Association of Environmental Engineering Professors

Newsletter

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PRESIDENT'S LETTER

Dear Friends and Colleagues:

AY 1996-97 was an active year for AEEP starting with the Education Conference in August 1996 followed by numerous committee and workshop activities – some of which have been described in this and previous newsletters. I feel strongly that these activities and subsequent actions will lead to improvements in environmental engineering education. I received a number of comments on the concerns I expressed in the previous newsletter about the apparent lack of depth in environmental topics in some academic programs. Most of the comments were from faculty at universities that were planning or had recently implemented environmental engineering degree programs – some with anticipated or pending accreditation. It seems that the expansion of environmental topics in recent years and the formation of a registration track for environmental engineering has prompted a number of universities to initiate such programs. Graduates of these programs will soon present new challenges to faculty of graduate programs and to employers. Many of the environmental engineering graduates will have completed, as undergraduates, a significant number of the courses now offered for graduate credit, thus forcing changes – and I expect improvements – in graduate program offerings. The challenge to employers will be to find full-time work for graduates having more breadth and depth in environmental engineering but less training in traditional areas of emphasis.

The new Register of Undergraduate Environmental Engineering and Related Programs finally has been completed. The delays in completing the report were due in part to ongoing requests from schools who wanted to be added. We finally stopped adding and started publishing. The report costs $10 and can be purchased from Joanne Fetzner at the AEEP business office. We plan to update this register frequently. Requests for changes or additions can be sent to me directly or to my attention through the business office. When making requests for additions, please be sure to organize your materials in the format used in the register.

By now, all AEEP members should be aware of the change in schedule for our annual Fall meeting. This year, we have entered into an arrangement with the Water Environment Federation whereby AEEP and WEF are co-sponsoring the "Scientist's Luncheon." I personally think this arrangement has a lot to offer both parties. It not only solves some of the conflicts in scheduling but can lead to a closer association between WEF and AEEP. It does however, force AEEP to move our awards presentations to the evening reception. This change, too, may be good in that it will allow more time for AEEP members to congratulate the award recipients and thank the award sponsors. Too often we have had to rush away after the awards presentations to attend a meeting or conference session. This year we will have the opportunity to hear both Wes Eckenfelder's presentation as WEF's Guest Scientist at the luncheon and Gene Parkin's presentation as AEEP Guest Lecturer in conference Session 1 immediately following the luncheon. The AEEP Awards Presentation and Reception is scheduled for Monday evening (see other sections of this newsletter for the time and place). I encourage all AEEP members to participate in these functions. Also feel free to invite prospective members to the reception – especially new faculty members and others who may be interested in learning more about our organization.

Finally, I wish to express my appreciation and thanks to everyone within AEEP who has helped make this past year both exciting and productive, and I look forward to continued association with AEEP through the new academic year.

Jim Young

REMINDER:
Deadline for submissions for the January 1998 AEEP News is December 1, 1997

An Environmental Engineer's Perspective on Pollution Prevention

by
Edward H. Bryan, Ph.D.
Program Director, Environmental Engineering
National Science Foundation

In the beginning, dilution was the solution to pollution. Residuals accumulated where they were produced, and caused pollution until local dilution was insufficient and it became necessary to move away from them. We then learned how to move residuals away from where we wanted to stay. One might say that dilution was still the solution to pollution, but on a broader scale. As public acceptability of the movement options for residuals become exhausted, pressure will increase on us to manage residuals where they are produced, resulting in a progressively stronger movement toward a pollution prevention strategy.

Pollution prevention is not a new idea. It predates my starting to practice the profession as an environmental engineer for the Dow Chemical Company in 1953. Dow's original water needs in Midland, Michigan were supplied by the Tittabwassee River. By 1953, the company's water needs had been augmented by Lake Huron water from a pipeline serving the City of Midland, potable water from the City of Midland, recycled water from cooling towers and the Division's own treated wastewater. There were times during the summer when the river flowed upstream past the plant. Recalling this suggests a pollution prevention concept worthy of being considered seriously, viz., requiring users of water to withdraw water downstream from where they place their wastewater effluent.

In his Keynote Address to the 1989 American Academy of Environmental Engineers workshop on Environmental Quality and Industrial Competitiveness, supported by the National Science Foundation, Dr. Robert M. White, then President of the National Academy of Engineering, noted that, "the nation and the world suffer from an unhealthy industrial metabolism--the transformation by industrial and agricultural processes of raw materials into products and services and residual wastes." He suggested a management philosophy was needed by industry to assume responsibility for including in production costs for goods and services the costs for waste management, environmental damages and those to human health. In a way, he was suggesting that economic factors governing human behavior be more consistent with the knowledge that survival of all living organisms depends on the success with which they and/or their ecosystem cope with their metabolic products and other residuals.

One procedure used by Dow over 40 years ago for minimizing production of pollutants was to allocate costs for waste management to its production plants in proportion to the amount of the product produced and its demand for waste management services. The relationships between units of product and quantities of potential pollutants were established and regularly reassessed by the waste management department. Since production superintendents were held responsible for profitable operation, responsibility for their share of costs for waste management influenced their efforts to reduce production of pollutants to a level capable of being supported by the economic value of their products.

Another way of addressing pollution prevention is to convert residuals into resources. Dow's approach to using residuals productively included using by-product hydrochloric acid for acidizing oil wells and for converting its scrap iron into ferrous chloride as a step toward making ferric chloride. However, use of or conversion of residues into resources is subject to significant considerations beyond those related to technical and economic issues.

Consulting environmental engineers are not rewarded for involving clients in projects that fail before completion of their useful life. The acceptability of residuals as resources is contingent on the marketability of the product, which may be negatively affected by having been made with "secondary materials." The products made from or by using residuals must compete with materials in current usage with an acceptable and proven record of good performance, sometimes described as "virgin," suggesting their possession of superior qualities not measurable by objective criteria such as ASTM Standards. For example, while the process of using sludge to make bricks described by Dr. Jim Alleman in 1980, encapsulates inorganic metallic contaminants, destroys pathogenic organisms, stabilizes organic matter and results in a product that meets accepted standards for constructive use, marketability of the product may be adversely affected by the associative relationship it had with a substance of unclean origin during production.

An alternative that avoids the problem of marketing residuals is to make products by an environmentally benign process that does not generate residuals of pollutional significance. This approach, when coupled with

utilization of residuals as resources, and, as a final resort, treatment and management of those remaining residuals in an environmentally acceptable way, is the most realistic and appropriate way of coping with environmental pollution, achieving sustainable growth and perhaps even assuring societal survival in the next century while we continue to work toward understanding the more basic factors that place limits on survival in the earth ecosystem.

The adage that "an ounce of prevention is worth a pound of cure," suggests that pollution prevention should be integral to all strategies for addressing environmental problems. Environmental engineers will continue to play an important role in dealing with the challenges that exist before and remain after pollution prevention and avoidance potentials have been found and adopted in addressing the environmental quality problems of the 21st Century. Until this approach succeeds, residuals must be managed in environmentally acceptable ways while we continue to search for better answers to the pressures against the earth's ecosystem that must eventually be resolved.

This article is based on a presentation given March 25, 1997 by the author in the Seminar Series sponsored by the University of Arizona's Engineering Research Center on Environmentally Benign Semiconductor Manufacturing, an Engineering Research Center supported by the National Science Foundation. Any opinions expressed in this article are those of the author and do not represent an official position of the National Science Foundation or any other Federal agency.

AEEP News and Announcements

Perry L. McCarty named 1997 Clarke Prize Laureate

Perry L. McCarty, the Silas H. Palmer Professor of Engineering at Stanford University, was recently honored as the 1997 recipient of the prestigious Athalie Richardson Irvine Clarke Prize. The Clarke prize was established in 1994 by the Clarke Foundation and the National Water Research Institute to recognize and honor "Outstanding Achievement in Water Science and Technology." The prize, which includes a gold medallion and a $50,000 cash award, was presented at the Fourth Annual Clarke Lecture and Award Ceremony held at the Marriott's Laguna Cliffs Resort at Dana Point, California on May 30.

Dr. McCarty began his professional career in 1951 as a field engineer working on the layouts of subdivisions, paving, water mains and sewers. He received his B.S. degree from Wayne State University in 1953 and his M.S. and Sc.D. in 1959 from Massachusetts Institute of Technology where he taught for four years.

He has a most distinguished academic career. He came to Stanford University as a member of the faculty in 1962. In 1975 he was named the Silas H. Palmer Professor of Engineering and in 1989, he became the Director of the EPA-sponsored Western Region Hazardous Substance Research Center. He continues to serve in those capacities today. Between 1980-85, Dr. McCarty was the chairman of the Department of Civil Engineering at Stanford.

He has served as a visiting professor at the University of Cape Town in South Africa and an honorary research associate at Harvard University. In 1992, Dr. McCarty received the coveted Tyler Prize for Environmental Engineering Achievement. He was elected to the National Academy of Engineering in 1977.

In his letter of nomination to the Clarke Prize Executive Committee, Dr. John L. Hennessy, Dean of the School of Engineering at Stanford University stated, "Professor McCarty is one of the most highly regarded members of the global community in the water science and technology branch of environmental engineering. He has heightened our perceptions of the crucial link between water quality and public health and fundamentally changed the concepts of how biological processes take place in the aquatic

Perry L. McCarty

environment. Modern engineering concepts largely derive from his work."

Dr. McCarty has been published over 250 times and is co-author of the textbook, *Chemistry for Environmental Engineering*. He holds an honorary doctorate from the Colorado School of Mines, and honorary membership in the American Water Works Association and the Water Environment Federation. Other awards include distinction as a Fellow of the American Association for the Advancement of Science and the American Academy of Arts and Sciences, the Simon Freeze Environmental Engineering Lecturer of the American Society of Civil Engineers, and Distinguished Lecturer

of the Association of Environmental Engineering Professors.

Professor McCarty has donated his time and talents freely and unselfishly to professional service in numerous ways over a span of forty years. His professional activities encompass nearly a hundred instances of substantial contributions in the form of organizing panels and workshops and participation in numerous commissions that provide basic scientific judgment necessary for national water quality standards and the wise use of water resources. His efforts have fostered the exchange of ideas on dealing with environmental challenges at the national and international levels. He is an engineer-scientist of profound and broad achievement and genuinely dedicated to the protection and improvement of water quality.

"I believe our ability to develop and maintain adequate supplies of good quality water is critical to the future of the world and its ecosystems," said Dr. McCarty. "The NWRI has helped bring water issues to the public's attention through the establishment of The Clarke Prize, and has also made major achievements in fostering needed research on the quality of water and its management. I am thrilled to receive this honor."

WEFTEC '97

This year AEEP will hold its annual luncheon in conjunction with the Water Environment Federation (WEF) Scientists Luncheon. AEEP and WEF will be co-sponsoring the Scientists Luncheon at the WEFTEC '97 meeting in Chicago on Monday, October 20, 1997. The joint luncheon will be held Monday from 12:00 noon to 1:30 p.m. at the McCormick Place (the Convention Center, no need to take a bus to and from the luncheon). The featured speaker is Dr. Wes Eckenfelder. The costs for the luncheon are expected to be $30, $35, and $40 (for super saver, discount, and on-site tickets). Reservations should be made through WEFTEC by using the WEF meeting application form. Registration at WEFTEC is not required in order to attend the luncheon. To register and for more information, contact Berinda Ross at WEF, (703) 684-2400, bross@wef.org.

The annual AEEP Meet-and-Greet, sponsored by John Carollo Engineers, will also be held Monday, October 20, from 5 p.m. to 8 p.m. in the Marquette Room at the Chicago Hilton and Towers. The event is open to all AEEP members and their colleagues, friends, and others new to environmental engineering. AEEP awards, normally presented at the luncheon, will be given at this reception. Come meet with your fellow AEEP members and help us congratulate the new award winners.

WEF AEEP Lecture

Starting this year, the AEEP lecture at the WEF conference will be part of the official technical program. Professor Gene Parkin from the University of Iowa will kick off the research symposium on Monday afternoon, October 20, at 1:30 p.m. with his talk, "Anaerobic Biotransformation of Chlorinated Hydrocarbons: Ugly Duckling to Beautiful Swan." The theme of this research symposium session is Anaerobic Processes. This is the first technical session and will be immediately after the AEEP/WEF Scientists Luncheon.

Free drinking water video available

A free videotape about drinking water, "Tap Water – Terror or Treasure?" is available from **Jim Symons**, based on a talk he gave at a University of Houston luncheon March 12. The 47-minute noncopyrighted video includes questions and answers from the audience and is available to borrow at no cost, except for return postage. It is a good seminar for almost any lay or professional group interested in drinking water. More information is available at http://www.egr.uh.edu/CIVE/symons/. Contact Ms. Maureen A. Taillon at fax (713) 743-4260 or email mtaillon @uh.edu.

Logan named new Kappe Professor at Penn State

The Environmental Engineering Program at Pennsylvania State University is pleased to announce that Professor **Bruce Logan** will join the faculty this fall as the Kappe Professor in Environmental Engineering. This professorship was endowed by Stan and Flora Kappe to provide leadership to academic and research programs. Bruce brings an outstanding record of teaching, research, and service to the profession and his achievements have been acknowledged by numerous awards and leadership positions, including his current position as Vice-President of AEEP.

AEEP Register of graduate programs available

The Eighth (1996) edition of ***AEEP's Register of Environmental Engineering Graduate Programs*** is now available from the AEEP business office. The cost per copy is $25.00 for AEEP members and $40.00 for non-members. Shipping within the U.S. is included in this price; non-residents, please add $10.00 for shipping outside the U.S. To purchase a copy, contact: AEEP Business Office, c/o Joanne Fetzner, 2208 Harrington Court, Champaign, IL 61821; (217) 398-6969; jfetzner@s.psych.uiuc.edu.

In Memoriam...

Donald J. O'Connor of Manhattan College died April 18 in Ridgewood, New Jersey. His wisdom and goodness will be missed. He is survived by his wife, Anita.

Rolf Eliassen, Professor Emeritus of Civil Engineering at Stanford University and founder of Stanford's environmental engineering and science program, died suddenly in Palo Alto, California, on Friday, March 14, 1997, at the age of 86. Born in Brooklyn, New York, on February 22, 1911, Eliassen earned his Bachelor of Science degree in civil engineering in 1932, a Master of Science degree in 1933, and a Doctor of Science degree in sanitary engineering in 1935, all from MIT. After graduating in the depths of the Great Depression, he held a variety of positions such as design engineer with J. N. Chester Engineers, Pittsburgh, Pennsylvania, and sanitary engineer with Dorr-Oliver, Inc., Stamford, Connecticut. He began his teaching career in 1939 as Assistant Professor of Civil Engineering at the Illinois Institute of Technology (in Chicago) and in 1940 moved to New York University as Associate Professor of Sanitary Engineering.

Rolf married the former Mary Hulick of Easton, Pennsylvania in 1941. Shortly thereafter, World War II erupted, and he left university life for four years to serve as a Major in the U.S. Army Corps of Engineers, supervising sanitary engineering facilities at army installations in the United States. Returning to New York University after the war as Professor of Sanitary Engineering, he directed his research towards finding safer ways to dispose of the enormous quantities of solid wastes generated in New York City and methods for controlling the city's growing air pollution problems.

In 1949 Rolf became Professor and Head of the Sanitary Engineering Division at MIT where he developed a nationally renowned program. His teaching skills were recognized early and he received the George Westinghouse Award of the American Society for Engineering Education. He realized that one of the major problems with the newly emerging nuclear power industry was the production of radioactive wastes, and he turned his research activities towards finding ways to stabilize such materials through vitrification for safer storage or disposal. This approach is now being used at U.S. Department of Energy's facilities. From 1960 to 1961 he served as Acting Head of MIT's Civil Engineering Department.

In 1961 Stanford University invited Rolf to join its Department of Civil Engineering to form a new program in environmental engineering. His early research with solid wastes, air pollution control, and radioactive waste disposal suggested to him that environmental problems were rapidly expanding beyond the traditional framework of water supply and wastewater disposal. A much broader approach to their solution was needed that involved interdisciplinary collaboration between engineering and the social and natural sciences, and he felt that Stanford provided a unique climate for such cooperative activities. He founded a new and flexible environmental engineering program that permitted students from a wide range of backgrounds and career goals to obtain a graduate education that met their individual needs. This approach proved to be most successful, and his program continues to serve as a model for programs throughout the country.

Rolf believed that environmental quality should be the concern not only of civil engineers but also of the community at large, and to address this belief he developed an undergraduate course in 1961 called "Man and His Environment," a course that continues to be offered at Stanford today, 36 years later. This 8:00 a.m. elective course quickly became very popular, attracting hundreds of students from all disciplines each year. Preceding by several years the popular environmental movement symbolized by Earth Day in 1970, his course provided the nation's first integrated approach to the environmental problems of air, water, and solid wastes.

Rolf was a favorite among students, who often were found in long lines at his office for counsel, not only about the contents of his courses, but also about personal choices, problems, and career goals. He was always most considerate and supportive of staff and students alike, and was an exceptional mentor for his younger colleagues. He and his wife Mary were frequent and most cordial hosts for students in their home.

He became the Silas H. Palmer Professor of civil engineering at Stanford in 1969, and Emeritus Professor of civil engineering in 1974. But academic life did not represent his sole endeavor. Rolf was an active engineering consultant and advisor to the federal government throughout his career. He was a registered professional engineer in six states, and was a partner from 1961 to 1967 of Metcalf and Eddy, Engineers, one of the largest and oldest environmental engineering firms in the country. He subsequently became Senior Vice President, Vice Chairman of the Board, and then Chairman of the Board in 1973. His consulting experiences provided a rich source of material that enlivened his classroom teaching and enhanced his mentoring of graduate students.

With his broad experience and knowledge of environmental matters, Rolf was frequently sought as an advisor to federal agencies, including the Office of Science and Technology, Executive Office of the President; the Atomic Energy Commission; the Department of the Interior; the Department of Commerce; the Department of Defense; the Energy Research and Development Administration; the Public Health Service; and the Federal Power Commission. His international assignments were equally broad, including projects with the Agency for International Development, the World

Health Organization, the United Nations, and the International Atomic Energy Agency. His many important contributions to the environment have been broadly recognized, and have earned him election to the National Academy of Engineering, the American Academy of Arts and Sciences, the American Academy of Environmental Engineering, and to Honorary Membership in the American Society of Civil Engineers.

Memorial services were held on March 18 at the First Congregational Church, Palo Alto, where Rolf had been an active member for many years.

He is survived by his wife, Mary, of Palo Alto, his two sons, Thomas Eliassen of Carlisle, Massachusetts, and James H. Eliassen of Colorado Springs, Colorado, and five grandchildren.

[The editor acknowledges and thanks Prof. Perry McCarty for his assistance in preparing this article.]

SEND SUBMISSIONS FOR THE JANUARY 1998 AEEP*NEWS* to:

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ORGANIZATIONS OF INTEREST

Hazardous Waste & Harzardous Materials expands focus

The journal *Hazardous Waste & Hazardous Materials* has recently undergone significant changes. After many years of successful leadership by Jim Noble, Domenico Grasso has assumed the position of editor. In order to better serve the needs of environmental professionals, the journal will have an expanded focus and a new title, ***Environmental Engineering Science***. The journal will publish papers on environmental engineering science topics that include development or application of fundamental principles toward solving problems in land, air, and water media, including environmental applications of the basic sciences. Descriptions of original experiments are welcome as are developments in theory; papers combining new experiments with theoretical insights are especially encouraged. Scientifically-based, practice-oriented papers are also invited. Contributions on newly emerging topics, e.g. brownfields, natural attenuation, and pollution prevention, are particularly desired. Manuscripts are also sought that describe the application of environmental engineering science to policy issues and sustainable development. Topics covered include: contaminant fate and transport, environmental risk assessment and management, formation and control of air pollutants, hazardous and toxic substances, pollution prevention, site assessment and remediation, and water and wastewater treatment and reclamation.

An expanded and rapid peer-review process has been adopted. The journal will have a new fully-typeset 8-1/2 x 11" format. The editorial board has been restructured to include the following:

Domenico Grasso, Editor
Environmental Engineering Program
University of Connecticut

John Gregory, European Editor
Civil & Environmental Engineering
University College
London

Air pollution submissions should be mailed directly to:
Dr. Brian K. Gullett
U.S. Environmental Protection Agency
National Risk Management Research Laboratory (MD-65)
Research Triangle Park, NC 27711

European contributions should be mailed to:
Professor John Gregory
Department of Civil and Environmental Engineering
University College London
Gower St.
LONDON WC1E 6BT

Other manuscripts may be submitted to:
Domenico Grasso, Ph.D., P.E.
Associate Professor & Director
Environmental Engineering Program
The University of Connecticut
Storrs, CT 06269-2037
Tel: (860) 486-2680
Fax: (860) 486-2298
http://www.eng2.uconn.edu/environ/

Clemson University

Assistant Professor. The Department of Environmental Systems Engineering at Clemson University (ESE) is seeking applications for an assistant professor tenure-track position. Applicants may specialize in any area that compliments current faculty strengths, but a research emphasis in one of the following areas is especially of interest: air pollution control, advanced hazardous or mixed (hazardous and radioactive) waste treatment or site remediation, or thermal treatment processes. An earned Ph.D. is required. ESE is a well-established multi-disciplinary environmental engineering and science program offering M.S., M.E. and Ph.D. degrees that occupies exceptional new laboratory facilities. Teaching and research focus areas include process engineering (water, wastewater, and hazardous waste treatment; site remediation; air pollution control), fate and transport in environmental systems, environmental chemistry, nuclear environmental engineering and science, waste and environmental management, and risk assessment. The successful candidate will be expected to teach graduate courses in their specialty area and introductory undergraduate and graduate courses, as well as develop a funded research program. Review of candidates will begin September 1, 1997 and will continue until the position is filled. Send resume, a statement of teaching and research interests, and a list of three references (name, address, telephone, fax and e-mail) to Dr. Alan W. Elzerman, Chair, Environmental Systems Engineering, Clemson University, 342 Computer Court, Anderson, SC 29625.
Clemson University is an affirmative action/equal opportunity employer.

Stanford University

The Department of Civil and Environmental Engineering at Stanford University invites applications for a tenure track faculty position in the area of environmental biotechnology and biological process engineering. The appointment may be made at any level, commensurate with the successful candidate's experience. The new faculty member will teach graduate and undergraduate courses and conduct research in the department's Environmental Engineering and Science program, with specialization in one or more of the following subareas: application of biotechnology to water and waste treatment as well as to hazardous waste remediation and pollution prevention; biological processes in natural and polluted aquatic and soil environments; biodegradation of pollutants; and related engineering scientific topics. In research, the candidate preferably should offer a balance of interest in laboratory and field experimentation, with emphasis on understanding the relevant biochemical processes and developing engineering applications for environmental quality control. Stanford's program in Environmental Engineering and Science comprises a nationally and internationally renowned faculty/student group. Information on the program's research and teaching activities can be found on the following web site: http://www-seep-server.stanford.edu/SEEPWeb/ews/EWSBROCH/overview.html.

The position is available as early as September 1, 1998. Applications will be accepted until the position is filled, but applicants are strongly encouraged to send a resume, transcripts, a description of teaching and research interests and experience, and a list of potential references by September 30, 1997 to Professor Paul V. Roberts, Search Committee Chair, Department of Civil Engineering, Stanford University, Stanford, California 94305-4020.
Stanford University is an equal opportunity employer, and encourages applications from women, members of ethnic minorities, and disabled individuals.

University of California, Davis

The Department of Civil & Environmental Engineering, University of California, Davis is accepting applications for a tenure-track position in Air Quality at the Assistant Professor level. The applicant should have a solid grounding in fundamental physical and chemical processes leading to the formation, transport and fate of pollutants in the atmosphere, especially aerosols. A background in fluid mechanics, chemical kinetics, and computational modeling, and degree(s) in civil, chemical, environmental or mechanical engineering are strongly encouraged. Experience with application of regional (micro to mesoscale) photochemical models to develop strategies for source control and policy-making decisions are desirable, as well as familiarity with transportation engineering issues and systems engineering.

The successful candidate is expected to have earned a doctorate and to be able to develop a research program that integrates multi-disciplinary aspects of air pollution at a regional scale. The individual will engage in both independent research contributing to the development of models capable of describing the formation and fate of fine particles in the atmosphere, as well as collaborate with campus colleagues on problems critical to the rural/urban interface, e.g., intermedia transfers. Contribution to the core education of undergraduate civil and environmental engineering students and development of graduate courses complementary to existing strengths are also necessary.

To be assured of consideration, applications should be

received by October 1, 1997. A complete resume, including statement of teaching and research interests, all college transcripts, and names of three references should be sent to Dr. Dan Chang, Air Quality Search Committee Chair, Department of Civil & Environmental Engineering, University of California, Davis, CA 95616.
The University of California is an affirmative action/equal opportunity employer.

National University of Sciences and Technology, Pakistan

The National University of Sciences and Technology (NUST), Pakistan, invites applications for the post of Associate Professor in Environmental Engineering. All specialty areas of environmental engineering will be considered. A Ph.D. or comparable degree from an internationally recognized program with 5-7 years of teaching experience is required. The successful candidate will be expected to 1) teach graduate courses in both general subjects and in one or more specialty areas, 2) develop a research program, 3) take on a mentoring role with several junior faculty, and 4) assume a position of leadership as head of the environmental engineering group. Preference will be given to Pakistani nationals with previous teaching experience. Others are encouraged to apply, however.

This position resides in the Institute of Environmental Sciences and Engineering (IESE), which was formed within NUST in 1996. IESE currently offers a M.S. in environmental engineering and operates a split M.S. program of study in conjunction with Michigan State University. Modern facilities, including offices, classrooms, laboratories, library and computer center, have been established. Plans have been approved for steady expansion of the program over the next several years. The immediate goal is to develop a strong applied research program focused on the municipal and industrial needs of Pakistan as the economy develops.

Application materials, including a curriculum vitae and the names of three professional references, should be sent to Registrar, National University of Sciences and Technology, Tamiz-ud-Din Road, Tariqabad, Rawalpindi, Pakistan, or Fax: +92-51-580003.

Colorado State University

Applications are invited for a tenure-track faculty position at the assistant professor level in the area of environmental engineering. All requirements for the Ph.D. in Civil Engineering or closely related field must be completed at time of hire. The starting date is fall semester 1998. Applications and nominations will be considered until the position is filled; however, applicants should submit applications by December 1, 1997 for full consideration. Applicants must comply with position requirements; see complete announcement at http://www.lance.colostate.edu/ depts/ce or contact Dr. Steven Abt, Search Committee Chair, Department of Civil Engineering, Colorado State University, Fort Collins, CO 80523-1372.
Colorado State University is an EEO/AA employer. Women and minorities are encouraged to apply.

University of Florida

The Department of Environmental Engineering Sciences at the University of Florida is seeking applicants for a tenure track position at the Assistant Professor level in the field of Air Pollution, with a specialty in aerosols. This position is expected to be filled by August 7, 1998. An earned Ph.D. is required prior to beginning employment. The successful applicant will be expected to develop an active, externally funded research program and teach both undergraduate and graduate level courses in the aerosol and air pollution design fields. Salary is negotiable. Send curriculum vitae, copies of transcripts, appropriate reprints if available, a statement of teaching and research interests, and the names, phone numbers, and e-mail and postal addresses of three references to Dr. Joseph J. Delfino, Department Chairman, Department of Environmental Engineering Sciences, A.P. Black Hall, P.O. Box 116450, University of Florida, Gainesville, FL 32611-6450. Applications must be postmarked by December 30, 1997. For additional information about the department, see website http://www.enveng.ufl.edu.
The University of Florida is an equal opportunity, affirmative action employer.

National Science Foundation

Directorate for Engineering. The National Science Foundation is seeking an Assistant Director for Engineering (ENG). The Assistant Director, ENG, manages a Directorate consisting of six divisions: Bioengineering and Environmental Systems; Electrical and Communications Systems; Chemical and Transport Systems; Civil and Mechanical Systems; Design, Manufacture, and Industrial Innovation; and Engineering Education and Centers. The Assistant Director for Engineering serves as a key member of the NSF senior policy team. The Assistant Director (AD) provides leadership and direction to programs and initiatives within ENG and is responsible for planning and implementing programs, priorities, and policy within the framework of statutory authority and National Science Board authority. The AD must have outstanding leadership abilities, a deep sense of scholarship, clear vision regarding opportunities and issues in engineering, and a commitment to the goals and strategies of the National Science Foundation.

Additional information may be obtained from website http://www.nsf.gov/cgi-bin/getpub?eng975. Please send recommendations, including any supporting information which you might be able to provide, by September 15, 1997, to the AD/ENG Screening Committee via e-mail at engsrch@nsf.gov or to National Science Foundation, Office of the Director, 4201 Wilson Boulevard, Suite 1205, Arlington, VA 22230.

Environmental Engineering Education: The Relationship to Engineering Practice

A valuable reference for those interested in engineering education, *Environmental Engineering Education: The Relationship to Engineering Practice* addresses topics presented at the Seventh AAEE/AEEP Environmental Engineering Education and Practice Conference held in Orono, Maine August 3-6, 1996. It discusses the major issues facing the environmental engineering education profession now and in the future, specifically:

- Coping with Criteria 2000 and Outcomes Assessment
- The Market for Environmental Engineers
- New Educational Approaches – The Educator's Perspective
- Engineering Skills Required – The Practitioner's Perspective
- Educator & Practitioners Partnerships

Among the better-known authors whose contributions are contained in this reference are J.C. Goldman, Phil Hall, Darryl Hertz, Richard Miller, Dave Sonstegard, William Ball, Francis DiGiano, C.P. Leslie Grady, Perry McCarty, Robert Marini, John Wilkinson, Hugh Campbell, Jr., Ray Letterman, Arthur Purcell, David Thompson, Avery Demond, Dee Ann Sanders, William Anderson, Trudy Banta, Anthony Collins, Barbara Olds, Joseph Sussman, Roger Dolan, Cliff Randall, and Karl Smith.

The price is $55.00 per copy, $49.50 for AEEP members, plus $4.75 for shipping and handling. (Maryland residents, add 5% sales tax.) Copies may be ordered from the American Academy of Environmental Engineers, 130 Holiday Court, Suite 100, Annapolis, MD 21401, phone (410) 266-3390, fax (410) 266-7653.

TIO announces new service

The U.S. EPA Technology Innovation Office (TIO) has announced a new service to help keep you abreast of developments in technologies for site characterization and remediation. TechDirect is a free service that highlights new publications and events of interest to site remediation and site assessment professionals. Approximately once a month, TIO will send you a message describing the availability of publications and events. Short messages will describe the publication or event and direct you to places to obtain further information.

TIO produces numerous one-time and periodic publications and electronic information on technologies and markets for soil and groundwater remediation. It strives to provide information that is relevant to technology developers, academics, consulting engineers, and state and federal regulators. TIO's mission is to advance the use of new technologies for characterization and remediation.

Most of the information TIO generates resides on its Clean-Up Information (CLU-IN) home page at http://clu-in.com. CLU-IN is intended as a forum for all stakeholders in waste remediation and contains information on policies, programs, organizations, publications and databases useful to waste remediation professionals. The site contains technology descriptions and reports as well as current news on business aspects of waste site remediation. It includes links to other sites important to managers interested in site characterization and soil and groundwater remediation technologies.

Now available by downloading CLU-IN or by calling (800) 490-9198 for hard copies, are the following publications:

- Bibliography for Innovative Site Clean-Up Technologies (EPA 542-B-96-003)
- Partnerships for the Remediation of Hazardous Waste (EPA 542-R-96-006)
- Accessing Federal Databases for Contaminated Site Clean-Up Technologies (EPA 542-B-95-005)
- Accessing the Federal Government: Site Remediation Technology Programs and Initiatives (EPA 542-B-95-006)
- Federal Publications on Alternative and Innovative Treatment Technologies for Corrective Action and Site Remediation (EPA 542-B-95-004)
- State Funds in Transition: Models for Underground Storage Tank Assurance Funds (EPA 510-B-97-002)
- UST Program Facts: Implementing Federal Requirements for Underground Storage Tanks (EPA 510-B-96-007)

Other publications available are:

- Vendor Information System for Innovative Treatment Technologies (VISITT) Version 5.0 Released in December 1996. Download from CLU-IN. For diskettes and a user manual, contact the VISITT help line, (800) 245-4505.
- Technology Evaluation Report: Treatment Walls (TE-96-01). Download from http://gwrtac.org.
- Technology Summaries. Provide an introduction to the general principles and techniques associated with the technologies listed below. Download from http://www.gwrtac.org.

  1. Artificially-Induced or Blast-Enhanced Fracturing to Improve Groundwater Recovery for Treatment and Migration Control (TS-96-01) [5pages]

2. Horizontal Wells (TS-96-02) [10 pages]
3. Phytoremediation (TS-96-03) [27 pages]
4. Airsparging (TS-96-04) [10 pages]
5. Bioslurping (TS-96-05) [10 pages]
6. Ultraviolet/Oxidation Treatment Processes (TS-96-06) [7 pages]

Conferences and Training Opportunities:

The CLU-IN home page lists many exciting conferences and training courses related to remediation and characterization. For a complete listing, enter the "What's Hot, What's New" area of the page.

To subscribe to the list:

1. Send an e-mail to listserver@unixmail.rtpnc.epa.gov.

2. Leave the "subject" line empty. If your main server requires an entry, you may type in a "."

3. Type the following command on the first line in the message area of your mail: subscribe techdirect firstname lastname (Example: subscribe techdirect john doe).

Questions or comments concerning this service can be directed to Jeff Heimerman at (703) 603-7191 or heimerman.jeff@epamail.epa.gov.

Book Reviews

THEORY AND PRACTICE OF WATER AND WASTEWATER TREATMENT, by Ronald L. Droste, John Wiley & Sons, New York, 1997

Glenn Miller used to have a song sequence on his radio show called "Something old, something new, something borrowed, something blue," after the bridal tradition of the same name. This is what came to mind reading Ron Droste's fine new book.

The "something old" includes technology that harks back over a hundred years but is still useful and interesting. For example, Droste discusses the old Imhoff tanks once widely used in North America. These venerable dinosaurs work, and they refuse to go away, still being useful in parts of the world where efficiency is not as important as reliability. Imhoff tanks are also useful in discussing the history and development of wastewater treatment practice. Why do old timers keep referring to "separate digestion" anyway?

There are, however, a few old things that should be eliminated from the book, such as the description of vacuum filters. Vacuum filters are extinct and there seems no reason for discussing them.

The "something new" includes a whole host of technologies not found in typical design books, such as a fine discussion on bulking and foaming, and ultraviolet disinfection of wastewater effluents. The book is up-to-date and would even be useful as a supplemental text in a design course.

In the emerging technology of environmental engineering, there is a lot of "something borrowed," and the research efforts of many of our contemporaries are included in the text. And finally, the cover is a bold process blue, taking care of the "something blue" requirement.

The book is based on three courses taught at the University of Ottawa. The first course represents the first half of the book, on environmental chemistry and microbiology. Section 1 covers chemistry, starting with the very basics for all those civil engineers who have forgotten everything they never learned in Chem. 1 in their freshman year, and continuing with the thermodynamic basis for equilibrium, acid-base chemistry, organic and biochemistry, and the analysis of water. Section 2 is on microorganisms and includes again the very basic microbiology, parasitology, epidemiology and water quality standards. Although emanating from a Canadian university, the book covers the United States, as well as the Canadian standards. Section 3, presumably the start of the second course, introduces water and wastewater processes. A rather weak section on hydraulic design is included. If the students taking this course had taken fluids and/or hydraulics, this cursory treatment is redundant. If they have not taken fluids, it is inadequate.

Physical-chemical processes in Section 4 includes all the standard processes, and Section 5 discusses biological treatment including aerobic treatment processes, anaerobic processes, treatment ponds and land disposal systems, sludge processing and effluent disposal in natural waters.

The book is the result of an immense amount of work and our profession should be grateful to Ron for the effort. It is rich in design information while the approach is from a theoretical perspective. It would be applicable to many two-course sequences typically taught in civil engineering departments. For many of us, using this book as a text would be as comfortable as listening to a medley of Miller songs.

-- Aarne Vesilind

ENVIRONMENTAL ORGANIC CHEMISTRY, by René P. Schwarzenbach, Phillip M. Gschwend, and Deiter M. Imboden, John Wiley & Sons, New York, 1993

If organic compounds in the environment were tracked by Wall Street as a commodity, its charts since the Second World War would resemble those of Microsoft; steady growth with huge spurts every five years or so (Houston Shipping Channel, Bhopal, Love Canal, Times Beach and, most recently, Theo Colburn's account of endocrine disruption, *Our Stolen Future*). It is amazing that, until very recently, no comprehensive organic chemistry text has been completely dedicated to the structure of compounds and how they behave in the environment. This text begins to rectify this problem. Previous comprehensive works have emphasized the synthesis, manufacturing, and specific applications of organic compounds. Environmental organic chemistry must emphasize the analytical perspective and deal with open-ended questions and open-system "experiments." Environmental professionals have had to pull together information from a variety of organic chemistry sources, without the luxury of consulting a single reference.

The companion problem and case study booklet added last year enhances the practicality of the text. The authors could go one step further in their next edition, by incorporating example problems with solutions, and using side bars and boxes of real case studies. For example, the importance of isomers could be illustrated with case studies of how the pharmaceutical and pesticide industries approach chiral stereoisomers (for efficacy and toxicity), or the subtle toxicity and fate differences among the PCB congeners could illustrate the importance of planarity and halogenation in risk calculations. These enhancements would go a long way in fulfilling the authors' desire to give instructors a single text for introductory environmental organic chemistry courses. An interactive software companion program could also help students (and professors), as well as environmental professionals to make calculations of K_{ow}; thermodynamics; Henderson-Hasselbach relationships; diffusion; sorption; redox; photochemistry; and intra-compartmental and multi-compartmental modeling.

Although the authors generally cite recent work, the atmospheric references are becoming a bit dated. For example, the 1982 PCB reference has likely been superseded by recent work in the Great Lakes (Eisenreich, Bidleman) and in the Arctic (Solomon and Forget). Factors in addition to classical fugacity and pressure considerations, such as particle size, shape, and chemical characteristics, can determine the distribution in particle and gas phases. This discussion may be enhanced by recent work on phase distributions between particles and gas phases (Gundel *et al.* and Lewis and Gordon). The atmospheric modeling concepts are presented concisely and logically, but for completeness (in scale and compartments), some mention should have been made of the recent work in larger scope, regional Lagrangian models and Eularian models, as well as the emerging area of multi-compartmental modeling.

A potential limitation of the text's usefulness as a "one-stop reference" is discussing the role of photochemistry in fate and analytical chemistry together. Photochemistry is important to environmental scientists for two distinct reasons: explaining the phenomena that lead to transport, transformation, and understanding the fate of organic compounds in the environment; and using photochemically-based techniques to analyze compounds in the environment. The first is totally dependent upon sunlight (except for those engineers using UV and other electromagnetic spectra in treatment and remediation of contaminants). The second takes advantage of quantum chemistry to identify and to quantify analytes in environmental samples. Although the basic chemistry and physics are the same, the readers' interests are quite different. The professions have become sufficiently specialized so that the environmental fate chemist may not be interested in the same photochemical concepts as the environmental analytical chemist. Fate deals with the overall likely half-life of a compound in the air, at the water surface, at various depths in the water column, in the sediment, and in the soil and biota. Analysis makes use of spectroscopy: absorption wavelengths (Beer's Law); fluorescence and phosphorescence; and quantum yield.

My environmental engineering bias causes me to recommend a discussion of the major treatment and containment strategies for organic contaminants (incineration, chemical treatment, UV, and biological treatment). The three major transformation reaction chapters (chemical, photo, and biological) would provide an excellent lead-in.

In seeking the perfect environmental organic chemistry text, I have dwelled on possible improvements when, in fact, I found the text to me a "must" for the environmental engineer's bookshelf. I highly recommend it as a text for organic chemistry courses in environmental engineering departments.

-- *Daniel A. Vallero,*
U.S. EnvironmentalProtection Agency

Author's Response to Aarne Vesilind's Review of *PROCESS DYNAMICS IN ENVIRONMENTAL SYSTEMS*, Wiley Interscience, John Wiley & Sons Inc., New York, NY, 1996 [AEEP News, Vol. 32, No. 1, January 1997]

We applaud Aarne's valiant effort to overcome faint heart and offer his thoughts on our book, along with some of his personal perspectives of environmental engineering education. The book is designed to be a comprehensive

source of fundamental scientific concepts and their environmental applications. We believe that students should be presented, and expected to grasp, many of these fundamental concepts in the course of their undergraduate education. If they do, they then will be prepared to master the most important of the concepts and fully comprehend their applications as they pursue their first professional degree, the M.S. or M.S.E. Moreover, they will be prepared to build and expand upon such concepts and applications as they proceed into advanced graduate education and post graduate practice. We wrote *Process Dynamics* as a treatise to accommodate the intellectual and professional growth of *novice* to *master*, a tough-love career text so to speak. As with every challenge, the rewards are commensurate.

In our Preface we list several (albeit fewer than a *zillion*) uses for the book in undergraduate and graduate degree programs, and we will shortly cite specific examples of how this is done for *undergraduates* at Michigan (UNC does not have an undergraduate engineering degree program). Before that, however, we advance a counter position to a philosophical issue raised by Aarne relative to undergraduate education in general. We believe firmly that the learning of scientific fundamentals is aided greatly by tangible examples. We disagree strongly with Aarne's notion, however, that indoctrination in specifics must occur before exposure to more general concepts begins.

We would agree with Aarne that students learn by tackling problems and we have woven this philosophy into our book by inclusion of nearly 100 example problems. There is also a much larger number of assigned problems that relate concepts to practice. A complete solution manual is now in the works and should be available within the next six months or so. Our examples are drawn from a wide range of practical situations inclusive of natural and engineered systems, and of physical, chemical and biological processes within them. We took this approach to emphasize that mastering the fundamentals lifts artificial barriers that are often presented to students in traditional process courses. Perhaps the point that concerns Aarne is that the specifics we present follow presentation of fundamentals that are too general. But does this not contradict what we mean by fundamentals? To pick up on Aarne's concern about the Navier-Stokes equation as being too general, is it not exciting for students to learn that the Hagen-Poisseuille equation for pipe flow and Darcy's equation for groundwater flow easily derive from a simplification of the Navier-Stokes equation, as illustrated in Example 3-2 of our book?

Major portions of *Process Dynamics in Environmental Systems* were developed specifically for undergraduates in Civil and Environmental Engineering at the University of Michigan. Other portions were developed to provide a broad fundamental basis for a graduate course taught at the University of North Carolina which precedes courses in physical, chemical, and biological treatment. In this use, graduate students with interests in atomospheric and groundwater transport/reaction processes gain as much as those with interests in the traditional water and wastewater treatment areas.

The book is by no means an experiment with regard to undergraduate teaching. It has been used with good results (in various but similar drafts of its present form) for more than seven years to teach upper level undergraduates the skills of analytical analysis in the context of environmental applications. While these students are challenged by it, as we have intended, they invariably rise to the challenge. Moreover, they generally benefit in great measure for doing so, at least by the metrics of i) their enhanced abilities to solve complex practical problems that defy rote treatment, and ii) their ready abilities to gain admission to graduate study or secure attractive employment. The book cannot be mastered *en toto* in a semester or two of course work, though many essential elements of it can within a semester, many more within two, and most within three. Because the book is written to cross-cut a variety of specific course topics that build on the same fundamental concepts, the subject matter it covers can be refined and mastered further during its use as a supplementary or complementary reference in courses for which it may not be the primary text.

As two examples in which the book is used as a *primary* text for courses taken by upper division undergraduates at Michigan, we cite first the course CEE480: *Process Dynamics in Environmental Systems*, which has a mixed enrollment of approximately 30-40 undergraduates (mostly seniors) and 20-25 first-year, incoming (new to Michigan) graduate students. The second course, CEE580: *Physicochemical Processes for Water Quality Control*, typically has a higher percentage enrollment of first-year, incoming graduate students than it does undergraduates, but it is elected by many undergraduates. Course outlines for CEE480 as presented in the fall semester of 1996 and for CEE580 as given in the winter semester of 1997 are presented below. These outlines cite specific topic coverage and related reading and problem assignments from *Process Dynamics* and from course pack (CP) materials drawn in part from the earlier text, *Physicochemical Processes for Water Quality Control*, and in part from contemporary technical publications on specific units of operations.

Both of the courses described here emphasize what we believe to be the three core elements of all process dynamics and all unit operations design; i.e.: i) quantification of the energies required and available to accomplish a specific process, ii) quantification of the rates at which those energies can and must be supplied and exercised; and iii) because both energy and the rate of its use are functions of mass, the way in which reactor configurations and initial and boundary conditions affect mass distributions in various natural and engineered systems. These are all very general elements, but the specifics follow quite naturally as the book illustrates.

We invite comments, suggestions and questions from our colleagues reflecting your views and experiences regarding the text. Walt's e-mail address is wjwjr@engin.umich.edu and Fran's is fran_digiano@unc.edu.

-- Walter J. Weber, Jr. and
Francis A. DiGiano

CEE 480
PROCESS DYNAMICS IN ENVIRONMENTAL SYSTEMS
FALL 1996 SYLLABUS

ACTIVITY	TOPIC	REQUIRED READING	PROBLEM ASSIGNMENT
Lec-1 thru 2	Introduction to Process Dynamics	Chapter 1	HW#1: 1-1, 1-4(a); Sect.A.1.1.3: 1(a, b), 2, 3, 4
Lec-3 thru 5	Process Characterization & Analysis	Chapter 2	HW#2: 2-1, 2-2, 2-3, 2-5, 2-6, 2-7, 3-9, plus handout
Lec-6 thru 7	Macrotransport Processes	Chapters 3 & 4 (Sections: 3.1-3.2.4; 3.2.6; 3.3.3; 4.2.7)	HW#3: 3-1, 3-4, 3-8
Lab-1	Mass Transport Processes	Lab 1 Handout	Lab#1 Assignmt.
EXAM I	Covers material from Lectures 1-7		
Lec-8 thru 11	Process Energy Relationships	Chap. 5 (Sections: 5.1.1-5.1.2; 5.2.1-5.2.3; 5.3.1-5.4.1; 5.4.4)	HW#4: 5-2, 5-3, 5-4, 5-9, 5-11, 5-13, 5-16, 5-17, 5-18
Lec-12 thru 13	Phase Partitioning	Chap. 6 (Sections: 6.1-6.3.2; 6.3.4; 6.7)	HW#5: 6-1, 6-10, plus handout
Lab 2	Phase Partitioning Analysis	Lab 2 Handout	Lab#2 Assignmt.
Lec-14 thru 16	Process Rate Relationships	Chap. 7 (Sections: 7.1-7.4; 7.5.5; 7.6-7.6.1)	HW#6: 7-3, 7-4, 7-5, 7-6, 7-12
Lab-3	Rate Coefficient Determinations	Lab 3 Handout	Lab#3 Assignmt.
EXAM II	Covers material from Lec-8 thru 16, Labs 2 & 3		
Lec-17 thru 18	Microtransport Processes	Chap. 4 (Sections: 4.1.1-4.1.2.3; 4.2.1; 4.2.3; 4.2.7)	HW#7: 4-6, 4-8, plus handout
Lec-19 thru 21	Reactor Engineering: Ideal Reactor Models	Chap. 9 (Sections: 9.1-9.3)	HW#8: 9-1, 9-3, 9-4, 9-5, 9-6, 9-7, plus handout
Lab-4	Demonstration of Non-Ideal Reactor Behavior	Lab 4 Handout	Lab#4 Assignmt.
EXAM III	Covers material from Lec-17 thru 21, and Lab 4		

Lab = Laboratory Demonstration @ 2-3 hrs.
Lec = Lecture(s) @ 1.5 hrs.
Semester Credit Hours = 3.0

CEE 580
PHYSICOCHEMICAL PROCESSES FOR WATER QUALITY CONTROL
WINTER 1997 SYLLABUS

ACTIVITY	TOPIC	REQUIRED READING	PROBLEM ASSIGNMENT
Lec-1	Course Introduction	Chapters 1 & 2 CP(A)	
	SOLUTE SEPARATION PROCESSES:		
Lec-2 thru 5	Gas Transfer Processes	Chap. 4, 8 & 10 (Sections: 4.2.3.2; Appendix A.4.1; 8.1-8.3.0; 8.3.3-8.4.3; 10.3.0-10.5.0) CP(B)	HW#1: 4-5, 10-12, 10-13, 10-16, 6-5, 6-8, 11-12, 11-13, 11-14, plus handout
DESIGN PROJECT	AIR STRIPPER SYSTEM		Completed Design Rept. due at Exam 1
Lec-6 thru 10	Adsorption Processes	Chapters 6, 8, 10 & 11 (Sections: 6.4.0-6.5.1; 8.5; 8.6.3; 10.2.1; 11.4.5-11.7) CP-C	
DESIGN PROJECT	FIXED-BED ADSORBER SYSTEM		Completed Design Rept. due at Exam 3
Lec-11 thru 12	Ion Exchange Processes	CP(D) -	
Lec-13 thru 14	Membrane Processes	CP(E)	HW#2: 9-10, 9-11, 9-13, 9-16, 9-17, plus handout
EXAM I	Covers material from Lectures 1-10		
	SOLUTE TRANSFOR-MATION PROCESSES:		
Lec-15 thru 16	Non-Ideal Reactor Models	Chap. 9 (Sections: 9.4-9.5)	
Lec-17 thru 18	Chemical Oxidation/ Reduction Processes	Chap. 5 (Sections: 5.1.3-5.2.3; 5.3.7-5.4.3) CP(F)	
EXAM II	Covers material from Lectures 11-18 & Lab 1		
Lec-19 thru 20	Precipitation Processes	Chap. 5 & 9 (Sections: 5.1.4-5.1.5, 9.3.8) CP(G)	HW#3: 5-5, 5-6, 5-7, 5-8, plus handout
	PARTICLE SEPARATION PROCESSES:		
Lec-21 thru 22	Coagulation & Flocculation Processes	Chap. 6 & 8 (Sections: 6.6.0-6.6.4; 8.7.0)CP(H)	
Lec-23 thru 25	Filtration & Ultrafiltration Processes	CP(I)	
EXAM III	Covers material from Lectures 19-25		

Lec = Lecture(s) @ 1.5 hrs.
CP(A-I) = Supplementary Course Pack Materials
Semester Credit Hours = 3.0

Microbial Ecology of Biofilms: Concepts, Tools, and Applications
Lake Bluff, Illinois
October 8-10, 1998

Co-sponsored by:

The International Association on Water Quality (IAWQ)
U.S.A. National Committee (USANC)
Northwestern University
Center for Biofilm Engineering
Societe Lyonnaise des Eaux
Waterways Experiment Station
U. S. Environmental Protection Agency

Theme:

Biofilms are ubiquitous. They occur in nature on almost any surface that is in contact with water. Biofilms are exploited beneficially for the treatment of waters and wastewaters and in bioremediation of groundwater and soil. In some settings, biofilms cause severe problems, such as accelerated corrosion, oil souring, and fouling. Until recently, the structure and function of biofilms could only be inferred from gross measures of biomass and metabolic activity. This limitation meant that scientists and engineers involved in biofilm research and application had only a crude understanding of the microbial ecology of biofilms. Their ability to control the biofilm was similarly coarse.

The past decade has seen an explosion of new techniques to elucidate the structure and function of biofilms. Key examples include:

1) Molecular probes that identify different microorganisms in complex communities, as well as the metabolic function that the microorganisms are carrying out;

2) Microsensors that show concentration profiles of key chemicals in the biofilm;

3) Scanning electron microscopy that describes the physical structure of the undisturbed biofilm;

4) Vital stains that differentiate between metabolically active cells and inactive cells; and

5) A new generation of mathematical models that help us understand why the features we observe develop and how those features affect the function, or performance, of the biofilm system.

Most exciting are the combination of several of these new techniques to study biofilms in nature and technological processes. A common theme found in very different biofilm systems is that the biofilm's microbial ecology is a key parameter influencing biofilm structure, activity, and dynamics.

A major contribution of this conference is to bring together insights on biofilm ecology from different fields of scientific research and engineering applications. Therefore, the conference theme emphasizes links between analysis and application.

Objectives and Program:

This IAWQ specialized conference will provide an international forum for exploring the concepts, tools, and applications of microbial ecology of biofilms. The conference will appeal to researchers conducting fundamental studies, applied studies, and studies that span between fundamental and applied. Research reports on biofilms of many types are solicited: aerobic and anaerobic waste water treatment, drinking water treatment, bioremediation, biofouling, corrosion, and a wide range of natural settings.

The three-day conference will include oral presentations, poster sessions, and ample opportunities for formal and informal exchange. In order to stimulate the exchange of information among the wide range of conference delegates, all platform sessions will be plenary, and discussion and workshop sessions will supplement the traditional oral and poster presentations.

The target number of delegates is 100. Our previous conferences demonstrated that this size fosters excellent exchange among all the delegates. Because of the limited number of delegates, the Organizing Committee will select delegates who are active in the research and application of biofilm ecology. This activity will be documented by their oral or poster presentations at the conference or by their records. The Organizing Committee will seek balance among the various disciplines relevant to biofilm ecology, as well as among geographical regions. Some financial assistance will be available to help meet our goals of quality and diversity.

Call for Abstracts:

Oral and poster presentations will be selected from extended abstracts, which should be no longer than 750 words and 3 letter-size pages. Authors wishing to present a contribution are asked to submit an abstract by October 6, 1997. The extended abstract should clearly identify the aim of the research, give a short description of the methods, and summarize the results and conclusions.

The Program Committee is responsible for the selection of oral and poster papers on the basis of the contents of the abstracts submitted. Authors will be notified before February 1998.

All manuscripts received by July 15, 1998 will be published in the conference proceedings, which will be available at the time of the conference. Manuscripts will be peer-reviewed, and acceptable manuscripts will be published in a special issue of *Water Science and Technology*.

Timetable:

Deadline for Abstract Submission	October 6, 1997
Selection of Contributions	February 1, 1998
Deadline for Manuscript Submission	July 15, 1998
Conference Begins	October 8, 1998
Manuscripts Sent to WS&T	November 30, 1998
Conference Final Report	December 30, 1998

For more information, contact:

Dr. Bruce E. Rittmann
Northwestern University
Department of Civil Engineering
2145 Sheridan Road
Evanston, IL 60208-3109 U.S.A.
ph. 1-847-491-8790
fax. 1-847-491-4011
e-mail: b-rittmann@nwu.edu

Location, Fees, and Registration:

The conference location will be the Harrison Conference Center, Lake Bluff, Illinois, USA. Lake Bluff is easily accessed from Chicago's O'Hare International Airport and is a lovely, wooded area north of the City of Chicago. The Harrison Center provides all accommodations, including lodging, meals, recreational facilities, and the conference venue. Lake Bluff is conveniently located for travel to Chicago or Lake Michigan tourist attractions. The weather in October normally is mild and pleasant, ideal for outdoor activities or sight-seeing. Registration fees include room, meals, conference registration, the proceedings, and a special social event. All fees are in U.S. dollars.

The schedule of fees is: $880 for early registration, IAWQ member, and double room occupancy; $930 for late or non-member registration and double room occupancy; $1080 for early registration, IAWQ member, and single room occupancy; and $1130 for late or non-member registration and single room occupancy.

Potential presenters and delegates should forward the reply form (with enclosures) by **October 6, 1997** to:

Microbial Ecology of Biofilms
c/o Dr. B. E. Rittmann
Northwestern University
Department of Civil Engineering
2145 Sheridan Road
Evanston, IL 60208-3109 U.S.A.
Fax.: 1-847-491-4011

Conference Organization:

U.S.A. Organizing Committee:
Dr. Bruce E. Rittmann, Northwestern University (chairman)
Dr. Paul Bishop, University of Cincinnati
Dr. Edward Bouwer, Johns Hopkins University
Dr. Al Cunningham, Center for Biofilm Engineering

International Program Committee:
U.S.A. Organizing Committee, plus
Dr. Erik Arvin, Technical University of Denmark, Denmark
Dr. Nicholas Ashbolt, University of New South Wales, Australia
Dr. Hans-Curt Flemming, University of Duisburg, Germany
Dr. Hiroaki Furumai, Tokyo University, Japan
Dr. Valentina Lazarova, Societe Lyonnaise des Eaux, France
Dr. P. Baldomero Saez, Catholic University of Chile, Chile
Dr. Hang-Sik Shin, KAIST, South Korea
Dr. David Stahl, Northwestern University, U.S.A.
Dr. Oskar Wanner, EAWAG, Switzerland

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* REPLY FORM *

International Specialty Conference
Microbial Ecology of Biofilms: Concepts, Tools, and Applications

Name:_____ Organization:_____

Address:_____ Telephone:_____
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_____ E-mail:_____

O I wish to participate in the conference. Please send the second announcement. I enclose a resume documenting my activity in the field.
O I enclose an extended abstract entitled:_____
_____

I prefer that my abstract be considered for:
- O oral presentation only
- O poster presentation only
- O oral or poster presentation

O Please send me information on becoming a member of IAWQ.

Send this form and enclosures to:
Microbial Ecology of Biofilms
c/o Dr. B. E. Rittmann
Northwestern University
Department of Civil Engineering
2145 Sheridan Road
Evanston, IL 60208-3109 U.S.A.; **Fax: 1-847-491-4011**

Tailings and Mine Waste '98
Colorado State University
Fort Collins, Colorado
January 26-29, 1998

This event provides a forum for members of the mining community, engineers and scientists serving the mining industry, regulatory groups, and other interest groups concerned with environmental issues related to tailings and mine waste management. The conference has proven to be an exciting place for attendees to present ideas, learn of new developments, make contacts in their professional fields and discuss problems of mutual interest. Issues of mining, milling, environmental geotechnics, mining engineering, tailings management, geohydrology, geochemistry and other related topics will be covered in focused sessions.

For information, contact Linda Hinshaw, Department of Civil Engineering, Colorado State University, Fort Collins, CO 80523-1372, tel. (970) 491-6081, fax (970) 491-3584, ext. 7727.

ASCE Wetlands Engineering & River Restoration Conference
Adams Mark Hotel
Denver, Colorado
March 22-26, 1998

Join engineers and scientists from around the world for this important conference, featuring technical presentations and informal discussions that explore everything from wetlands and rivers to ecosystems and watershed management. The Wetlands Engineering and River Restoration Conference provides a forum to feature civil engineering's expertise in wetlands and river restoration while facilitating the exchange of technical and scientific information. The topics scheduled to be presented on wetlands engineering, river restoration, waterways management and coastal restoration projects are from practicing professionals in diverse backgrounds and offer outstanding learning opportunities.

For more information, visit the conference website at http://www.civil.utah.edu/~hayes/conference.htm or contact Don Hayes, (801) 581-7110, e-mail: hayes@civil.utah.edu.

AAEE/AEEP Environmental Engineering Education and Practice Conference
Orono, Maine

Videotapes from the AAEE/AEEP Environmental Engineering Education and Practice Conference held August 3-6, 1996 are now available for purchase from the University of Maine. "Relation Between Environmental Engineering Education and Practices," is a seven-cassette series of the topics listed below. The cost is $100, which includes postage and handling. Address inquiries to Chet A. Rock, 5708 Barrows Hall, College of Engineering, University of Maine, Orono, ME 04469-5708 or call 207-581-2218.

Session 1: Environmental Engineering Work Force and Markets: Today and Tomorrow
Session 2: Educational Approaches and Curricula for Development of Requisite Skills: Educators' Perceptions
Session 3: Skills and Attributes Required of the Environmental Engineer: Practitioners' Perceptions
Session 4: Role of Practitioners in Education
Session 5: Involvement of Educators in Practice
Session 6: Outcome Assessment
Session 7: Summary Session

APPLICATION FOR MEMBERSHIP
in the
Association of Environmental Engineering Professors

Name_____

Official Title_____Department_____

Business Address_____Tel._____

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Home Address_____Tel._____

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E-mail_____Fax_____

Applying for: Regular Member ☐ Rank:_____
Affiliate Member ☐
Student Member ☐ Advisor:_____
Sustaining Member ☐

PLEASE ATTACH A BRIEF (1-3 page) CURRICULUM VITAE

Ordinarily, dues are payable to the Association on January 1. When you join AEEP, dues paid before October 1 will be credited to the current year. You will receive that year's *AEEP Directory* and back issues of the *Newsletter*. New member dues paid after October 1 will be credited to the following year. After joining, you will receive a copy of the *Newsletter* and a current *AEEP Directory* if extra copies are still available. Otherwise, you will receive a new *Directory* the following year.

RANK/STATUS:	ANNUAL DUES:
Regular Member (Professor)	**$65.00**
Regular Member (Associate Professor)	**$50.00**
Regular Member (Assistant Professor)	**$30.00**
Affiliate Member	**$40.00**
Student Member	**$15.00**
Sustaining Member	**$250.00**

Please return this form along with your dues, c.v., and Directory Data form to:

Jerry Schnoor
Department of Civil and Environmental Engineering
University of Iowa
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