ASSOCIATION OF ENVIRONMENTAL ENGINEERING PROFESSORS

Newsletter

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PRESIDENT'S LETTER

At the recently completed AAEE/AEEP Environmental Engineering Education Conference, held at the University of Maine, several times speakers stated that, "Engineering education in the USA is the best in the world", but a stronger theme of the speakers, including those who said it was the best, was a call for changes in the way we do engineering education in general, and environmental engineering education specifically. Perhaps the most sweeping of these statements was the presentation entitled, "The Revolution in Engineering Education: Challenges for 21st Century Engineers", presented by John Prados of the Engineering Education and Centers Division of the National Science Foundation. This presentation apparently grew out of, "The National Science Foundation's Strategic Plan, 1994", but also relates to the 1994 report by the ASEE Engineering Deans Council entitled, "Engineering Education for a Changing World". Winfred Phillips, Dean, College of Engineering, University of Florida, and current AAEE President discussed the latter and combined it with "ABET Criteria 2000", the proposed changes in ABET accreditation philosophies and procedures, scheduled to take effect in the year 2001. Nobody said that engineering education is broken, but most were recommending extensive changes.

While the ABET criteria have not yet been officially established and codified, there seems to be little question that major changes, rather than fine-tuning, are underway for engineering education, and these changes are being driven by professional, governmental and political organizations. Is AEEP poised and ready for the changes? If not, how do we get ready? The challenge to respond confronts your Board of Directors and your organization.

Another oft repeated theme during the AAEE/AEEP Conference was the need for environmental engineering professors and students to have more contact with practitioners during the educational process. A major purpose of the Conference was to explore and promote closer ties between AAEE, representing the practitioners, and AEEP. AAEE has responsibility for accreditation of environmental engineering programs, both undergraduate and graduate, and are currently developing criteria to conform with "ABET 2000" (*Editor's note: see page 6 for the latest draft*). The need for AEEP to form closer ties with AAEE seems obvious. Currently, AEEP members, who are also members of AAEE, are developing a partnership agreement for the two organizations which will be submitted to the AEEP Board of Directors, hopefully later this year, for their input, modifications and agreement. When an agreed upon document is developed between the Boards of the two organizations, the "Agreement" will be distributed to the memberships for comment before adoption is considered.

While the challenges of change are upon us, I am not convinced that we can correctly respond until we better understand who are the clients/customers of environmental engineering education. While the answer initially seems obvious to many environmental engineers, both professors and practitioners, closer inspection reveals that the answers given frequently are different. Some quickly say, "the students", others say, "the employers", while others say, "those who are paying for the education", which may be the taxpayers and/or contributors, in addition to the students and their families. How murky is the picture? In 1993, the operating costs of the College of Engineering at Virginia Tech, the land-grant and largest university in the State of Virginia, had the following breakdown: Taxpayers (state appropriation) 18%, student tuition 20%, endowments 20%, research overhead 42%. The greatest monetary investment came from the faculty, and employers were notably absence. But is there purpose without the employers? I'm sure the breakdown would be different for just about all engineering colleges. Perhaps this means that the ABET Criteria 2000 approach wherein each program defines itself is the most appropriate approach.

Cliff Randall

"New" AEEP Newsletter Editor

For the January 1997 issue of the AEEP Newsletter please send submissions to our new editor:

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AEEP News and Announcements

Walter J. Weber, Jr.

Recipient of the Athalie Richardson Irvine Clarke Prize

Walter J. Weber, Jr., The Gordon M. Fair and Earnest Boyce Distinguished University Professor of the University of Michigan has been named the 1996 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." This year's Clarke Prize citation notes that, "Over a professional career that spans nearly four decades, Dr. Weber has demonstrated a singular ability to bring basic sciences, engineering, and social values together to address problems of environmental and ecological protection, and the quality of human life. His work is characterized by an impeccable basis in physical, chemical and biological principles. This foundation underlies each of the process technologies that, through his engineering skill and appreciation of social and economic need, he has helped translate from theory to application in natural and engineered environmental systems." The Prize, which includes a gold medallion and a $50,000 cash award, was presented at an award ceremony and formal reception and dinner held at the Laguna Cliffs Resort in Dana Point, California on May 17th.

It is customary for the annual Clarke Prize awardee to prepare a lecture on some aspect of water resources for presentation at the award ceremony. Walt delivered a lecture titled, "Fit Water for the Future: The Requisite Exercise of Social Discipline, Competent Technology, Responsible Engineering, and the MEAD AORTA Agenda". The lecture addressed water related problems associated with spiraling population growth and the intemperate use of environmental resources, and proposed specific measures for addressing these problems to ensure safe and adequate supplies of water for the future.

In keeping with his abiding contributions to environmental science and engineering education, Walt has gifted the $50,000 monetary award to the University of Michigan for the purpose of initiating an endowed Environmental Engineering Excellence Fellowship fund.

"So....you want to be an environmental engineer!"

After years of being out of print, our flyer for prospective environmental engineering students (and their parents!) has been updated by Joe Malina (University of Texas) and Sandra Woods (Oregon State University). To place your order, please contact Joanne Fetzner at the AEEP Business Office.

AEEP Members in the news....

The Department of Civil Engineering at the University of Missouri-Rolla is pleased to announce that **Dr. Mark W. Fitch** has joined our Environmental Engineering program as an assistant professor.

Dr. Thomas Hess has recently been named the outstanding Young Faculty for 1996 by the College of Engineering, University of Idaho. The award is given to young faculty members, early in their careers, who have shown excellence in both teaching and research. The selection criteria is based on performance in the faculty member's field of research expertise together with teaching effectiveness in both the graduate and undergraduate curriculum as determined by peer review.

Where's the Next Conference?

The AEEP Board would like to begin the prelimnary planning for the next conference. First, when should the next Conference be held? There was some interest in having a teaching workshop every three years with the traditional conference being held in six year intervals. The Research Conference would also be held every six years (offset by three years from the Education Conference, but in conjunction with a teaching workshop).

If your institution is interested in hosting a teaching workshop, the Research Conference, or the Education Conference in the future, please send a brief letter of interest to Cliff Randall, AEEP President. Cliff would also welcome your comments on when a conference should be held and in what format.

DISINFECTION BY-PRODUCTS VIDEO TAPE SEMINAR

Dr. James M. Symons, AEEP member and leading authority on disinfection by-products, is offering a professionally taped video, "1974 Revisited-An Historical Review of the Disinfection By-Product Issue", that will be of interest to AEEP members. This 47 minute video can be obtained for $100 plus $3 S&H. To order or obtain more information (a preview tape is available) contact Jim at 713-743-4265 or write James M. Symons, Consultant, 6315 Sanford Road, Houston, TX 77096-5730.

Assessment of the Formation of a National Student Environmental Engineering Organization

AEEP Student Organizations Committee
James R. Mihelcic, (chair) Michigan Technological University Allen P. Davis, University of Maryland, John C. Little, Virginia Polytechnic Institute and State University; and, Sarah K. Liehr, North Carolina State University

In 1995 the Association of Environmental Engineering Professors (AEEP) formed the "Student Organizations Committee". This committee was created in response to the AEEP Board's growing interest in establishing, promoting, or assisting student organizations interested in environmental engineering and science. During the past year our committee: a) surveyed the AEEP membership and institutions which they represent to determine the number and types of student environmental organizations that exist, their ties to national organizations, the size of their membership, the names of faculty advisors, and their opinion on formation of a national group, and b) contacted professional and technical societies to determine their interest in co-sponsoring a national student environmental organization. We presented a draft report to the AEEP Board this spring and used the Poster Session at the Education Conference to obtain additional comments from AEEP and AAEE members. We plan to present a final report to the AEEP Board this fall. At the Education Conference there was a lot of excitement about our committee's activities from both AEEP and AAEE.

To date we have obtained information from 45 institutions. Of these 20 have no group and 25 have a group (4 of these are either inactive or just starting up). Of the 25 groups, 4 are affiliated with ASCE, 4 with AWMA, 11 with WEF, and 7 have no affiliation.

AWMA has a "Student Affairs Committee" and WEF now has a student organizations contact. However, AWMA has no current listing of student groups and WEF's data base is missing several existing groups. AWWA has no official student chapters; however, it does have 1,002 student members who represent 43 existing sections. The largest student groups have approximately 80 members and are at Clarkson University, Humboldt State University, University of Florida, and Michigan Technological University. Clarkson's group is affiliated with NYWEA. Humboldt State has an organization named Environmental Resources Engineering Student Association (ERESA) which is affiliated with ASCE. The University of Florida's Society of Environmental Engineers is unaffiliated as is Michigan Tech's Society for Environmental Engineering (SEEn). However, SEEn is starting up a chapter of MIWEA this fall which would be organized as a committee under the parent organization. Finally, in 1996 Manhattan College established the first chapter of the "National Honor Society of Environmental Engineers" and wants to hear from interested universities (contact Robert Sharp at Manhattan College for more information).

Universities with active groups typically have a faculty member who provides the initial energy, continuity, and organization. Also, the large "active" student groups are typically located at universities which have a large number of undergraduate students who emphasize environmental engineering. In some cases graduate students are active in formal groups (e.g., University of Cincinnati); however, in general, graduate students appear to be less involved in formal groups.

Some reasons to keep and strengthen our ties with existing professional societies are because they provide: 1) networking and employment opportunities near the university's geographical area, 2) access to speakers, 3) job fairs, 4) chapter meetings which are easy for students to attend, and, 5) substantial financial support to student groups. In addition, survey respondents mentioned that national groups provide cohesion and continuity. Also new groups mean new dues. Membership can be expensive for a student who wishes to join several organizations. For example, student memberships currently range from $7 to $44.50. Several respondents noted the difficulty in forming a new professional society which encompasses all areas of environmental engineering. For example, one respondent felt it was already difficult to bring civil, chemical, environmental, and agricultural engineers together as well as chemistry, geology, and biology.

Survey respondents mention several reasons to form a new group. For example ASCE has failed to meet the professional needs of our students at a grassroots and national level. There is a lot of interest in forming a new professional society or "umbrella" student group. "Umbrella" groups would not be affiliated directly with any professional society and therefore would allow student groups to work on all aspects of environmental engineering. However, these groups could allow some of their members to join a national group or feed students into national groups upon graduation. As mentioned earlier, many universities already have unaffiliated groups which are working well. They provide students a forum to develop professionally in the many areas which comprise environmental engineering. The umbrella group can then serve the needs of all environmental engineering students while the different specialty groups can serve the needs of students with specific interests.

The Student Organizations Committee has recommended that during the following academic year AEEP continue to study the formation of a national student group and also begin to link students interested in environmental engineering with one another. AEEP is in a unique position to provide this link and a forum for students to communicate. In addition, AAEE has expressed an interest in assisting AEEP. This fall the AEEP web page will add a "student page" which will provide a link to student group home pages. AEEP will also set up an electronic "bill board" for students to interact with one another so students can provide comments/suggestions/information which would remain for others to read and comment on. AEEP will also set up an electronic email list for officers of various groups to subscribe and exchange correspondence and hopes to link the student page to information about student activities such as contests, gatherings, and awards/scholarships. Individuals interested in learning more about our committee's activities or getting their student group linked to the AEEP home page should contact one of our members.

Lehigh University

The Department of Civil and Environmental Engineering at Lehigh University is inviting applications for a tenure-track position in Environmental Engineering. Appointment will be made at the Associate or Full Professor rank but outstanding individuals at the Assistant Professor level will also be considered. An earned Ph.D. degree in Civil/Environmental Engineering or a closely related field is required and a B.S. degree in a related engineering field from an ABET accredited program is desirable. The candidate's research interests may be in any area of waste management, contaminant transport and remediation. The successful candidate is expected to teach courses at both undergraduate and graduate levels, to supervise graduate students in M.S. and Ph.D programs, and to develop a strong externally funded research program in candidate's area of expertise.

The Department comprises about 20 full-time faculty members, approximately 80 graduate students and 200 undergraduate students. The graduate program has consistently been ranked by National Research Council among the top 20 Ph.D. granting institutions in the nation. Lehigh stresses excellence in teaching and research, and is committed to strengthening and expanding its Environmental Engineering program. The Environmental Engineering Laboratory is equipped with state-of-the-art instruments.

To apply, please send a resume, a short description of teaching and research interests, and the names and addresses of at least three references to: Search Committee Chair (Environmental), Fritz Engineering Laboratory, 13 East Packer Avenue, Bethlehem, PA 18015-3176. Review of applications will begin on February 1, 1997 and will continue until the position is filled.

Lehigh University is an equal opportunity/ affirmative action employer, and is committed to recruiting, retaining and tenuring women and minorities.

University of Michigan

The Department of Civil and Environmental Engineering at The University of Michigan invites applications for two tenure-track faculty positions in Environmental Engineering. A Ph.D. degree in Environmental Engineering or a related field is required. It is desired to fill the positions at the Associate or Full Professor rank, but truly outstanding individuals at the Assistant Professor level will also be considered. Preference will be given to applicants with national and international reputations in: (1) environmental industrial process design for waste avoidance and minimization, industrial ecology, or advanced technologies for treatment of gaseous, liquid, or solid wastes, or (2) geostatistics, parameter estimation in heterogeneous environments, or stochastic processes and modeling of contaminant fate and transport. Field and industrial experience are highly desirable. A commitment to excellence in teaching and research is expected. Responsibilities will include teaching at the undergraduate and graduate levels, and maintaining a creative and vigorous research program. To apply, please send a resume, a description of teaching and research interests, and the names and addresses of at least three references to Dr. Kim F. Hayes Environmental and Water Resources Engineering Building, Room 181, The University of Michigan, Ann Arbor, MI 48109-2125 (email: ford@engin.umich.edu; TN: (313) 763-9661; FN: (313) 763-2275). The review of applications will begin immediately and will continue until the positions are filled. EWRE program information and faculty profiles are available on the world wide web at http://www.engin.umich.edu:80/dept/cee.

The University of Michigan is an equal opportunity/ affirmative action employer, and especially encourages women and minorities to apply.

University of Missouri-Rolla

The Department of Civil Engineering at the University of Missouri-Rolla (UMR) invites applications for a tenure/tenure-track faculty position at the Assistant Professor level in the area of Environmental Engineering commencing January 1, 1997. The salary is competitive and commensurate with qualifications and experience. The successful candidate will have a B.S. degree in Civil Engineering and an earned doctorate degree with research emphasis on environmental engineering. The candidate's interests may be in any area of environmental engineering although expertise in biological or physicochemical operations in water, wastewater, industrial, or hazardous waste treatment is preferred. Applicants should possess or eventually be eligible for registration as a professional engineer in the state of Missouri.

The position will require the teaching of environmental engineering courses at the graduate and undergraduate levels. The successful candidate will be expected to develop a strong, externally-funded research program and to direct masters and doctoral level research. The successful candidate will be expected to complement and interact with existing faculty in environmental engineering and related fields. Graduate research in the Environmental Engineering Program is conducted primarily in the Civil Engineering Department's Environmental Research Center which is equipped with state-of-the-art analytical and experimental instruments. Additionally, environmental research is supported by close collaboration with the Environmental Trace Substance Laboratory (part of the Center for Environmental Science and Technology) located on the UMR campus.

The University of Missouri-Rolla is the technological campus of the University of Missouri System. Established in 1870 as the Missouri School of Mines and Metallurgy, the campus is located in the heart of the Missouri Ozarks, 100 miles southwest of St. Louis. More than 70 percent of the students are majoring in science and engineering. In addition to the BSCE, the Department of Civil Engineering offers the MSCE, MS in Environmental Engineering, and Ph.D. degrees. Areas of emphasis for the MSCE and Ph.D. include environmental engineering, geotechnical engineering, hydraulic engineering and engineering hydrology, structural engineering, and civil engineering materials.

Review of applications will begin on September 15, 1996 and will continue until the position is filled. Applications should be submitted with a statement of teaching and research interests, a complete curriculum vitae, and names of three references to: Dr. Craig D. Adams, Mathes Professor, Department of Civil Engineering, 202 Butler-Carlton Hall, University of Missouri-Rolla, Rolla, MO 65401.

The University of Missouri-Rolla is an affirmative action/equal opportunity employer.

University of North Carolina at Chapel Hill

Applications are invited for a tenure-track position at any level in environmental policy analysis and management. The successful candidate will hold at least one degree in a science or engineering field, and a PhD in engineering, environmental science, policy analysis, or closely related field. He or she will teach and conduct research in one or more of the following areas: risk assessment, decision theory, and environmental control strategies and systems optimization. The area of environmental policy specialization is open, but expertise in at least one of the following areas would be an advantage: air quality, hazardous and solid waste, water quality, or environmental health. Applications will be accepted until the position is filled. Review of applications will begin September 30, 1996.

For further information, please contact: Dale Whittington Director, Environmental Management & Policy Program and Chair, Search Committee Department of Environmental Sciences and Engineering CB# 7400, School of Public Health, University of North Carolina at Chapel Hill, Chapel Hill, NC, 27599-7400. 919-966-7645, Fax: 919-966-7646 or Email: Dale_Whittington@unc.edu.

Women and minorities are particularly encouraged to apply. The University of North Carolina is an Equal Opportunity employer.

University of Connecticut

POSTDOCTORAL POSITION—Advanced oxidation of organic pollutants in water. The individual will investigate fundamental mechanism and/or applications aspects of the photoassisted Fenton reaction. The position is for one year renewable for a second. The most suitable candidate will be a recent Ph.D. having a background in AOPs, photochemistry, kinetics, free radical chemistry, elucidation of chemical reaction mechanisms, and experience with GC and LC techniques. Please send letter addressing these qualifications; a C.V.; one or two recent examples of your writing; and the names, addresses, telephone, fax, and e-mail addresses of two references. Joe Pignatello, Department of Soil and Water, The Connecticut Agricultural Experiment Station, P.O. Box 1106, New Haven, CT 06504; (203)-789-7237.

CAES is an equal-opportunity employer and encourages applications from under-represented groups.

AAEE/AEEP Educational Conference '96 Vendors

The Conference also featured displays of current textbooks and reference books relevant to environmental engineering and science. Three book companies, Ann Arbor Press, McGraw-Hill, and John Wiley and Sons participated. Elsevier Science also sent 25 copies of the Journal of Ecological Engineering. Wayne Anderson of John Wiley and Sons attended the conference and the other companies sent books. All three companies became immensely popular when all display books were given away in a free raffle to the assistant professors in attendance. We hope this will become a tradition at our conferences and want to thank Wayne, Skip DeWall, and B J Clark for their generous participation in this year's conference.

Wayne Anderson
John Wiley and Sons, Inc
605 Third Avenue
New York, NY 10158

Robert (Skip) DeWall Jr
Ann Arbor Press
P O Box 310
121 South Main Street
Chelsea, MI 48118

B J Clark
Executive Editor/Engineering
College Division, McGraw-Hill, Inc.
1221 Avenue of the Americas
New York, NY 10020-1095

AEEP Annual Meeting

The AEEP Annual Meeting (as well as the luncheon and "Meet and Greet") will take place on Monday, October 7, 1996 at the Ramada Plaza Hotel in Dallas, Texas. For further information and registration please contact:

James C. Young
Professor of Environmental Engineering
Department of Civil Engineering
4190 Bell Engineering Center
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501/575-4196
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IWRN Directories of Water Resources Organizations and Training Opportunities for North America

The Center for Environmental Studies (CES) at Florida Atlantic University and the Universities Water Information Network (UWIN) are collaborating to create the *Directory of Water Resources Organizations in North America* and the *Directory of Water Related Training Opportunities in North America* for the Inter-American Water Resources Network (IWRN). The IWRN is a network of people and information dedicated to improving water management in the Western Hemisphere. The technical secretariat is headquartered at the Organization of American States in Washington, DC.

These *Directories* will be publicly available on the World Wide Web and will be fully searchable with hotlinked email addresses and URL's. You can include your organization's information in these *Directories* by filling out the on-line form at http://www.uwin.siu.edu/FORMS/ or by requesting that these forms be mailed to you. Make sure your organization is not left out of the most comprehensive *Water Directories* to be made available worldwide over the Internet. Submit your information today! More information on this project, CES, IWRN, UWIN and samples of completed forms are available at http://www.uwin.siu.edu/FORMS/

For more information, please contact: Fay Anderson, UWIN, email faye@uwin.siu.edu or fax 618/453-2671; or the Universities Water Information Network (UWIN), c/o UCOWR Headquarters, 4543 Faner Hall, Southern Illinois University, Carbondale, IL 62901-4526.

The First Annual Hazardous Materials Management Student Competition

The Institute of Hazardous Materials Management (IHMM), sponsor of the First Annual Competition will award a total of $14,250 in the form of scholarship funding to the three winners of the competition and their respective schools. Specifically, the first prize is a $5,000 scholarship award and the winner's sponsoring school will receive a $2,500 stipend towards a scholarship fund of their choice. The second prize is a $3,000 scholarship award to the winner and a $1,250 contribution to the sponsoring school. The third prize will include $1,500 to the winning student and $1,000 to the sponsor.

Competition Eligibility, Rules Defined

All full-time students currently enrolled in an accredited four-year college or university are eligible to compete in the First Annual National Hazardous Material Management Competition. Proof of this status must be in the form of a letter from a department head or dean verifying the student's enrollment status and a willingness on the part of the school to be a "sponsor." The number of students sponsored by any academic institution is unlimited. The entries, in the form of a presentation, will be limited to one entry per student. All entries must be received in the Institute's office no later than June 12, 1996. The entry must represent an original student work and never presented or published prior to the submission to this competition. The entries must be typed or printed 8 ½" x 11" plain white paper. Each sheet shall be single-sided and with left and right margins of at least one inch. The length of the presentation must be a minimum of 2,000 words and a maximum of 3,000 words (or 20 typed pages) exclusive of tables, charts and illustrations.

Any questions, may be directed to IHMM's National Competition Office, 11900 Parklawn Drive, Suite 450, Rockville, MD 20852 or phone 301/984-8969.

DRAFT Environmental Engineering Program Criteria

The following draft criteria were approved by AAEE August 3, 1996. AEEP Would like to receive comments from members. Please send your thoughts and reaction to Cliff Randall, President AEEP. (*Editor's note: The draft criteria will be used to supplement the general criteria of ABET for accrediting environmental engineering programs.*)

Sections 1 and 2 Provide Background:

1. Preamble

The professional discipline of Environmental Engineering is defined as "the application of engineering principles to improve and maintain the environment for the protection of human health, for the protection of nature's beneficial ecosystems, and for environment-related enhancement of the quality of human life." Educational programs for Environmental Engineers must address human dependence on a healthy environment; effective resource management; the conception, design and operation of engineered systems affording protection of human health and the environment; the interactions and transformations that occur across environmental media (i.e., surface water, groundwater, land, and air); the behavior of natural systems in response to outside stimuli caused by human activity; and the need to work closely and effectively with the public and other professionals in multi-disciplinary teams to meet the challenge of environmental protection.

2. Mission

Environmental Engineering education must provide a base of knowledge which, when supplemented by professional experience, will provide those skills necessary to conceive, plan, design and implement those actions necessary for the protection of human health and for the sustenance and enhancement of the environment.

Sections 3 through 5 Amplify the General Criteria:

3. Program Outcomes and Assessment (Amplifies General Criterion 3)

Environmental engineering programs must demonstrate that their graduates have:

A. an understanding of their moral, ethical, legal and professional obligation to protect human health and the environment;

B. an understanding of the basics of the specialties which comprise the discipline;

C. a recognition of how critical and innovative thinking are necessary for human health and the environment to be protected and enhanced within a framework of sustainable development;

D. the basic oral and written communication skills necessary to communicate complex technical information to the public and allied professionals;

E. the ability to work effectively in multi-disciplinary teams; and,

F. a commitment to lifelong learning and professional responsibility, as demonstrated by licensure, specialty certification, and active participation in professional and technical organizations.

4. Professional Component *(Amplifies General Criterion 4)*

Accredited Environmental Engineering programs must include:

A. appropriate elements of design integrated throughout the curriculum and which culminate in a major comprehensive design experience;

B. appropriate concepts of waste minimization, pollution prevention, and resource management integrated throughout the curriculum;

C. a curriculum that provides an understanding of the roles and responsibilities of public and private institutions and organizations in environmental management.

D. programs which include relevant quantitative and experimental laboratory training and experience applicable to the measurements required and processes utilized in Environmental Engineering, including data interpretation and application;

E. relevant training in modern computing, information technology and environmental systems and process modeling techniques; and,

F. the following professional components:

(1) Mathematics and basic science

(a) Mathematics through differential equations

(b) Probability and statistics

(c) Calculus based physics

(d) General chemistry followed by water or organic chemistry, relevant to the program of study

(e) An earth science course (e.g., geology, meteorology, soil science, etc.), relevant to the program of study

(f) A biological science course (e.g., microbiology, aquatic biology, etc.) relevant to the program of study

(2)Engineering topics

(a) Grouped or linked coursework, providing an introductory level exposure to the basic fundamentals in the following major focus areas of Environmental Engineering: water and water resources, environmental systems modeling,environmental chemistry, wastewater, solid waste, hazardous waste, atmospheric systems and air pollution control, and environmental and occupational health; and leading to proficiency in a minimum of three of the above major focus areas of Environmental Engineering, and including exposure to professional practice issues

(b)Fluid mechanics and hydrology, including exposure to groundwater hydraulics and hydrology with relevant geology fundamentals

5. Faculty *(Amplifies General Criterion 5)*

A. The faculty as a whole must be competent to teach the basic fundamentals in the focus areas listed in 4. F (2) (a), and to teach advanced principles and practice in at least three of the listed focus areas.

B. A majority of those faculty teaching courses which are primarily design in content must be Registered Professional Engineers or have equivalent design experience.

American Society of Civil Engineers Environmental Engineering Division

Announces

The Seventh National Environmental Engineering Student Essay Competition

ASCE Student Chapters and their Advisors will soon be receiving the applications for the 1996-97 EED Student Essay Competition. Purush TerKonda, Chairperson of the Student Essay Competition Committee, reports, "This year marks the seventh annual division-wide competition that is open to graduate and undergraduate students who are members of ASCE Student Chapters. We are very proud of this competition which was established to develop interest and enthusiasm in environmental engineering."

Essays are submitted on any technical aspect of environmental engineering, generally in one of four areas: Water Pollution Management, Water Supply Management, Solid and Hazardous Waste Management, and Air and Radiation Management. Advisors of ASCE Student Chapters are asked to select a maximum of two essays per chapter and forward them for judging by a national panel of experts in environmental engineering.

The Student Essay Competition Committee anticipates that awards will be similar to previous years' competitions. A Grand Prize of $1,000, plus additional prizes in both the undergraduate and graduate categories of $500, $250, and $125. Certificates are awarded to all winners and winning essays will be considered for presentation at the CSCE/ASCE Environmental Engineering Conference in Edmonton, Alberta, Canada, in July 1997.

The deadline for submission of essays is January 13, 1997. Although this may appear to be adequate time to develop essays, Chairman TerKonda urged students and their advisors and professors to "start now."

For more information, see your ASCE Student Chapter/ Faculty Advisor, or contact Purush K. TerKonda, University of Missouri-Rolla, 222 Engineering Research Laboratory, Rolla, Missouri, 65409-0710; telephone (513-341-4484).

ENVIRONMENTAL SCIENCE AND ENGINEERING 2nd Edition
J. Glynn Henry and Gary W. Heinke, Prentice-Hall, Upper Saddle River NH, 1996

Wasn't it Debbie Reynolds who sang something about "Love's More Comfortable, the Second Time Around"? (All those who don't remember Debbie Reynolds can quit reading now.)

For Glynn Henry and Gary Heinke, both of whom been around the barn a few times themselves (and would certainly remember Debbie Reynolds), the second time around with their book is certainly more comfortable. In this second edition, they have consolidated topics, introduced new areas such as pollution prevention, added many more problems and examples, and most importantly, tried very hard to make the book read as if it is written by a single author, even though seven co-authors helped write various chapters of the book.

The organization is fairly straightforward. Beginning with a chapter on the scope of environmental problems, they cover human population growth, growth in energy use (they don't really mean "energy growth", the title of the chapter), natural environmental hazards, and human environmental disturbances. Part 2 begins with a very good discussion of physics and chemistry, followed by a separate chapter on atmospheric sciences, as if there was no physics and chemistry in the atmosphere. In my opinion, some of the topics in this chapter could have easily been introduced in the previous chapter and the rest moved to the chapter on air pollution control. There is nothing to keep the instructor from teaching the course in that way, of course. Part 2 also has an excellent chapter on microbiology and epidemiology and a chapter on ecology. Part 3 is more like the canon of environmental engineering introductory courses: water resources, water supply, water pollution, air pollution, solid waste, and hazardous waste. A dangling chapter on environmental management concludes the book, and tries really hard to fit in, but does not quit make it. Particularly unfortunate is the short and almost useless discussion on environmental ethics.

The only word of caution to you who teach introductory environmental engineering courses is that the book has a distinctly Canadian flavor. Mostly this is acceptable, such as the discussion of Great Lakes water quality programs, but occasionally, such as the discussion of acid rain, the Canadian bias is annoying (to this American). But I am being really picky. All in all, Glynn and Gary have written an excellent book that will find wide use in the undergraduate curriculum. I highly recommend considering it as a text for introductory environmental engineering courses.

INTRODUCTION TO WATER POLLUTION BIOLOGY
Richard J. Schmitz, Gulf Publishing Company, Houston, 1996

I find it difficult to place this book into the classroom. It is not a book that would be used in an environmental engineering program because it is almost devoid of any growth kinetics or anything smacking of calculations. (For example, the author notes in one place that an equation may be used to calculate pollution loading in a steam, without noting that the magical equation is a simple mass balance.) It is not a book that would be used to teach water quality issues to environmental biology students who have already taken basic biology and microbiology because the level of microbiology is elementary. (What is a bacterium?) It is not a book that would be used in a basic environmental awareness course ("The Environment and You") because many of the issues commonly taught in such a course are missing. It is not a book that would be used in a public health course because it mentions pollution by pathogenic organisms in only one chapter. So where does this book fit into environmental engineering/science education?

In the Preface, the author suggests that this is a book for those students who have completed "the spectrum of basic college requirements". If this is true, then the "basic college requirements" certainly are not very demanding.

I don't want to pan this book too badly. It is nicely put together and has interesting sections on such topics as toxicity, thermal pollution, estuarine pollution, heavy metals, pesticides, petroleum hydrocarbons and pathogens. Several case studies are discussed, to good effect, and these would make valuable additions to any lecture.

But what is most annoying about the book is the author's writing style. He is incessantly telling the reader, in future tense, that some other topic or other *will* be covered. He is fond of the word "utilize" and uses this word incessantly. He uses the word "man" when he means people -- a habit a good copy editor should have beat out of him long ago. Finally, he has a fondness for complex diagrams (e.g. the carbon cycle) that would be useful only to the person who drew the diagram. Nobody can learn from or teach from such masses of links and nodes.

I am certain that someone will find this book useful. However, I don't see it being of much value to the reading public of the AEEP Newsletter.

WORKBOOK OF ATMOSPHERIC DISPERSION ESTIMATES: Introduction to Dispersion Modeling D. Bruce Turner, Lewis Publishers, Ann Arbor MI, 1994

When Bruce Turner first published the Gaussian dispersion models in the Public Heath Service publication (No. 999 AP-26), he demonstrated how it was possible to assimilate the work of many meteorological researchers and to develop a workable and effective means of predicting the dispersion of air pollutants. His methods have been copied and discussed in almost all environmental engineering books that cover air pollution. The similarities of the Gaussian dispersion equations with the Streeter-Phelps dissolved oxygen sag equation are strong and both provide the means of developing excellent examples and problems for student involvement.

The book comes with a computer disk that contains the main dispersion model and this is quite useful in solving the loads of example problems.

Because of the copying and recopying of the technique developed by Turner, the finer points of the model are sometimes lost. This is why this book is such a good read for anyone teaching dispersion. Turner is scrupulous in giving credit to all those researchers who originally developed the bits and pieces of the technique. For example, the dispersion coefficients are credited to

Pasquill and Gifford (Pasquill, F. "The estimation of the dispersion of windborne material" *Meteorol. Mag.*, 90(1063), pp 33-49, 1961; Gifford, F. A. "Atmospheric dispersion calculations using the generalized Gaussian plume model" *Nuclear Safety*, 2(2), pp 56-59, 67-68, 1959).

The most depressing part of this book is, however, that there seems to have been no progress in obtaining empirical data to back up the model. The dispersion coefficient plots still have no data points and still go off into never-never land. For example, the dispersion coefficients (standard deviations) are still 10,000 meters at a distance 100 kilometers downwind. That's pretty heady extrapolation. Where are the data?

But for anyone teaching the Gaussian dispersion model in an environmental engineering class, this book is worth having because it presents a much deeper background than would be covered in a typical undergraduate class. And most of the time it is still useful to know a little more about the material than what's in the text, if for no other reason than to be able to respond to the smart-alec who asks difficult questions!,

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SOLID WASTE LANDFILL ENGINEERING AND DESIGN Edward A. McBean, Frank A. Rovers and Grahame J. Farquhar, Prentice Hall PRT, Englewood Cliffs NJ, 1995

MATERIAL RECOVERY FACILITY DESIGN MANUAL CalRecovery and PEER Consultants, C. K. Smoley (CRC Press) Boca Raton FL, 1993

COMPOSTING AND RECYCLING MUNICIPAL SOLID WASTE Luis F. Diaz, George M. Savage, Linda L. Eggerth, and Clarence G. Golueke, Lewis Publishers (CRC Press) Boca Raton FL 1993

The search goes on for a truly comprehensive and useful *engineering* solid waste textbook. The classic by George Tchobanoglous, Larry Theisen and Sam Vigil (INTEGRATED SOLID WASTE MANAGEMENT McGraw-Hill, 1993) is a fine book for solid waste *management*. Its use is clearly for a more general audience and engineers are often left wondering "Where is the beef?".

I want to review the three books listed above as options for a good solid waste engineering textbook.

The book by McBean, Rovers and Farquhar is a fine effort in landfill design and other aspects of solid waste engineering. After a short introductory chapter, Chapter 2 is on opportunity for reduction, reuse and recycling. Then the book concentrates on landfilling. Subsequent chapters include site-selection methodologies, principles of decomposition in landfills, mass balance computational procedures in landfill assessment, hydrogeologic principles, water balance modeling for a landfill, landfill cover design, barrier layers, design of leachate collection systems, treatment of leachate, design of attenuation sites, landfill gas migration, landfill gas collection and recovery, construction and operation principles in landfilling, and monitoring program concerns. This pretty much covers the field (no pun intended). The book is well written with few errors and lots of tables and graphs, as well as homework problems for students. Anyone teaching a landfills course could well use this book as a text.

The book suffers only on two accounts: First, the authors seem not to have had good coordination. Composition numbers, cost figures and other data are repeated in several places in the book, often with some differences. The senior author should have used a bigger axe in editing. Second, the quality of printing is marginal, with fuzzy graphics and cheap production. The book deserves better.

The book by Diaz and friends is another in a series of good books full of information based mostly on their vast experiences in the solid waste field. In the book they include information that would be difficult if not impossible to get otherwise and this is what makes this such a good reference work. The subjects include storage and collection, waste characterization (an especially well-done topic), processing, recycling (they really mean recovery, in MRFs), use of organic matter as a soil amendment, composting, production and markets (for compost), biogasification, and integrated waste management.

The basic problem with the book is that so much space and effort is spent on composting. Clarence Golueke is of course the dean of composting and his contribution as always is outstanding. But as has been amply and expensively demonstrated, composting MSW is seldom a cost-effective option for municipalities.

The book does not contain homework problems and was not designed as a textbook. It would be an excellent choice as a supplemental reader, however.

Finally, the book by CalRecovery and PEER Consultants personnel (otherwise unidentified) has by far the best title for engineers. Who could turn down a book entitled MATERIAL RECOVERY FACILITY DESIGN MANUAL? We all want to know how to design(!) MRFs, and the "manual" tag promises a comprehensive treatise on how this design is to be rendered. Unfortunately, the reader will be greatly disappointed. It appears that this book is a reprint of an EPA-sponsored study that seems to have added little to the engineering literature. Its most damaging feature is the lack of specifics. Take for example someone who needs to know something about plastics granulators, and looks in the MANUAL to read:

"A plastics granulator is used to size reduce PET and/or HDPE containers to a 2 flake-like condition. The granulated plastic is generally shipped in gaylords. Due to the relatively large reduction in volume, substantial savings in shipping can be realized when plastic granulation is employed. Plastics granulation is an operation which requires a relatively high degree of maintenance and may be prone to dust generation."

What has the reader learned about plastics granulators? And relative to what?

This book, which had such potential, is pretty much useless for classroom use and I would guess for engineering design offices as well. Which brings up a much greater problem, of course, and that is the lack of rigorous review of EPA literature. But that can wait for another day. Gotta get back to looking for a textbook for my solid waste engineering class.

ANAEROBIC BIOTECHNOLOGY FOR INDUSTRIAL WASTEWATERS, Richard E. Speece, Archae Press, Nashville TN, 1996

In the preface to this book, Dick Speece states that "There is always a recurring need within a profession to review the literature periodically. Such a summary, because of it collation and synthesis of a wide spectrum of pertinent information, benefits the practitioner as well as the academic by eliminating the

continued...

task, often of staggering proportions, of analyzing the data reported. The purpose of this book therefore is to present a distillation of current and past use of anaerobic biotechnology in industrial wastewater treatment in order to facilitate a wider range of industrial applicability and broader curriculum acceptance".

What Dick does not say, with due humility, is that what is needed is that this task be done by someone with the historical perspective and currency of knowledge. It is a task that only few would (and should) attempt. Fortunately for all of us, Dick has produced an excellent technical monograph that will become a standard reference for years to come.

The outline begins with a discussion of the advantages of anaerobic treatment (with a very short paragraph on disadvantages!), followed by a section on biological treatment in general. In the section on the principles of anaerobic treatment the basic ideas of biological kinetics, free energy release, stoichiometry, methanogeneris, and biofilms are covered, with an excellent checklist of requirements for optimal anaerobic treatment, invaluable to the industrial practitioner. The heart of this book, in my opinion, is the chapter on operational considerations which is full of case studies and practical guidelines. Treatability protocols and biomass immobilization are the next chapters, followed by a discussion on reactor configuration. Bicarbonate alkalinity and the effect of heavy metals each deserve separate chapters, as do toxicity response and sulfide production. The book concludes with an up-to-date discussion on anaerobic treatment of refractory chemicals.

What is missing (in my obviously biased opinion) is any mention of sludges and their disposal. Some mention is made of bulking, but none of thickening and dewatering. This unfortunate omission perpetuates the idea that wastewater treatment is linear and that the arrow coming off the page with "sludge to disposal" is a mere detail.

The book is well organized and nicely composed. Each section has a sidebar with the most important idea of that section outlined -- sort of preempting the use of the highlighter. The figures are all well turned out and readable. Each chapter contains a summary of the central ideas as well as a set of problems for the student.

If you have the luxury of teaching courses on anaerobic treatment, then this might be a good book to consider for a text. It's most immediate and I believe lasting impact will be, however, on the practitioners of industrial wastewater treatment.

ZEALOTRY AND ACADEMIC FREEDOM, Neil Hamilton, Transaction Publishers, New Brunswick NJ 1995

Neil Hamilton suggests that since I am a professor, I am a spineless wimp. He stereotypes professors as caring more about their scholarly work and careers than about academic freedom. He believes that professors will not stand up for principles of truth, honesty and integrity, and that we will cave in to pressure from anyone with a loud voice. Can this be right?

Unfortunately, stereotypes must have some truth at root. We have to admit, for example, that most fraternity members drink too much, and that most Republicans care more for individualism than for altruism. Is it then also true that most professors are wimps, afraid to stand up for what they believe, scared that somehow their opinions will harm them and their careers? Could it be that the professorate is not nearly the fine, upstanding, moral heroes that I like to think we are?

In this excellent book Neil Hamilton presents a historical and legal perspective on zealotry as practiced today in academia. He defines zealots as those people who cannot conceive of the possibility that they might be mistaken. He shows how zealotry has a long history in the United States, including ultra-patriotism during WWI (where many Americans of German ancestry changed their names to escape the inquisition), the years of communist witch-hunting that we now call McCarthyism in the 1950s, the student left peace movements in the late 1960s and early 1970s, and then the political correctness movement in the mid 1980s and early 1990s. The diversity of these waves of zealotry makes it impossible to predict there the next wave will come from.

All of these waves of zealotry have common features -- anyone can be accused without need of proof, and one is guilty unless proven innocent. The effort to mount such proof of innocence is overwhelming, and even if successful, seldom prevents a loss of prestige, career, or even health. Accusation, humiliation and ostracism are enough to suppress dissent.

The present wave of zealotry, according to Hamilton, is unique in that it is rooted in the universities and is a combination of postmodernism and the political correctness of diversity. He suggests that the core belief of postmodernists is that there is no accurate representation of reality, that objective knowledge is a myth, merely stories or narrative devised to help us make some sense of the world. Most importantly, all concepts or good and virtue are artificial and biased. This philosophy combined with the notion that all people can be described as belonging either to the oppressed or the oppressors, (somehow) leads to the conclusion that all dissent with the oppressed is wrong, harmful and immoral.

To oppose these views requires courage -- the kind of courage that most professors seem to lack. Consider the story of a professor who cast a lone dissenting vote in an English department against the formation of a special concentration in ethnic and third world literature. He became an outcast in his department, did not get invited to faculty meetings or social functions, and received hate notes in his mail. One colleague called to express his sympathy but added that he had "a family to think about and so I have to ask a favor. Please don't stand in my doorway and talk to me when other people are watching".

Neil Hamilton's book is an excellent and disturbing study of such cowardice. Read it at your own risk.

REMINDER

Deadline for the January 1997 AEEP Newsletter is Monday, December 2nd.

PUBLICATIONS

Advances in Environmental Research

Advances in Environmental Research, a new journal for the publication of peer reviewed, original research in the fields of environmental science, engineering and technology, will publish full length research papers, case studies, notes and critical review papers on topics that could; a) lead to improvements in or protection of the quality of the air, water and land environments, or; b) improve the efficiency or cost effectiveness of existing technology, or; c) contribute to our knowledge of transport and fate of pollutants in the environment.

Timeliness of articles and speed of publication will be important features of the journal. It will be available online as well as in print. The first issue of the print version will be released this fall, and it will be published quarterly thereafter.

For more information and the Guidelines for Contributors, please visit our site on the World Wide Web at http://www.sfo.com/~aer. The Guidelines are also available by email or mail.

Contact Alison L. Gill, Editor, *Advances in Environmental Research* at 11072 San Pablo Avenue, Suite 344, El Cerrito, CA 94530 or email: aer@sfo.com or phone/fax: (510) 237-9328 with any questions, comments and/or suggestions.

The New Professor's Handbook A Guide to Teaching and Research in Engineering and Science

Authors Cliff I. Davidson and Susan A. Ambrose
Foreword by Nobel Laureate Herbert A. Simon

For years, new assistant professors in engineering and science have struggled to make the jump from graduate student to faculty member. And a struggle it is, for a new professor is likely to find an overwhelming array of responsibilities. The name of the game is trial and error - frequently leaning on more experienced faculty members for help.

Now, for the first time a single volume has pulled together vital information to make this jump easier. The New Professor's Handbook achieves this by filling two voids. First, the book bridges the gap between teaching theory, on which copious volumes have been written, and practical aspects of college and university teaching in technical courses. Second, the book puts into writing much of the "folklore" about starting a research program as told by experienced professors, information which is normally communicated by word of mouth.

To order make your check payable to Anker Publishing Company, Inc. for $24.95 per copy, with $4.00 extra for shipping and handling on the first book and $1.00 for each additional book ordered. Send your order to Anker Publishing Company, Inc., P.O. Box #249, Bolton, MA 01740-0249. For additional information telephone 508/779-6190 or fax 508/779-6366.

CONFERENCES/CALL FOR PAPERS

2nd Annual SERDP Symposium

Sheraton Premiere at Tysons Corner
Vienna, Virginia

November 20-22, 1996

The 2nd Annual Strategic Environmental Research and Development Program (SERDP) Symposium provides a technology transfer forum for sharing results of research and development projects supported by SERDP. The symposium provides an overview of SERDP activities performed by the three federal partners - the Department of Defense, the Department of Energy, and the Environmental Protection Agency - and their many public and private collaborators. This Symposium includes presentations, abstracts, and poster exhibits highlighting SERDP's many innovative technology developments in cleanup, compliance, conservation, pollution prevention, energy conservation/renewable resources, and global environmental change.

For more information contact: Erin Cannelli, Registrar, LABAT-ANDERSON INC., 8000 Westpark Drive, Suite 400, McLean, VA 22102, 703/506-1400, ext 512, fax 703/506-0946 or e-mail Erin_Cannelli@laib.labat.com

Tailings and Mine Waste '97

Colorado State University
Fort Collins, Colorado

January 13-17, 1997

This event provides a forum for members of the mining community, engineers and scientist serving the mining industry, regulatory groups, and other interests groups concerned with environmental issues related to tailings and mine waste management. Issues of mining, milling, environmental geotechnics, mining engineering, tailings management, geohydrology, geochemistry and other related topics will be covered in focused sessions.

To submit an abstract or for information contact: Linda Hinshaw, Department of Civil Engineering, Colorado State University, Fort Collins, CO 80523, 970/491-6081 or fax 970/491-3584/7727.

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Environmental Fate and Effects of Gasoline Oxygenates

213th American Chemical Society National Meeting

San Francisco, California

13-17 April 1997

(Sponsored by: ACS Division of Environmental Chemistry and Co-sponsored by the Division of Fuel Chemistry)

For more information, links, instructions, and abstract forms see the symposium web page at: http://www.ese.ogi.edu/ese_docs/tratnyek/mtbe.html or contact: Paul G. Tratnyek, Oregon Graduate Institute, P.O. Box 91000, Portland, OR, 97291-1000, 503-690-1023, Fax: 503-690-1273, tratnyek@ese.ogi.edu

The deadline for Short and Extended Abstracts is November 8, 1996.

The 71st Colloid and Surface Science Symposium

University of Delaware/Newark

June 29 - July 2, 1997

AEEP members are invited to submit papers for the sessions on "Environmental Aspects of Colloid and Surface Science." Sessions are also being organized on the following topics:

General Papers
Polymers at Interfaces
Wetting/Surface Tension Effects
Microscopy Techniques
Scattering Methods in Colloid Science
Complex Fluids
Catalysis and Surface Science
Rheology
Biological Molecules at Interfaces
Colloidal Dispersions

A brief abstract is requested by Nov 29, 1996 with paper title and sufficient information for judging the nature of the presentation. For the Environmental Aspects sessions, this may be sent to Steve Dentel (dentel@udel.edu) or Allen Davis (apdavis@eng.umd.edu). After this is accepted, a camera-ready abstract typed on the standard ACS form must be received by January 15, 1997.

Further details on this conference may be found at http://www.che.udel.edu/colloid/

Biofilm CD Project

The American Society for Microbiology's Board of Education and Training announces the culmination of its two year Biofilm CD project. The CD-ROM is a digitized data base demonstrating the diversity of biofilms. Each image is accompanied by a legend describing the biofilm, including what organisms are present, as well as how and where the biofilm was formed. The collection is designed not as pre-packaged software, but rather as a data base of resources that a teacher can utilize to custom tailor their own unique teaching materials. Included on the CD-ROM are sample presentations and instructions for the educator on how to create presentations for the classroom. The Biofilm CD-ROM will be launched at both the Conference on Microbial Biofilms, September 30th-October 4th at Snowbird, Utah and at the NABT meeting, October 16th-October 19th in Charlotte, North Carolina. If interested in more information concerning the Biofilm CD-ROM, please see our web page: http://www.asmusa.org/edusrc/edu3.htm

AEEP Educational Conference Workshop

A new feature of the AAEE/AEEP Conference was the AEEP-Sponsored Teaching Workshop, featuring the Saturday morning presentations of Cynthia Atman, University of Pittsburgh, and Karl Smith, University of Minnesota. The Workshop was an outsanding success with attendance far exceeding expectations and many commenting that teaching workshops should be held more often! In the afternoon breakout sessions were held on a variety of topics. Summaries of most the sessions are reported below.

"How do I teach environmental ethics?" (Aarne Vesilind, Duke University)

In this workshop we really did say that it was impossible to teach environmental ethics. People formulate their own personal evnironmental ethics in individual ways and no amount of rational argument is going to convince otherwise. We did agree that information on the consequences of our actions may affect choices. We also agreed that there was a "canon" on environmental ethics that seems to be evolving and that this is worth reading and discussing.

"Hazardous Waste Engineering/Management" (Edward J. Bouwer, Johns Hopkins University)

The session began with Ed Bouwer discussing the content of his course offered at Johns Hopkins University. The syllabus from a Hazardous Waste Management course taught by Mike Kavanaugh at Stanford University was provided as a second example. Both of these courses are targeting Master's students and tend to emphasize waste site characterization and remediation. The Master's students come into the class with knowledge of chemical, physical, and biological processes, so the material on remedial technologies can be covered with substantial depth. Several other faculty that attended this session are teaching their Hazardous Waste Management classes to advanced undergraduate students. The themes for these courses generally center around waste site characterization and remediation, but the material is more survey in nature because the students have limited backgrounds in environmental engineering process fundamentals.

There was consensus that successful activities for courses on Hazardous Waste Management include field trips and case studies. A few of the faculty include modules on pollution prevention, but the information tends to be a philosophical framework rather than the elements of technical

design. Aspects of radioactive waste management are generally not included in the courses offered by the faculty attending the session with the exception of the graduate program at Clemson University which offers at least one course on this subject.

"How Do I Teach Air Pollution Control?" (Sarina J. Ergas, University of Massachusetts/Amherst)

The group started off discussing available texts for an air pollution control course. A number of newer texts are available, however, some are more geared to chemical engineers than civils. We noted that some of the texts that do a good job with the pollution control systems design don't do as well with explaining air quality management issues, global air issues, atmospheric chemistry, etc.

We looked at course syllabuses from air pollution classes at UMass Amherst, UT Austin, UC Davis, and Univ. Tennessee. Most people teaching an introductory air pollution course wind up packing a lot of diverse material into a one semester course (Davis has a two quarter sequence). Topics might include: structure and origin of the atmosphere, air pollution calculations, sources of air pollutants, atmospheric chemistry, air pollution meteorology, air pollution modeling, control of mobile source emissions, particulate control systems, control of gases and vapors, etc.

We noted that it would be helpful if environmental engineering courses including processes courses, modeling courses and environmental chemistry courses could include air pollution issues. For example, if an environmental chemistry course covered photochemical smog formation, students might get a better understanding of the topic. A environmental quality modeling course might do a better job of introducing students to air pollution models since the basic transport processes would already have been discussed. Lab classes should also include some air issues.

We discussed ways to include more active learning activities and field trips into our classes. UNLV students are asked to measure barometric pressure, temperature, wind speed, relative humidity, and to estimate visibility, and get the local air quality report and make a brief presentation each week to the class. UMass Amherst students take a field trip to the campus steam plant and then do a design project where they design a bag house for the plant. We noted that air pollution courses are quite popular among students, that there is a fair market for people with air quality backgrounds, and that people working in waste water or haz waste areas needs a knowledge of air pollution issues.

"How do I use practitioners in environmental engineering courses?" (Dave James, University of Nevada at Las Vegas)

We had eight participants in the workshop. The following contributions were made by the workshop's participants:

1. Practitioner participation can especially help MS professional practice programs. Invite practitioners to:
   a. Describe how bid proposals are put together, and what makes for a winning bid proposal.
   b. Give feedback on curriculum, so that faculty can teach the right things in existing courses, and so that new, appropriate courses can be developed.
   c. Teach a class, but be sure to give them some training and support first.
2. Time commitment for a faculty member to work with practitioners is very large, and may not be valued in some institutions that emphasize Ph.D. level training and research. New faculty at such institutions should proceed with such interactions only if they can get some indication that this kind of interaction will be positively evaluated.
3. Be careful when interacting with consultants on their projects. Put yourself in the consultant's shoes. If you ask a consultant for information, think about how much effort a consultant went through to get that data. Don't try to ask:
   a. What mistakes did you make?
   b. I'd like the data so that I can do a better job with it than you did. Above all, don't do anything, however inadvertant, to drive a wedge between the consultant and their client.
4. Municipal agency support for "research" projects.
   a. Try to remember that municipal agencies are often not interested in research. They need help solving operational problems. You can help them solve their problems, and call it, for internal use at the university, applied research.
   b. Municipal agency funds can, with the agency's permission, be used as a match for federal grants that require matching funds.
   c. Municipal agency funding will seldom be sufficient in either quantity or duration to support a Ph.D. student. It's better suited to supporting undergraduates and M.S. students.
   d. A student working on municipal projects is a servant of two masters. The municipal agency wants practical answers. The student's thesis committee wants understanding of fundamentals. The student's presentation, reports and thesis should be written with this in mind.

"How do I teach large introductory environmental engineering courses?" (Jim Mihelcic, Michigan Tech)

The breakout session on "How do I Teach Large Introductory Environmental Engineering Courses" was filled to capacity. The session was very informative for us as we learned about each other's approaches, successes, and frustrations. Jim Mihelcic began the session by describing how Michigan Technological University (MTU) handles the large introductory course. MTU requires all civil and environmental engineering undergraduates to take a 2-course sequence (10 weeks per course) in "environmental engineering fundamentals" (CE251) and "environmental engineering" (CE352). CE251 covers fundamental physical, chemical, and biological processes while CE352 applies these fundamentals to solving engineering problems. CE352 also includes a 10-week laboratory. Both classes range in size from 60-150 students and are offered three times per year. The 2-course sequence is taken by environmental engineering majors at the sophomore/junior level while civil engineering majors take it at the junior/senior level. For the past two years these classes have been taught by teams of 3 faculty who typically have expertise in a particular area. Advantages of this system include: 1) extensive surveying indicates the vast majority of students like it, 2) faculty teach within their expertise so "real world" examples are much better, 3) faculty work on developing an excellent set of partial course notes, 4) this has been an excellent way to ease new faculty into teaching, 5) the stress and difficulty of teaching large sections of a required course is spread over a group of faculty. In MTU's case where the class is offered several times a year this advantage of spreading stress is not obtained. Disadvantages include: 1) much less intimacy with the class, 2) students like consistency in exams/assignments so there is extra effort required by faculty to make sure consistency is present, 3) some individuals may not understand how to evaluate a member of a team during promotion decisions, and 4) course evaluations are more confusing to some students because they must evaluate a "team".

After a discussion of MTU's approach we discussed other items which included: 1) the textbooks we use and what we like and did not like about them, 2) the different methods faculty handle grading large numbers of assignments and exams, and, 3) the role of laboratory in these classes and whether it is needed. Because of the broad material covered in this type of course, there was no one satisfactory textbook that everyone was happy with. Several faculty were interested in learning more about Wiley Publishing's ability to create a custom text which is made up of faculty notes and selected chapters from existing Wiley texts. We all agreed that successful use of real world examples is critical when teaching large classes which contain students with a broad range of interest in the course material. In addition, if you are using a laboratory to promote writing skills the large class sections make this difficult. Finally, several participants suggested that the AEEP home page provide a link to the syllabi of different institutions.

"Why Would I Use the Internet in Environmental Engineering Classes?" (Kurt Paterson, Michigan Tech)

Held in one of the University of Maine's computerized classrooms, this session highlighted five examples of Internet-mediated classroom activities

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utilized by several AEEP members. The five examples highlighted one of five strengths identified for Internet-Assisted Learning: (1) information, (2) dissemination, (3) communication, (4) visualization, and (5) computation. These strengths served as foci for understanding why other environmental engineering faculty have implemented Internet-Assisted Learning in a variety of classes.

Example #1 (information) was a Pollutant Information Retrieval Assignment created by Catherine Peters (cap@soil.princeton.edu) of Princeton University. The objective of this assignment is to retrieve via the World Wide Web current EPA information (properties, regulations, emissions) for an assigned chemical pollutant.

Example #2 (dissemination) was Electronic Term Project Reports created by students in a class taught by Kurt Paterson. The objectives of this assignment are preparation of documents with public accountability and peer review via the World Wide Web.

Example #3 (communication) was Student-Directed Learning via an Electronic Discussion Forum by Kurt Paterson. The objectives of this tool are to stimulate thinking prior to lecture and extend the classroom beyond class time.

Example #4 (visualization) was Computer-Assisted Learning of Fundamental Environmental Processes by Nancy Love (nlove@vt.edu) and John Little (jcl@vt.edu) of Virginia Tech. The objective of this tool is to illustrate fundamental environmental processes via a computer multimedia learning module.

Example #5 (computation) was Internet-Based Learning Modules for Environmental Systems Modeling by Catherine Peters, Kurt Paterson, and Joe Mertz of Carnegie Mellon (joemertz+@andrew.cmu.edu). The objective of this project is to enable asynchronous learning of environmental systems modeling via interactive, integrated computer technologies accessible via the Web.

Throughout and following the demonstrations, session participants offered questions, answers, advice, and experiences. From these, a list of benefits and problems was compiled. General benefits of Internet-Assisted Learning methodologies include: forces faculty to consider alternative teaching and learning styles; strengthen sense of classroom community; teamwork, leadership, and learning emerge from student initiative; greener approach, electrons not paper; relatively inexpensive; convenience and efficiency; rapid delivery to many audiences; students and administrators love it. General problems of Internet-Assisted Learning methodologies include: the reward to effort ratio; time needed for development; time needed to keep abreast of rapidly evolving technologies; lack of development tools and staff; excessive printing of resources by students; spiraling expectations of students; pressure on and reaction of "non-Internet" colleagues; copyright and theft; new direction of information flows threatening the traditional roles of the university. Informal conversations on the session topics continued for the remainder of the conference. While there is considerable interest in pursuing Internet-Assisted Learning methodologies by many AEEP faculty, the challenges suggest a collaborative approach would benefit all. Subsequently, discussions of future partnerships continue to this day.

For more information please contact session chair, Kurt Paterson via email (paterson@mtu.edu) or telephone 906-487-3495. Lastly, a downloadable copy (PDF file) of the session handout is available via the AEEP web site (http://bigmac.civil.mtu.edu/aeep.html).

"How Do I Teach Environmental Microbiology?"

(Bruce Rittmann, Northwestern University and Mark Fitch, University of Missouri at Rolla)

The results of a survey of ten courses from research universities across the country. Key findings are:

Most courses have 39-46 lecture hours.

All courses require or recommend Brock et al., Biology of Microorganisms. However, most also require extensive supplementary material to cover the applications and more quantitative aspects of microbiology.

All courses cover basic metabolism, physiology, and taxonomy of procaryotes, eucaryotes, and viruses, as well as public-health microbiology. Optional subjects (in descending order of responses) are energetics and stoichiometry, biogeochemical cycles, microbiology of treatment processes, biodegradation of xenobiotics, kinetics, microbial ecology, organic chemistry, and phylogeny.

Four of nine courses offer no lab. One course offers a separate, but optional laboratory course. Of the remaining four courses, three have 4-5 lab exercises, and the remaining one has nine.

Two issues were extensively discussed by the participants in the breakout group: prerequisites and laboratories. There was a consensus that many students enter the classroom ill-prepared in organic chemistry. Some faculty review of the important aspects of organic chemistry in class, others distribute extensive handouts, and one teaches organic chemistry in a concurrent chemical principles course. Sharing of the handout materials is being investigated. All participants agreed that laboratories are valuable, but a lively discussion ensued on how best to balance the value of laboratories with their intense usage of faculty, student, space, and financial resources. Some participants emphasized the unique value to laboratory learning, while others stressed that most concepts can be learned by reading, lecture, and video.

Finally, the discussion group generally agreed that "engineering" microbiologists should teach these classes, not "pure" microbiologists. The difference between "engineering" and "pure" microbiologists is not their disciplinary background. Instead, the "engineering" microbiologist is strongly interested in and involved with the applications of microbiology to environmental settings.

"How to incorporate case studies into environmental engineering classes." (Susan E. Powers, Clarkson University)

Nineteen people participated in the discussion group on using case studies in environmental engineering classes. Susan Powers began the session with a brief review of the use of case studies in her Hazardous Waste Management class. She identified ABET, Clarkson University, and good pedagogy as incentives for incorporating open-ended problems into classes. Three examples were briefly presented ranging from in-class discussions to semester projects. Critical in any of these examples were the need to: provide an appropriate amount of information to the students so the solution requires critical thought but can be accomplished in the required time frame; and, guide the student through the evaluation or design process so they learn the critical steps required.

The ensuing discussion focused primarily on the accessibility of appropriate case studies which can be used in the class room. Most participants identified alumni and colleagues working for consulting firms or municipalities as their sources of suitable projects. While these sources provide many opportunities, there were also several difficulties in utilizing these case studies discussed, including: questions of confidentiality time constraints of both the faculty and practitioner in preparing the materials and interacting with students. Professional societies were also identified as sources of suitable case studies. Examples of the real-world problems developed as annual student design competitions by the Waste-management Education and Research Consortium (WERC) and the Florida Member Association of the Water Environment Federation were discussed as suitable case studies for design classes. A lively discussion followed the suggestion that we include "mistakes" as well as successes in the case studies presented to students. A consensus was reached when "mistakes" were defined as engineering decisions that we would not make based on our present state of knowledge, but might have been thought appropriate in the past. In this case, it would be advantageous to teach students the evolutionary nature of the design process and the associated need to always strive to learn new approaches.

The final brainstorming discussion - which continued into the general discussion at the end of the day - focused on the organization of some sort of a document or data base with case studies suitable for use by other educators. In terms of distributing case studies that have already been used in classes, the most reasonable solution would employ the AEEP WWW homepage as a clearing house and link to information provided by AEEP members. It was also identified that AAEE could help in identifying and organizing information on 1-2 projects annually that would be appropriate for incorporation into environmental engineering classes.

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