:

Does AEESP have your correct address? Send address changes to Joanne Fetzner at the AEESP business office:

Joanne Fetzner
AEESP Business Office
2208 Harrington Court
Champaign, IL 61821
e-mail: jfetzner@uiuc.edu
phone: (217) 398-6969
fax: (217) 355-9232

4. To provide a forum for the review of graduate and undergraduate curricula, in order to enhance education in environmental engineering, science, and related fields.

5. To provide assistance to state professional boards, civil service boards, and other groups charged with the licensing and regulation of environmental engineering practice and education.

6. To work with other organizations interested in research and education in environmental engineering, science, and related fields.

7. To establish an information service that keeps its members informed about developments in environmental engineering, science, and related fields.

8. To promote communication about matters concerning the interest of the members and the functions of those pertinent professional and scientific societies in which members have professional interests.

9. To assist public agencies, professional societies, and other groups, through advisory and consultative services, in the development of programs related to education and research in environmental engineering, science, and related fields.

10. To recognize outstanding achievement in research and education in environmental engineering, science, and related fields.

Recommendations for AEESP Committees

AEESP could not function if it were not for the tireless efforts of its committees. The lion's share of AEESP's work is accomplished by the many highly motivated volunteers among our members who make up these committees and serve as chairs. In May, the AEESP board developed the following set of recommendations in the hope of sustaining the high functioning of its committees.

1. The term of chairs and committee participants is typically three years, renewable one time.

2. Committees should devise plans for rotating members to ensure continuity.

3. Chairs are responsible for filing biannual reports (May and October). Chairs will be replaced for failure to submit two reports.

4. All reports must list committee members and indicate who was involved in committee activities.

5. The AEESP Secretary will track reports.

AEESP Member News

Lizette R. Chevalier, Ph.D., was recently tenured and promoted to associate professor in the Department of Civil Engineering at Southern Illinois University Carbondale.

The University of Houston Department of Civil and Environmental Engineering is pleased to announce the appointment of **Dr. Shankar Chellam** as assistant professor of environmental engineering. Dr. Chellam, a Ph.D. graduate of Rice University, formerly with Montgomery Watson Americas, will conduct membrane research and teach water treatment courses. He will occupy the position formerly held by Cullen Distinguished Professor James M. Symons, who retired in 1997.

Dr. David James, P.E., became licensed as a Civil Engineer in Nevada and has been appointed chair of the Civil and Environmental Engineering Department at UNLV.

Dr. Thomas Piechota, P.E., will be joining the Civil and Environmental Engineering Department at UNLV in Fall 1999 as an assistant professor. Dr. Piechota received his Ph.D. in civil and environmental engineering at UCLA in 1997 and has expertise in engineering hydrology and the interaction of urban hydrology with water quality.

David Yonge was promoted to the rank of professor this year with the Department of Civil and Environmental Engineering at Washington State University.

The Purdue Board of Trustees has named **P. Suresh Chandra Rao** as the first Rieth Distinguished Professor of Civil Engineering. Dr. Rao comes to Purdue from the University of Florida, where he has earned an international reputation for his work over the last quarter-century.

Andrew Randall, Ph.D., was recently tenured and promoted to associate professor in the Department of Civil and Environmental Engineering at the University of Central Florida.

The Department of Civil Engineering at the University of Minnesota has hired three new faculty in the environmental engineering area. **Midhat Hondzo**, associate professor (Ph.D., 1992, civil engineering, University of Minnesota), returned to the University of Minnesota after a productive period with Purdue University. His areas of research are experimental work and numerical prediction techniques in the areas of environmental fluid dynamics, emphasizing physical-biological-chemical interaction, microstructure measurements, and transport processes in lake, rivers, watershed, and coastal waters. **William Z. Arnold** is assistant professor (Ph.D., 1999, geography and environmental engineering, Johns Hopkins University). Dr. Arnold's Ph.D.

advisor was Lynn Roberts, and his research areas are the transformation of anthropogenic chemicals in natural and engineered aquatic systems, and reaction kinetics, pathways and mechanisms, especially with regard to interactions at the particle/water and particle/air interfaces. **Fernando Porte-Agel** is assistant professor (Ph.D., 1999, environmental engineering, Johns Hopkins University). Dr. Porte-Agel's Ph.D. advisor was Marc Parlange, and his areas of research interest involve fluid mechanics in the environment, specifically hydrology, micrometeorology, and turbulent transport in the atmospheric boundary layer.

John S. Gulliver has been appointed as the first holder of the Joseph S. and Rose T. Ling Professorship in Civil Engineering at Johns Hopkins University. Joseph S. Ling is a member of the National Academy of Engineering and is known as the father of pollution prevention, a term that he coined and advocated as part of the Pollution Prevention Pays program at 3M, Inc.

Susan M. Morgan, Ph.D., P.E., passed the April 1999 environmental engineering exam to become a professional engineer and became graduate program director in the Department of Civil Engineering at Southern Illinois University, Edwardsville, effective Fall 1999.

Joseph C. Reichenberger, P.E., was promoted to full professor and granted tenure in the Civil Engineering and Environmental Science Department at Loyola Marymount University in Los Angeles. In February 1999, he was inducted into the College of Fellows for the Institute for the Advancement of Engineering and received its Distinguished Teaching Award-College Level.

Professor Jim Morgan, the Marvin L. Goldberger Professor of Environmental Engineering Science at Caltech, has been honored with the 1999 Clarke Prize, awarded by the National Water Research Institute, and the 1999 Stockholm Water Prize, which he shares with the late Werner Stumm.

Kevin Gardner is leaving his assistant professor position at Case Western Reserve University and joining the faculty of the Civil Engineering Department and the Recycled Materials Resource Center at the University of New Hampshire as a research assistant professor.

Dr. Glen Cass, an internationally renowned professor at Caltech, conducting research in air pollution dynamics and control, is moving to Georgia Tech as chairman of the School of Earth and Atmospheric Sciences and professor of civil and environmental engineering. Dr. Cass's research has been focused on better understanding the processes impacting particulate matter and co-occurring pollutants in the atmosphere and their impacts on health

and welfare. His studies have been both experimental and computational and have included source and regional particulate matter characterization and modeling, investigation of pollutant damage to historical artifacts and works of art, and control strategy design. He is author of over 100 journal publications and has been a member of a number of international committees, including those with the National Research Council, the Health Effects Institute, the California Air Resources Board, and others. He is on the editorial board of a variety of environmental journals, including *ES&T* and *Aerosol Science and Technology*.

Roger Ely, editor of the *AEESP Newsletter*, recently moved from the University of Idaho to Yale University as assistant professor of environmental and chemical engineering and director of undergraduate studies for Yale's new Environmental Engineering Program. His research interests center on biological processes in environmental engineering, particularly molecular-level fundamentals and modeling of microbial systems, application of molecular biology and microbiology tools, bioremediation, biodegradation of xenobiotic compounds, and toxic effects and stress responses in microorganisms.

James E. Saiers has joined the faculty of Yale University's School of Forestry and Environmental Studies (F&ES) and the Environmental Engineering Program as an assistant professor of hydrogeology. His research focuses on migration of toxic metals, herbicides, and particulate matter in saturated and vadose-zone subsurface environments. Dr. Saiers earned his Ph.D. degree from the University of Virginia in 1995. Prior to moving to Yale, he was an assistant professor of geology at Florida International University.

The Environmental Engineering Program at Yale University is pleased to announce the following adjunct faculty appointments: **Dr. F. Peter Boer**, a member of the National Academy of Engineering and an expert in air pollution control; **Dr. Joseph N. Pignatello**, well known for his research in fate and transport of organic pollutants in the environment; **Dr. Sheryl L. Stuart**, an expert in anaerobic microbiological processes in environmental engineering; and **Dr. James R. Wallis**, a pioneer in statistical modeling of environmental and geophysical phenomena and a world-renowned expert in hydrology and water resources.

James Morgan awarded 1999 Clarke Prize



James Morgan

Established in 1993 by the National Water Research Institute, the Clarke Prize was awarded this year to Dr. James J. Morgan. The award honors outstanding research scientists who through their devotion and perseverance have implemented better water science research

and technology. Dr. Morgan has authored over 100 peer-reviewed technical publications, and with Dr. Werner Stumm of Switzerland, he co-authored the pivotal textbook, *Aquatic Chemistry*.

Dr. Morgan's work has led to the development of improved technologies for the treatment of wastewater and drinking water. He is the Marvin L. Goldberger Professor of Environmental Engineering Science at the California Institute of Technology

where he has taught since 1965. Among the numerous awards he has received throughout his career are the ASCE Simon Freese Award for Environmental Engineering in 1997 and the AEEP Publication Award in 1994.

In August, Dr. Morgan was honored with the 1999 Stockholm Water Prize which he shares with the late Dr. Stumm for contributions toward "the preservation, enhancement, or availability of the world's water resources."

The Clarke Prize was established in honor of Mrs. Athalie Richardson Irvine Clarke, co-founder of the National Water Research Institute. Mrs. Clarke dedicated much of her life to water and water technology and recognized the vital importance of water science. "In my experience with the water environment, and for the environmental ethic I believe in, the natural world and appropriate technology need to be jointly supported by our science. Our motivation should be harmony with the environment, not 'mastery,'" states Dr. Morgan.

'All those who receive the Clarke Prize share a concern for and sense of responsibility for the development of water resources and the protection of water environments.'

-- James P. Morgan

New UNC-CH professorship honors environmental engineering pioneer

In 1994, University of North Carolina at Chapel Hill faculty colleagues of Dr. Daniel A. Okun, Kenan professor emeritus, launched a campaign to fund an endowed professorship that would carry his name.

Nearly five years and more than 200 gifts later, the Okun Distinguished Professorship in Environmental Engineering at the UNC-CH School of Public Health has become reality. A matching grant of \$167,000 from the state's Distinguished Professors Endowment Trust Fund recently put the endowment campaign over the top.

As chair of the UNC-CH Department of Environmental Sciences and Engineering from 1955 to 1973, Okun played a key role in shifting the department's focus from a narrow program in sanitary engineering to the comprehensive and 10-fold larger program in environmental sciences and engineering that it is today. Still active in the department, Okun has received recognition from virtually every professional organization in his field for excellence as an engineer, scholar, teacher, and public servant.

"High on my list of priorities is the creation of endowments to support faculty," said Dr. William L. Roper, dean. "These campaigns take on added meaning when the professorship allows us to honor one of our own. Dan Okun has provided the School of Public Health an identity and prestige in environmental engineering for more than 40 years. How fitting to attach his name and reputation to the department of environmental sciences and engineering in this permanent way."

With a fully accredited graduate environmental engineering program and more than 2,000 alumni worldwide, the department offers one of the largest programs of graduate environmental education and research in the U.S. today. Besides engineering, the department's instruction and research address the chemical, biological, toxicological, and physical aspects of environmental processes, as well as social, political, and legal considerations in managing the quality of water, soil, and air resources.

"For 50 years, Dan Okun has advocated for the protection of drinking water resources, for desperately needed technology infrastructure in developing countries and for responsible water supply planning," said Dr. Phil Singer, professor of environmental sciences and engineering, and a long-time colleague of Okun's who helped spearhead the funding drive. "He has always raised the questions, championed the good ideas, motivated others, and set the standards in environmental education. This campaign gave the many people whose lives he has touched the chance to say thank you in a very special way."

Efforts to recruit the first Okun professor will begin soon, with an initial appointment expected for the 2000-2001 academic year. Anyone wishing to contribute to the professorship should contact Sharon O'Neill in the School of Public Health Development Office, phone (919) 966-0198, or e-mail sharon_oneill@unc.edu.

Case Western Reserve University

Case Western Reserve University is pleased to announce the availability of Case Prime Fellowships in environmental engineering. The Case Prime Fellowship is a competitive award for Ph.D.-bound students and provides full tuition benefits, a competitive stipend, and a \$2,000 discretionary fund that can be used for the purchase of books, a computer, journal subscriptions, software, equipment, reimbursement of travel expenses to attend conferences, and other expenses related to the student's degree program. Students with undergraduate degrees in engineering or the sciences are encouraged to apply. Preference will be given to candidates already holding a master's degree in environmental engineering or a closely related field.

For more information on the department and a graduate school application, see the department's web site at <http://ecivwww.cwru.edu/civil>. Questions and requests for further information should be addressed to Dr. Kevin Gardner at khg4@cwru.edu, or by phone at (216) 368-6938.

Gannon University

Gannon University has recently announced a new Bachelor of Science degree program in environmental engineering. Gannon University is located in Erie, Pennsylvania and currently offers a B.S. in environmental science and an M.S. in environmental studies with concentrations in environmental science, industrial hygiene, and environmental engineering.

Manchester College

In 1987, Humboldt State University in California initiated the Pledge of Social and Environmental Responsibility. It states, "I pledge to explore and take into account the social and environmental consequences of any job I consider or any organization for which I work." Since that time, dozens of colleges and universities have enacted the pledge, which allows students to define what "responsible" means to them. Graduates who voluntarily signed the pledge have turned down jobs in which they did not feel morally comfortable. Some, for example, have promoted recycling at their organization. In one case, a graduate convinced her employer to refuse a chemical weapons contract.

In 1996, Manchester College began coordination of the campaign effort, which has taken different forms at different institutions. At Manchester, it is a community-wide event coordinated by a diverse committee. Fifty to sixty percent of students sign and keep a wallet-size card stating the pledge, while students and supportive faculty wear green ribbons at commencement and the pledge is printed in the formal commencement program. Depending upon the school, it might take several years to reach this level of institutionalization. If one can get a few groups or departments involved, with media attention on and off campus, it will get others interested to build for the future.

The pledge helps educate and motivate students to contribute to a better world and can be a focal point for other types of consciousness raising both on and off campus. Contact NJW@Manchester.edu for information, or write to GPA, MC Box 135, Manchester College, 604 E. College Ave., North Manchester, IN 46962. The campaign also has a web site at <http://www.manchester.edu> (click on "index," then "Graduation Pledge Alliance"). Please keep us informed of any pledge efforts you undertake, as we try to monitor what is happening and provide periodic updates on the national effort.

Dear AEESP members,
Have you or a colleague been recently promoted? Received an award? Moved? We want to know about it. Please share items of professional achievement with AEESP members in the AEESP Newsletter. Send a brief note in an email to:

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Purdue University

A team of 28 environmental engineering and hydraulics senior undergraduates from the School of Civil Engineering at Purdue University have successfully competed at a national design competition sponsored by the Waste-management Education and Research Consortium (WERC), held in New Mexico from April 12-15, 1999. The competition has been held annually for the past nine years and this year included contestants from 24 colleges and universities. The Purdue team chose to compete in four of the six tasks set forth by WERC: a. Innovative Landfill Cap; b. Transuranic Waste Reduction; c. Pipeline Plug Removal; and d. Anaerobic Bioremediation of High-Explosives. We are pleased to announce the following results:

- Task b: Purdue tied for first place (with Oregon State Univ.), winning \$3500,
- Task c: Purdue placed second, winning \$2000,
- Task d: Purdue tied for first place (with Case-Western Reserve), winning \$3500.

The Purdue team of 28 students was also named "Overall Winner" of the contest by a panel of approximately 50 technical judges from various national laboratories, federal agencies, and private corporations. This garnered an additional \$2500. The team's total award was \$11,500. The faculty advisors for the Purdue team were Dr. Inez Hua, Dr. Loring Nies, and Dr. Ron Wukasch. Further information about the contest and tasks can be found at the WERC web site, <http://www.werc.net/contest.htm>.

Letters to the President may be sent to:

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[Below is an article by Dave Dzombak based on a long e-mail exchange that lasted throughout the spring.]

Environmental Engineering and Manufacturing Industries

A professional position advertisement in the May 23, 1999, issue of the *Pittsburgh Post Gazette* caught my attention as a possible harbinger of the future of environmental engineering in the manufacturing industries. Below are some excerpts from that advertisement:

Kennametal -- Metallurgical Engineer/EHS Administrator: Kennametal, Inc., a worldwide leader in tooling systems for the metalworking industry, has an excellent opportunity for employment as a Metallurgical Engineer/EHS Administrator at our World headquarters. The Metallurgical Engineer/EHS Administrator position will require a Bachelor of Science degree in Engineering/Science, preferably material related, and five to seven years experience in a process manufacturing environment, preferably a powder metallurgy industry. In depth knowledge of powder manufacturing including sintering, comminution, sizing, and milling, preferably tungsten carbide specialty, is required. Experience in EHS administration should include a knowledge of required OSHA standards, DEP permitting, and EPA compliance. Knowledge of ISO9000 requirements and recordkeeping is required. Requires excellent verbal and written communication skills. The candidate will be responsible to establish and maintain programs to assure compliance with Global Manufacturing goals, improve process yields, reduce production lead time, and improve product quality. Design, implement, review, and audit all EHS activities. Primary contact and person responsible for OSHA, DEP, EPA, and POTW.

I don't know if Kennametal will be able to find someone with all the qualifications that they are seeking, but it is clear that they want a metallurgical engineer with some EHS experience, and not the other way around. Also, it is clear that they are seeking a person who can help improve product quality and yields while thinking about pollution control and reduction.

I have been thinking about the role of environmental engineering in manufacturing industries for some time from experience gained in various industrial interactions, and more intensely since reading an editorial entitled "Challenges for Environmental Engineers in Manufacturing Industries," by Dr.

Byung Kim of Ford Motor Company in the Feb. 1997 issue of *Journal of Environmental Engineering*. Dr. Kim noted that environmental engineering has very little visibility as a discipline in the manufacturing industries and concluded by expressing concern that without technical training in manufacturing processes, environmental engineers may be increasingly "squeezed out of the job market" in manufacturing industries. I think that Dr. Kim's message is an important one for us environmental engineering educators to reflect upon.

Professors Makram Suidan and Pratim Biswas of the University of Cincinnati responded to Dr. Kim's comments (*JEE*, March 1997) by recommending a broader undergraduate CEE curriculum that emphasizes connectivity among disciplines and that yields generalists able to participate in team considerations of the range of issues involved in civil infrastructure or manufacturing projects.

In the Nov. 1998 *JEE*, my colleague, Prof. Francis McMichael, and I joined the discussion of this topic. We argued that "the most effective and efficient approach to pollution prevention and waste minimization will be to have product and process design and operation engineers trained to incorporate environmental considerations and constraints in the daily practice of their profession.... Environmental education for all engineers is the evolving trend.... As for environmental engineering, the focus will likely remain on management of industrial and municipal residuals and the assessment and control of environmental impacts of human activities." We closed by suggesting that a role that could be expanded more substantially for environmental engineers will be in environmental management. "There is increasing need for systematic, integrated management of process and product residuals and environmental impacts, and the opportunity exists for environmental engineers to lead these efforts."

In follow-up correspondence, several colleagues provided additional thought on this issue. Dr. Kim relayed the sentiment that "we need to ask ourselves how much we are involved in those activities that may ultimately shape our profession. Issues of life cycle analysis, sustainable development, ISO 14000, global climate change (e.g., CO₂ sequestration), etc., are being heatedly pursued and debated. We, environmental engineers, need to be more actively involved in defining many engineering/scientific aspects of these issues. If we don't, someone else will." Dr. Kim then noted that our potential for success in this regard is closely tied to environmental engineering curricula. "We need to understand current and future job markets for our graduates. What are potential employers expecting from environmental engineering graduates? I feel that the current environmental

engineering curriculum is too heavily skewed toward municipal applications. Is this the way we [want to] prepare our future graduates?"

Professor Domenic Grasso of the University of Connecticut suggested that we should "consider redefining Environmental Engineering or risk losing ground to others that have environmentally-related training and broader perspectives. It is time to look beyond our legacy of sanitary engineering. Environmental engineering should require much more broad-based preparation."

AEESP President Kimberly Gray commented that there are "future opportunities in the manufacturing industry that environmental engineers may miss," but she expressed optimism that environmental engineers will "have major roles in the manufacturing and chemical production industry" and that these roles will not be exclusively in residual management. Citing as an example the participation of environmental engineering students and faculty in the Manufacturing Institute at Northwestern University, Prof. Gray foresees significant involvement of

environmental engineers on industrial process and product design teams. She concurs that we need to improve general environmental education for all engineers, but does not believe that this will fulfill all needs. She notes, for example, that "good knowledge of environmental fate and impacts is valuable in deciding on material use in production."

From these various assessments of the current state of our profession and its future directions, it is clear that there are challenges and opportunities for environmental engineers in the manufacturing industries. I encourage all to read the *JEE* Forum articles cited above for provocative insight as we think about the future of environmental engineering and our curricula.

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Organizations of Interest

EPA-NSF International Meeting

On March 23, NSF International and the U.S. Environmental Protection Agency hosted the second meeting of the Stakeholder Advisory Group for the Wet Weather Flow Technologies Pilot. Established as one of 12 voluntary pilot programs under the EPA's Environmental Technology Verification Program (ETV), the Wet Weather Flow Technologies Pilot (WWF) is designed to verify the performance of commercial-ready technologies for stormwater runoff, combined sewer overflows and sanitary sewer overflows. The Stakeholder Advisory Group (SAG) is comprised of technology vendors, users, and specifiers (e.g., municipalities, consulting engineers), as well as members of regulatory agencies and national and regional associations.

"Stakeholder input is critical to our goal of improving wet weather technologies," says John Schenk, Ph.D., WWF pilot manager. "NSF International and the EPA are encouraged by the advisory group's interest and commitment."

Discussions at the meeting centered on two main areas: general processes and procedures for pilot operation, and the development of technically sound verification protocols in the following categories: high-rate separation and clarification technologies; high-rate disinfection technologies; flow monitoring/sampling equipment; wet weather models; and stormwater source control technologies. A Technology Panel for each category was convened during breakout sessions to define critical elements of verification protocols for the respective technologies.

An element common to all categories was the need to report results that allow technology users/specifiers to make purchasing decisions at the local level. The committee also acknowl-

edged that no single approach toward protocol development or verification testing can suit all technologies.

SAG members stressed the need for a rigorous generic protocol review and the ability to modify protocols if early tests reveal flaws. To ensure timely verifications, the group agreed that the pilot should be flexible and allow for collaboration with organizations that plan to conduct testing or have suitable testing facilities in place. The advisory group also highlighted the importance of balancing comprehensive evaluations that generate high-quality data with reasonable testing costs.

Action items for each Technology Panel were identified, as were prospective contractors for protocol development and testing. Technology Panels will meet before drafting test protocols. "Significant progress has been made in defining the scope of verification protocols in each technology category," says Dr. Schenk. "We are optimistic that verifications in two or more technology areas will be completed this year."

The next meeting of the Stakeholder Advisory Group will be held in November 1999 at a location to be determined. Information about the WWF Pilot and the ETV Program is available online at www.epa.gov/etv and www.nsf.org/etv, or by calling 1-800-NSF-MARK.

NSF International, The Public Health and Safety CompanySM, is an independent, not-for-profit organization engaged in standards development, product certification, and educational services in environmental and public health safety. Headquartered in Ann Arbor, Michigan, with offices in Washington, D.C., Brussels, Belgium, Sydney, Australia, and Nairobi, Kenya, NSF International is a World Health Organization (WHO) Collaborating Centre for Drinking Water Safety and Treatment, and Food Safety.

Yale University

POST-DOCTORAL POSITION. MOLECULAR BIOLOGY/ENVIRONMENTAL MICROBIOLOGY. Applications are invited for a post-doctoral research position in the Environmental Engineering Program at Yale University. Candidates should have a Ph.D. degree in microbiology, biochemistry, molecular biology, environmental science or engineering, or a closely related field. Candidates must be highly self-motivated, must have experience in environmental and molecular microbiological techniques, must be able to collaborate and communicate effectively (both verbally and in writing), and must be able to participate in supervisory functions. Preferably, candidates should be familiar with methods for obtaining nucleic acids and proteins from various environmental matrices and have broad experience with microbiology and molecular biology methodologies, for example, amplification of DNA by PCR, RT-PCR, and RAPD; separation of nucleic acids and proteins using methods such as DGGE and one- and two-dimensional gel electrophoresis; sequencing of DNA and proteins; and detection of specific DNA or RNA sequences using hybridization assays and related techniques.

The successful candidate will interact with researchers in environmental engineering, microbiology, and molecular biology at Yale and perhaps at other institutions. The recently instituted and rapidly growing Environmental Engineering Program at Yale is currently comprised of 15 faculty members engaged in several environmental science and engineering research topics (for more information, see <http://www.yale.edu/env/>). Environmental engineering research laboratories have been recently refurbished and equipment is new and state-of-the-art. Yale University and the greater New Haven area offer an unparalleled blend of intellectual, cultural, and recreational opportunities. The position will be available October 1, 1999, for a one year term, with possible extension depending on performance; the start date may be negotiable depending on the successful candidate's circumstances. Applications will be accepted until the position is filled. Send application letter and curriculum vita (including copies or reprints of at least two recent, pertinent publications and description of experience, interests, and expertise), with contact information for at least three references to: Prof. Roger L. Ely, Ph.D., P.E., Environmental Engineering Program, Department of Chemical Engineering, P.O. Box 208286, Yale University, New Haven, CT 06520-8286.

University of Minnesota

ENVIRONMENTAL MICROBIOLOGY, ENVIRONMENTAL ENGINEERING PROGRAM. The Department of Civil Engineering, University of Minnesota, invites applications for a tenure-track position at the assistant or associate professor level effective Fall 2000. Individuals with a strong background in environmental microbiology are encouraged to apply. We are particularly interested in applicants with research experience and interest in using

molecular techniques to study microbial communities and microbial ecology in engineered processes and natural systems. The position will be associated with the departmental program in environmental engineering and water resources. This program is strongly interdisciplinary and it is important that the applicant have sufficient background and experimental experience to develop interactions with faculty and existing research initiatives within the program and other departments at the University of Minnesota. The successful candidate will be expected to demonstrate high quality teaching at the undergraduate and graduate levels, to develop a strong sponsored research program, and to supervise M.S. and Ph.D. students. The appointee will be expected to teach some introductory environmental engineering classes as well as courses in environmental microbiology. Candidates must have an earned doctorate in an engineering or science discipline by the time of appointment. Additional information describing the Department of Civil Engineering at the University of Minnesota is available at <http://www.ce.umn.edu>. Applicants should send a detailed resume, graduate transcripts, and the names, addresses, and telephone numbers of five references to: Professor Michael J. Semmens, Search Committee Chair, Department of Civil Engineering, University of Minnesota, 500 Pillsbury Drive, SE, Minneapolis, MN 55455-0116. The deadline for applications is November 15, 1999, however, the position will remain open until filled. *The University of Minnesota is an equal opportunity educator and employer.*

Clemson University

FACULTY POSITION IN RADIOCHEMISTRY. Search expanded to include Full Professor, Radiochemistry. The Department of Environmental Engineering & Science at Clemson University (EE&S) is seeking applications for a tenure-track position at the assistant, associate, or professor level. Applicants must have teaching and/or research experience in the chemistry of actinides as it applies to radiochemical separations, radioactive waste management, and/or environmental fate and transport. An earned Ph.D. is required. The successful candidate will be expected to develop graduate courses in their specialty area, teach related undergraduate and graduate courses, and develop a funded research program. Additional information on the position is available at www.ces.clemson.edu/ees/news.html. Review of candidates will begin immediately and continue until the position is filled. Send resume, a statement of teaching and research interests, and a list of three references to: Dr. Timothy A. DeVol, Environmental Engineering & Science, Clemson University, 342 Computer Court, Anderson, SC 29625-6510. *Clemson University is an affirmative action/equal opportunity employer.*

Book Reviews, Publications

Biological Wastewater Treatment

C. P. Leslie Grady, Jr., Glen Daigger, and Henry C. Lim, Second Edition, Marcel Dekker, New York, 1999

There are essentially three ways to write a 1000-page textbook, and each has its advantages and exemplars in our field:

1. Have someone else write it. A famous and highly successful industrial wastewater book was allegedly written by students as semester projects, each student concentrating on one industry.

2. Be redundant and write everything two or three times. We have several of these books in the present repertory, in which the author justifies the system as allowing instructors to use the same book for many different courses.

3. Have a lot to say. The long-awaited second edition of the original 1980 book by Grady and Lim is of the third category. Grady, Daigger and Lim have a lot to say.

The changes from the first to the second edition are significant. Most notably, the second edition is beautifully presented, unlike the first edition which left much to be desired in its presentation.

The second significant change is that the authors have chosen to exclude several chapters of introductory material on reactor kinetics and microbiology. This decision is understandable given the greater sophistication of the the students we now have compared to twenty years ago, but it is still a shame since the chapter on reactor kinetics especially was one of the finest, most lucid treatments of the subject. I suggest instructors using this second edition might photocopy the reactors chapter from the first edition and use it as a handout.

The second edition is arranged logically beginning with Part I, introductory material, which includes classification of biochemical operations; fundamentals of biochemical operations; and stoichiometry and kinetics of biochemical reactions. Part II

covers the theory of ideal suspended growth reactors, including aerobic growth of heterotrophs in a single CSTR receiving soluble substrate; multiple microbial activities in a single CSTR; multiple microbial activity in complex systems; and techniques for evaluating kinetic and stoichiometric parameters. Part III covers application for suspended growth reactors, including design and evaluation of suspended growth processes; activated sludge; biological nutrient removal; aerobic digestion; anaerobic processes; and lagoons. Part IV covers the theory of ideal attached growth reactors, with chapters on biofilm modeling; aerobic growth of biomass in packed towers, aerobic growth of heterotrophs in rotating disc reactors; and fluidized bed biological reactors. Part V logically follows with applications of attached growth reactors, including trickling filters; rotating biological contactors; and submerged attached growth bioreactors. The last section covers future challenges and presents the author's well-considered views on where this field is going.

This book is a monumental effort that covers much more material than could comfortably be taught in one semester. Unlike some other books, however, in this case we should not worry about having our students buy an expensive book, only a part of which will be used in the course. This book will be of value to our students long after they graduate and the book will assume an honored space in their professional bookshelves.

Les Grady is the R. A. Bowen Professor of Environmental Engineering at Clemson University; Glenn Daigger is senior vice president with CH2M Hill; and Henry Lim is a professor of chemical, biochemical and environmental engineering at University of California, Irvine.

Clean Hands: Clair Patterson's Crusade Against Environmental Lead Contamination

by Cliff I. Davidson
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Published by Nova Science Publishers
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Novascience@earthlink.net or Novascil@aol.com
ISBN 1-56072-568-0

Dear Colleagues,

I am pleased to announce the publication of a new book, *Quantitative Microbial Risk Assessment*, authored by myself (Charles N. Haas), Joan B. Rose and Charles P. Gerba. We have put together our collective experience working in this field and incorporated many examples dealing with food, water, and other exposure routes. This is designed for use either as a professional reference or as a textbook. It is published by Wiley, and further information can be obtained from Wiley, from the various on-line booksellers, or by e-mailing me.

Sincerely,

Chuck Haas

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Environmental Soil and Water Chemistry: Principles and Applications

V. P. Evangelou, John Wiley & Sons, New York, 1998

Professors are members of the service industry. We provide a service to our students by helping them become knowledgeable in our field and by being there for their questions. There are times, however, when the pressures of scholarship or finances requires us to want to avoid those very people whom we are to serve. In those critical times, we HIDE! We find remote, unused offices or seminar rooms, or even faculty lounges where we hope we can get a few hours of uninterrupted work done.

I first realized that professors do this when I was a graduate student at UNC Chapel Hill. I needed (wanted!) to ask Charlie O'Melia some trivial question, and not finding him in his office, asked around as to his whereabouts. Someone, I don't remember who, suggested that I might find him in this small classroom in the far, remote corner of the building. I opened the door of this room and sure enough, there was Charlie, buried deep in a pile of books. The look on his face was memorable. The expression for, "Oh hell, he found me," was mixed in equal amount with "Oh well, this is my job." I was immensely sorry for having disturbed him and never again sought out professors in hiding.

I remember this story because in my embarrassment I had a chance to see the books he was studying so intensely. They were air pollution books, having to do with removal of particulates using bag filters. This made no sense to me, Charlie being a confirmed water person, until I found out about the research conducted by George Yao, a fellow graduate student and Charlie's advisee. What Charlie was doing was going into a related field to find out what the state of the technology there was, to see if he could apply the technology of bag filters to the removal of particulates by deep-bed water filters. The result was an imaginative and now classic analysis of filter removal processes that became the Ph.D. dissertation for George Yao.

In a field like ours, we often have to go outside the boundaries of our education to seek new ideas. The book by Evangelou on soil and water chemistry is exactly such a text, and I highly recommend it to engineers doing work on soil remediation and related areas. Evangelou is a soil chemist who writes for an interdisciplinary student mix but includes in the book many of the topics familiar to environmental engineers. I found the section on aluminosilicate minerals especially insightful and helpful in understanding water/soil interactions.

The book is in two parts, with the first part devoted to basic principles and the second to the applications. In the first part, the author covers water chemistry (physical chemistry of water and some of its constituents, and solution/mineral chemistry); soil-mineral and surface chemical properties (soil minerals and their surface properties, and sorption and exchange reactions); and electrochemistry and kinetics (redox chemistry, pyrite oxidation chemistry, and reaction kinetics in soil/water systems). In the applications part are chapters on soil dynamics and agricultural-organic chemicals (organic matter, nitrogen, phosphorus and synthetic organics); colloids and transport processes in soils (soil colloids and water-suspended solids, water and solute transport processes, and the chemistry and management of salt-affected soils and brackish waters); land disturbance pollution and its control (acid drainage prevention and heavy metal removal technologies); and soil and water treatment technologies (water quality, and soil and water decontamination technologies). Of particular use to environmental engineers would be the listing of specific chemical contaminants and the procedures for their neutralization.

This is both a fine textbook and a handy reference for engineers and scientists concerned with water/soil interactions. Go hide and read it.

V. P. Evangelou is professor of soil and water chemistry at the University of Kentucky.

In Defense of Garbage

Judd H. Alexander, Praeger Publishers, Westport, Connecticut, 1993

Donella Meadows, an ardent environmentalist (of the Club of Rome fame) started out her review of this book by acknowledging that it is necessary to understand your enemy before being able to vanquish him. To Ms. Meadows, Judd Alexander is certainly a vile and contemptuous creature, daring to suggest that garbage (or more correctly, the production of it) is good. Such heresy flies in the face of what everyone "knows" to be the right things to do—to reduce waste as much as possible and to recycle what is left. Alexander presents the other side of the story—the story of industry—and shows how waste products contribute to our economy and quality of life. He suggests that there is no "garbage crisis" but there is instead a crisis in our misunderstanding and political misinformation concerning waste.

Most disquieting to me is his treatment of the littering problem. Coming at this as the National Rifle Association

approaches violent deaths by shooting (people kill people—guns don't kill people), Alexander continues to assert that littering is the responsibility of the litterer and that American industry has no responsibility for putting litterable products into the hands of potential litterers. It is the message of Keep America Beautiful, Inc. which is supported in great part by the bottling industry.

Whether you agree with Mr. Alexander or with Ms. Meadows, the fact is that this is a fascinating book that should be in the library of everyone teaching solid waste engineering and management. It is full of great stories and anecdotes for spicing up lectures and for getting your students all upset. Buy it.

Judd H. Alexander is the retired former executive vice president of the American Can Company and the former chairman of Keep America Beautiful.

Engineering and Environmental Ethics: A Case Study Approach

John R. Wilcox and Louis Theodore, John Wiley & Sons, New York, 1998

There is the story of the mechanical engineer, the chemical engineer and the software engineer riding in a car, when the car stops cold and will not restart. The mechanical engineer suggests that it probably is something to do with the timing belt, but the chemical engineer thinks it must be bad fuel. The software engineer says "Why don't we get out of the car and get back in again. Maybe then it will start."

Every profession seems to have its own solution to a common problem. This book seems to represent (with apologies to Alan Molof and my other chemical engineering friends) the chemical engineer's approach to environmental ethics. The book is essentially hundreds of short (one- to two-page) vignettes concerning ethical problems in engineering. The case studies are from the perspective of industry and engineers employed by industry.

I want to be charitable to the authors. They have collected a wide array of interesting short stories where engineers are bent, mutilated, and spindled by ethical problems, sometimes choosing the high road but often selecting the less honorable but more expedient alternative. Reading these in sequence like a book or using them for discussions in a classroom would leave the impression that all engineers are basically ethically incompetent louts. Unfortunately, any student who would have this book as his or her sole introduction to ethics would still be an ethically incompetent lout.

The authors state in the first chapter that, in their belief, ethics can be taught and then present the *non sequitur* that studying case studies teaches ethics. The fact is that case studies in the hands of experienced and competent instructors, using other material, can and will raise the level of ethical understanding of students, but suggesting that by simply

reading and discussing a bunch of case studies develops ethical awareness is simply wrong.

The book has another curious purpose, as noted in the preface. The authors suggest that the book is useful to practitioners because employees who commit criminal acts are treated more leniently if the company has a code of ethics. Ergo (argue the chemical engineers) it is good to have a code of ethics and "these cases [in this book] will be helpful in designing effective ethics programs and codes of conduct." The reason for corporate ethical awareness is so that criminal acts by its employees will be treated more leniently? Where are these guys coming from?

The worst part of this book is the author's misconception of environmental ethics. Apparently chemical engineers consider environmental ethics to be such crimes as mismanagement of data, padding expense accounts, and ignoring standard procedures, as long as the data, accounts, or procedures have something to do with water or air pollution. I did not find a single case study in the book that talked about such concerns as causing pain to animals, destruction of natural habitats, and the rights of future generations.

If you want to add an ethical dimension to your courses, this book will not be of any help. Most importantly, the book has nothing to do with environmental ethics. Don't waste your money on this one.

John R. Wilcox is the director of the Center for Professional Ethics and Louis Theodore is a professor of chemical engineering, both at Manhattan College.

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Conferences, Calls for Papers

An announcement of a Special Symposium...

Chemical Speciation and Reactivity in Water Chemistry and Water Technology: A Symposium in Honor of James J. Morgan

Fall 2000 American Chemical Society Meeting
August 20-25, 2000

This symposium will be held at the Fall 2000 American Chemical Society Meeting, August 20-25 in Washington, D.C., sponsored by the Division of Environmental Chemistry and organized by Profs. Janet Hering (Caltech) and Jerry Schnoor (U. Iowa). For further information, see the Environmental Chemistry Division web page, <http://gemini.tntech.edu/~mjw5030/acspage.html>, and/or the link for the Washington meeting, <http://gemini.tntech.edu/~mjw5030/washdc.html>, or contact the symposium organizers, J. Hering, California

Institute of Technology, Environmental Engineering Science, 1200 E. California Blvd. (138-78), Pasadena, CA 91125, (626) 395-3644, FAX (626) 395-2940, jhering@cco.caltech.edu; and J. Schnoor, University of Iowa, Civil and Environmental Engineering, 116 Engineering Research Facility, Iowa City, IA 52242, (319) 335-5649, FAX (319) 335-5585, jschnoor@cgrer.uiowa.edu. THE DEADLINE FOR ABSTRACT SUBMISSION IS APRIL 7, 2000. Please mark your calendars—we hope to see you in Washington.



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