AEEP Newsletter

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FROM THE PRESIDENT'S DESK

MORE MONEY - SO WHAT?

There are not enough environmental engineers to get the job done. Some who call themselves environmental engineers don't understand what the job is all about. This is our fault, our responsibility, our failure. We claim to be environmental engineering educators. We claim to be able to teach people how to solve pollution control and other environmental problems. We claim to be able to educate enough environmental engineers to meet the national needs. We have not done this and there is not any indication that we will do it in the future.

Why?

Because the federal government won't give us enough money? Because the institutional arrangements are unworkable? Because students don't perceive the opportunities which exist? Because socioeconomic factors are against us? Because of stupidity and incompetence?

AEEP (along with some other organizations) has been working hard for the past four years to maintain federal support for graduate training in environmental engineering. Federal support is very important for many of our graduate programs, and the effort has been at least worthwhile if not essential. One result of this effort is that we now have a much better idea of what the manpower needs are and of how many graduate students there are in environmental engineering programs around the country. A second result is that we have concentrated so much on the reductions in federal support as a major problem that we haven't been looking at our other problems.

In May of this year, when Bruce Hanes testified before the House Appropriations Committee, Representative Talcott asked some very penetrating questions about our environmental engineering graduate programs. He finally came out with the suggestion that the reason for the shortage of well educated environmental engineers is that we haven't been doing our job. On the face of it, he is correct; if we were doing our job the country would have an adequate supply of well educated environmental engineers.

At this time, it appears that Congress has appropriated the money to keep the training grants program going and that the phase out has been postponed for another year if not reversed. Undoubtedly we will continue our efforts to keep the training grants program going and there is reason to hope for even greater success in future years.

Now we have some more money and some more time; so what? If Congress were to give, via the EPA, a million dollars to each of the hundred-odd graduate programs in environmental engineering in this country would that solve the problem? Would we then be able to graduate 5000 water pollution control engineers and 2000 air pollution control engineers and 200 solid waste managers and whatever numbers of other environmental specialists which are needed each year? If we did, would our graduates be able to solve the environmental problems which have been identified by the various national environmental programs? I think not; I think that something else is missing!

I don't know the entire answer to what else we need. Clearly, getting more students and better qualified students into environmental engineering is part of the answer. Most students have, at most, only a vague idea of what environmental engineering is and what an environmental engineer does. We do need to get more information about our field out to undergraduate students and to high school students so that they will realize that there are opportunities in environmental engineering. AEEP has started on this in a small way by publishing and making available the brochure on "So You Want to be an Environmental Engineer." But a much more aggressive campaign is needed.

Part of the problem is low salaries in state and local governments. Many positions which should be filled by environmental engineers are filled by chemists or biologists or liberal arts majors because they don't pay enough to attract an engineer even if the engineers were available. Some of the large municipal agencies pay very well and can attract well educated and capable environmental engineers but they are the exception. Certainly, we are not going to solve the financial problems of states and municipalities but we could do considerably more in terms of helping to define the professional qualifications for many positions.

Part of the problem may be in what we teach. Some mechanical engineering, chemical engineering, and civil engineering professors believe that they can teach students how to solve environmental problems just as well or better than environmental engineering professors. I know that many (perhaps the majority of) members of AEEP identify first with one of the traditional branches of engineering and only secon-

darily with environmental engineering as a field of application. I don't really want to argue with the question of the separate identity of environmental engineering. I do want to raise the issue of whether we teach our students some distinct competence. Is there anything which makes them more capable of solving environmental problems than other engineers? If we knew what the distinct competence of an environmental engineer is, we could do a better job of motivating well qualified students to become environmental engineers.

After admitting that I don't know the entire answer, I have rambled on about partial answers long enough. The point is our acceptance of the responsibility to provide the national needs for environmental engineers in terms of both numbers and capabilities. Federal funding is helpful but we never will get as much money as we want and even if we did we still wouldn't get the job done with our present efforts. Congress is beginning to ask questions about our meeting our responsibilities. We need to come up with some answers, soon.

Wesley O. Pipes
Drexel University

MARK YOUR CALENDAR

AEEP Activities at Miami (WPCF Conference) Miami

Sunday, October 5, 1975

Noon - 6:00 P.M. — Board of Directors Meeting Conference Room G, Fountainbleau Hotel

Tuesday, October 7, 1975

8:00 P.M. - 10:00 P.M. — Open Meeting, Everglades A, Fountainbleau Hotel

AEEP WORKSHOP ON STATISTICS IN ENVIRONMENTAL ENGINEERING

Dates: December 15-19, 1975
Location: Miami to Nassau Cruise
Registration: $30 for AEEP Members; $50 for Non-members
Room and Board: $175 per person for 4 nights and 14 meals on board ship
Reservations: Contact: Thomas M. Keinath - Clemson University

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Mac Berthouex and Bill Hunter have put together an excellent program. The first day is on statistical methods, the second day on statistical models, and the third day on specific applications of statistics in environmental engineering. More information will be forthcoming on the program and on arrangements for reservations.

Wesley O. Pipes

AEEP MEMBERSHIP MEETING AT MIAMI

The annual membership meeting will be held on October 7, 1975, at the Hotel Fontainebleau, Miami Beach, Florida, at 8:00 p.m. Check the final WPCF Program for the room location. The business meeting will include nomination of candidates for the Board of Directors for the 1976-78 term. The Engineering Science Award for the outstanding Ph.D. dissertation in environmental engineering for 1974-75 will be presented. The program will feature a talk by

Dr. J. J. Riesa
Coordinator of Environmental Monitoring Programs
Council on Environmental Quality
Executive Office of the President
Washington, D.C.

on "The CEQ's Environmental Monitoring Programs"

Wesley O. Pipes

ANNUAL ENGINEERING SCIENCE AWARD

The Awards Committee, Chaired by David Jenkins has received the nominations for the outstanding Ph.D. dissertation in environmental engineering for academic year 1974-75. Consideration of the nominations is currently in progress. The Award will be presented at the Annual AEEP Membership Meeting by a representative of Engineering Science, Inc.

Wesley O. Pipes.

CONGRESS COUNTERS EPA TRAINING GRANT PHASE-OUT DECISION

In the face of an announced EPA policy to phase out support of graduate level training grants in environmental engineering at the close of the 1975-76 academic year, a joint Senate-House Conference Committee has recommended continued funding of the program. Although no new funds were requested by EPA, the Conference Committee has agreed to a 2.0 million dollar level of support for the program as part of the current EPA appropriation bill. Action on this bill by the full House and Senate is expected shortly after Congress reconvenes in September.

An EPA source recently indicated that $400,000 of the newly appropriated money is being ear-marked for a manpower needs study and will not be directly used for support of graduate environmental engineering programs.

Many AEEP members have been active in support of continued training grant funding. Of particular significance has been the efforts of Professor N. Bruce Hanes who offered testimony on behalf of AEEP before both the House and Senate Appropriations Subcommittees which held hearings on the EPA appropriations bill.

Paul King

Quotation from:

Interim Staff Report
of the
Subcommittee on Investigations and Review
Committee on Public Works and Transportation
U.S. House of Representatives
on the
Federal Water Pollution Control Act
Amendments of 1972 (Public Law 92-500)

It has been difficult for personnel in the Environmental Protection Agency and the states to cope with the massive new requirements. EPA has not had enough trained people to handle the workload placed on it by the passage of PL 92-500. The states, too, have been short an estimated 3,400 positions in their water pollution agencies.

In spite of their very substantial personnel problems, the states are being encouraged to assume additional duties. By early 1975 more than half of the states were responsible for reviewing plans and specifications for waste treatment facilities. About a third of them were managing the permit program mandated under the National Pollution Discharge Elimination System. Needless to say, there are very troubling questions as to how well this work is being done.

Wesley O. Pipes
Drexel University

ACTIVITIES OF THE INTERNATIONAL ASSOCIATION ON WATER POLLUTION RESEARCH

The Eighth Biennial Conference of the International Association on Water Pollution Research will be held in Sydney, Australia on October 17-22, 1976. As announced in previous issues of the *Newsletter,* the deadline for submission of manuscripts (to Dr. S. H. Jenkins, IAWPR, Headington Hill Hall, Oxford, OX3 OBW, England) for consideration for the program is September 15, 1975. Papers for the program are to be selected on the basis of recommendations from international review panels comprised of experts on various topics to be included in the program.

The first issue of the new IAWPR Journal, *Progresses in Water Technology,* has recently appeared. This Journal will serve as a means of publishing proceedings of IAWPR Biennial Conferences and IAWPR Specialized Conferences. For example, the next two issues will contain Proceedings of the September, 1974 Biennial Conference held in Paris. The other IAWPR Journal, *Water Research,* will continue as in the past.John F. Andrews (University of Houston) is the American editor of *Water Research* and the person to whom manuscripts should be submitted. Dr. Andrews also serves as Chairman of the Membership Committee in the United States, and information on IAWPR membership can be obtained from him.

Recent Specialized Conferences from which papers are to be published in future issues of *Progresses in Water Technology* include the conferences on: "Effluent Variability from Wastewater Treatment Processes and its Control" (Tulane, December 1974), "Industrial Wastewater and Wastes" (Stockholm, February 1975), "Marine Municipal and Industrial Wastewater Disposal" (Sorrento, June 1975), "Nitrogen as a Water Pollutant" (Copenhagen, August 1975), and "Design-Operation Interaction at Large Treatment Plants" (Vienna, September 1975). Probable future IAWPR Specialized Conferences include those in South Africa in 1977 on "Advanced Treatment and Reclamation" and in Germany in 1977 on "River Basin Management."

Member countries of IAWPR are represented by national committees. The U. S. A. National Committee (USANC) is comprised of delegates from five professional organizations: AEEP, ACS, AICHE, and WPCF. AEEP's delegates are David Jenkins and Richard I. Dick, and Fred G. Pohland and John F. Andrews serve as alternates. Current USANC officers are Richard I. Dick (AEEP), Chairman; David G. Stephan (AIChE), Vice-Chairman; and Richard S. Engelbrecht (WPCF), Secretary-Treasurer. Recent USANC activities include the evaluation of IAWPR-USANC relations and responsibilities. One anticipated product of this activity is an IAWPR Newsletter to keep IAWPR members appraised of activities. USANC has submitted a proposal to the Environmental Protection Agency for support of American participation in the 1976 Biennial Conference in Sydney, and group travel arrangements are being organized.

Richard I. Dick

THE AEEP FORUM
(If Playboy can, so can we.)

The President's message in the April issue of the Newsletter contained an appeal for comment on undergraduate environmental engineering programs. The appeal was intended to solicit open debate for the AEEP Open Meeting at the Purdue Industrial Waste Conference. The debate did not get started at the Open Meeting; however, the President received a few letters on the subject of undergraduate environmental engineering. Excerpts from a few of the letters are printed in this section in hopes of stimulating more discussion.

Daniel A. Okun
The University of North Carolina at Chapel Hill

"The piece that you prepared in the April 1975 issue of the AEEP Newsletter was exceedingly thought provoking, and I believe represents the views of a great many of us who are concerned with the introduction of undergraduate environmental engineering. You can count me amongst those who are opposed to this, as being a backward step for the engineering profession generally and for environmental engineers particularly."

David W. Hendricks
Colorado State University

"I do have strong feelings on the topic of undergraduate training in environmental engineering. I am opposed to this primarily because of my philosophical views on the meaning of various degrees. I feel that at any degree level a person should be 'educated' (vis a vis 'trained'). I feel that pursuit of a specialty at the undergraduate level, while feasible from a training standpoint, would not result in an educated person and that this would not be in the best interests of either the student or the profession.

I feel that we need to turn out at the B.S. level persons who are educated broadly in the context of the basic profession such as civil engineering or chemical engineering, etc. Specialization at too early a stage would result in a narrow type of graduate. By specializing too early the student would be trained as a technician; he would not be educated to become a professional.

I believe it would be unfortunate also to attempt to make a person at the undergraduate level operational in design of treatment plants. This requires the background and depth of an

M.S. level program - and at this level the studies (even if partially training) can be an educational experience.

I believe that AEEP should attempt to understand and cultivate this philosophical difference in its approach to university programs. It is a subtle point and largely a matter of attitude. But it becomes very important that we all keep our bearings when the federal grant programs push the idea of 'trained manpower'."

Donald B. Aulenbach and Colleagues
Rensselaer Polytechnic Institute
(This was in response to the *National Policy Issues* publication)

"It is in your third paragraph where I would like to take greatest issue with you. You state that "the appropriate approach would be first a broad education in the fundamentals of environmental engineering, then a specialized education in sanitary engineering . . .' Again, you hang on tenaciously to the concept that the sanitary engineering master's degree is the only or the most desirable degree acceptable. We here at RPI believe that this is only a portion, although a large part of the entire environmental engineering concept. There is certainly room for both an undergraduate and a graduate program in environmental engineering including all of the concepts of water, air, and land, and both the functional (processs) and the structural design of treatment systems. We have no objections to anyone putting a major emphasis in any one of the three phases or in either functional (process) or structural design. However, the impression we get from your paper is that yours is the only route to take."

Comment from the President

I find myself in a strange position. I favor the development of undergraduate environmental engineering programs and worked hard to get one started at Northwestern University. However, it is also clear to me that the M.S. program in sanitary engineering developed and proved its great value over a period of fifty years. I don't think that we should abandon all of that accumulated value in response to the series of chaotic events which have occurred over the past seven years and for practical reasons we have to keep our graduate programs open to students with undergraduate degrees in other engineering and scientific disciplines.

It seems to me that the appropriate response in terms of academic organization is 1) to develop undergraduate environmental engineering programs which will do a much better job of preparing students for the M.S. programs in sanitary engineering, air pollution control, etc., than has been done previously, 2) to use the undergraduate programs also to prepare the students for useful employment (although they won't have all the engineering courses they need to handle technical design work) such as making environmental assessments and writing impact statements, and 3) to maintain the M.S. programs in specialized areas of environmental engineering as an entry point for people with other educational backgrounds retaining the traditional remedial courses in biology and chemistry for engineers and in engineering sciences for the biologists and chemists. This clearly is a compromise and I would be delighted to find a better solution for our current dilema.

I hope that AEEP can find an effective mechanism by which we can exchange our experiences, judgements, and opinions on these crucial educational issues.

Wesley O. Pipes
Drexel University

NEW OATH

"I am simply going to do my plain, unpretending duty when I cannot get out of it; I shall work diligently and honestly and faithfully at all times and all occasions, when privation and want shall compel me to do it; in writing, I shall always confine myself strictly to the truth, except when it is attended with inconvenience."

The AEEP Board of Directors have never had to swear an oath upon assuming their positions. However, we have now become a teenage organization and such a formality may be appropriate. The above quotation from Mark Twain's first editorial has been suggested as an appropriate oath for new Board Members to swear to. Other suggestions as to the wording of an oath will be accepted by Board Members pending determination of what purpose any oath might serve.

Wesley O. Pipes
Drexel University

AEEP MEMBERSHIP - NOW OVER 200

In July of 1975, the membership category of AEEP exceeded 200. Steady growth is continuing with an August total of 203. The affiliate category of membership (for non-U.S. University and U.S. government and industry types) is now 22. There are also 3 emeritus members.

AEEP OPERATING BUDGET

The AEEP operating budget per year is approximately $7,000.00. These monies are obtained primarily from dues payments and does not include the sale of publications. The publications are priced so that zero profit-loss is realized in the long run.

At the next Board of Directors meeting in Miami, it is proposed to increase the dues for affiliate members from $5.00/year to $15.00/year. The reason is to cover costs associated with the benefits of being an affiliate member.

Please comment on this to Marty Wanielista. In addition, if you have other comments on the dues structure, please call Marty. Now a full professor pays $50.00/year, associates and assistants pay $25.00/year. There is no initiation fee.

Martin P. Wanielista
Secretary-Treasurer
Florida Tech. University

AEEP PUBLISHES TWO NEW PUBLICATIONS

The following two publications are currently available from AEEP.

1. "An Evaluation of Environmental Engineering Education" by E. J. Middlebrooks.
2. "So You Want To Be An Environmental Engineer"

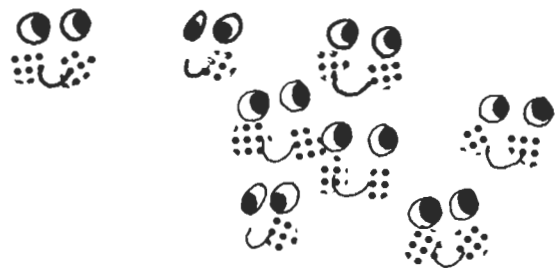
For further information on cost and ordering procedure, contact:

Dr. E. J. Middlebrooks
Dean, College of Engineering
Utah State University
Logan, Utah 84322
(801-752-4100 Ext. 7801)

AQUATIC MICROBIOLOGY MANUAL

The Association of Environmental Engineering Professors (AEEP) has awarded a grant to Professor Robert C. Cooper, Environmental Health Sciences, School of Public Health; Professor David Jenkins, Director of the Sanitary Engineering Research Laboratory; and Professor Lily K. Young, Environmental Engineering Department, Stanford University to write a laboratory manual on aquatic microbiology. The authors working at SERL will prepare a first draft of this manual for use in the classroom situation by AEEP members during the 1975-76 academic year. Following this use and further developmental work on experiments in the 1975-76 academic year, a final draft of the manual will be prepared. The AEEP received support for this effort from the U.S. Environmental Protection Agency, Office of Water Programs, Academic Training Branch. A previous grant from EPA to AEEP resulted in the production of a highly successful "Water Chemistry Laboratory Manual" which is currently widely used in the teaching of Aquatic Chemistry in this country.

MEMBERS IN THE NEWS



Millard W. Hall Named Executive Secretary of UCOWR

Dr. Millard W. Hall, director of the University of Maine at Orono's Environmental Studies Center, has been elected executive secretary of the Universities Council on Water Resources, a voluntary organization of universities engaged in education, research and public service related to water resources.

The announcement was made by Dr. Howard R. Neville, UMO president, and Prof. William R. Walker of Virginia Polytechnic Institute and chairman of the UCOWR board of directors.

The council was organized in 1964 to extend and strengthen programs related to water resources through united action of its members. Any academic institution in the United States with an established program in water resources education and research is eligible for membership and is entitled to two voting delegates. At present there are 79 member universities, representing the majority of the states, and eight foreign affiliates.

UCOWR standing education and research committees deal with such aspects as water resources engineering, land and water relationships, social sciences, hydrology, water quality, ecology, information transfer, and research administration.

UCOWR also supports or has co-sponsored international, national and regional professional meetings, including the International Symposium on Hydrology, the Water for Peace Conference, and the International Symposium on Cost of Water Pollution Control. A visiting scientist program has been operating for several years during which approximately 120 scientists have visited more than 150 colleges and universities.

Hall, an associate professor in civil engineering, has been a member of the UMO faculty for the past eight years, serving as director of the Environmental Studies Center since 1972.

Roger M. Jorden Resigns From the University of Colorado

Dr. Roger M. Jorden, Associate Professor of Environmental Engineering at the University of Colorado, has resigned his academic post to form a corporation "Water Purification Technology" specializing in the area of physical-chemical wastewater treatment systems. The AEEP wishes Dr. Jorden a full success in his new endeavors.

AEEP PUBLICATIONS

The publications listed below are available from AEEP. Prepayment must accompany all orders; therefore, please forward a check or money order made payable to AEEP to:
Ms. Susan Heussner, AEEP
8.612 Cockrell Hall
The University of Texas
Austin, Texas 78712
NOTE: The Order Form below must be completed and returned with your order. If your are a bookstore, please include a Certificate of Resale with your order. If you are a governmental agency or a library, please include an Exemption Certificate with your order.

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Water Chemistry Laboratory Manual ..... $ 3.00
Register of Environmental Engineering Graduate Programs* ..... $ 3.00
Environmental Impact and Linkages, Workshop $20.00
Mathematical Modeling in Environmental Engineering, Workshop $21.00
Interdisciplinary Education Programmes for Environmental Engineers, Workshop $10.00
Fundamentals of Chromatography, Workshop (limited supply) $10.00
Trends and Professional Manpower Production Capabilities in USA Educational Institutions (limited supply) ..... $ 3.00

*Due to the high cost of printing the Register, we are requesting $3.00 to cover the expenses incurred in the publication of this material.

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AEEP/ENGINEERING SCIENCE AWARD

The 1974 AEEP Engineering Science Award was given to Douglas T. Merril for his doctoral thesis on "High Rate Treatment of Raw Domestic Sewage by Lime Precipitation And Dissolved Air Flotation". The research was conducted at the University of Colorado, Boulder, under the direction of Professor Roger M. Jorden.

Drs. Douglas and Jorden each received a cash award of $500 from AEEP. The award was given at the AEEP general meeting held at the WPCF Conference in Denver.

THE TYLER AWARD
PEPPERDINE UNIVERSITY
Malibu, California

The John and Alice Tyler Ecology Fund

The following provisions govern THE JOHN AND ALICE TYLER ECOLOGY AWARD:

1. *The Fund will make an annual award of One Hundred Fifty Thousand Dollars ($150,000) to the individual or a team of individuals working on a common project who has conferred the greatest benefit on mankind in the field of Ecology and improvement of the Environment. This is the sole criterion for the Award.*
2. The Award will be presented by PEPPERDINE UNIVERSITY on the recommendation of the Selection Committee of the Fund. The Award will be announced each April in Los Angeles.
3. Nominations for the Award must be (1) made in writing in the English language, (2) addressed to the Executive Director of the Fund and (3) postmarked on or before December 1.
4. Nominations for the Award may be made by any individual in the world relating either to himself or another individual. Each nomination must be accompanied by a full and complete description of the achievement for which the Award is sought and a statement of the means for authenticating the achievement. Exhibits should be of reasonable size and weight, and preferably in soft covers. Exhibits must include biographies and photographs of nominees. All submitted materials will become property of the Tyler Award, unless previous arrangements have been made as to their disposition.
5. The Award will be presented on April 8, 1976. The recipient (or his or her designated representative if the recipient is unable to attend) shall be required to travel to Pepperdine University to receive the Award which will be presented at an appropriate ceremony.
6. The selection jury may reconsider nominees submitted during previous years. Therefore updated materials and further endorsements may be added to the nominee's file by forwarding same to the Executive Director of the Tyler Award.
7. The Award recipients shall be expected to make a presentation suitable for lecture and/or publication at an annual symposium to be held in conjunction with the Tyler Award and Pepperdine University.

EPA RECOGNIZES ITS R&D OFFICE

EPA Administrator Russell E. Train recently announced that the agency's Office of Research and Development (OR&D) would undergo a major reorganization. Train said that "the

reorganization will allow a significantly larger portion of OR&D's personnel to be devoted to scientific and technical activities."

OR&D's four new program offices will be the Office of Monitoring and Technical Support; the Office of Energy, Minerals, and Industry; the Office of Air, Land, and Water Use; and the Office of Health and Ecological Effects. A deputy assistant adminstrator will be responsible for each of the offices and will supervise OR&D program planning and management. The 15 OR&D laboratories will implement programs and will be assisted by 11 field stations.

Formerly, there were 24 labs in the field that were administered by the four National Environmental Research Centers (NERCs). Two of the NERCs, in Cincinnati, Ohio, and in Research Triangle Park, N.C., will become laboratories; there will be four laboratories at each location to correspond to each of the new OR&D program areas. The NERC at Las Vegas, Nev., will become a laboratory supporting the Office of Monitoring and Technical Support, and the one at Corvallis, Ore., will be converted to a laboratory supporting the Office of Health and Ecological Effects.

Wilson K. Talley, assistant administrator for R&D at EPA, said, "This new organizational structure streamlines and simplifies both program planning and program implementation."

He added, "One of the key benefits of this realignment of OR&D is the shifting of more detailed program management activities to the field and the resultant freeing of headquarters staff to improve coordination both within EPA and with groups external to the agency."

Talley also said that the new organization should be fully operating by the beginning of the new fiscal year.

ACADEMIC MARKETPLACE

Positions Available

University of Washington

Research Assistant Professor is available in aquatic biology with special interests and training in microbial metabolism, but with research and teaching experience in the effects of eutrophication and various types of waste water on the principal groups of the microbiota of natural water systems utilizing an accomplished expertise with a variety of microbiological and chemical techniques. Position requires research experience and leadership in microbial metabolic segments of lake nutrient cycle studies, including biomass and rate process determinations of the heterotrophic components with application of autoradiographic techniques, eutrophication and other waste water problems as well as experience in teaching those topics. Experience is also required with the engineering approach and associated methods of dealing with waste water problems. The position should be filled by September 1975. Send curriculum vitae and three references to V. B. Hammer, Dept. of Civil Engr. FX 10, University of Washington, Seattle, WA 98195 by July 15, 1975. Equal Opportunity/Affirmative Action Employer.

University of Nebraska - Lincoln

The Water Resources Research Institute, University of Nebraska at Lincoln, is currently receiving applications for a position of Research Associate. The person selected for this position will: (1) evaluate selected artificial recharge activities to obtain support data for recharge projects in Nebraska; (2) design artificial recharge systems, to include data acquisition systems, using wells and canals; (3) order necessary equipment and supplies for construction of systems; (4) supervise and assist in the construction of artificial recharge systems and in the installation of monitoring equipment; and (5) collect and analyze appropriate data and prepare reports. Person selected will be responsible for a research project on artificial recharge of groundwater through wells and canals in two areas of Nebraska. This is a two-year specific term appointment. Advanced degree in Agricultural or Civil Engineering as well as work experience in hydraulics and hydrology desired. Candidate must have academic and professional training in the fields of hydrology and water resources systems. Special competence and interest in groundwater systems is a requisite. Salary commensurate with qualifications but nationally competitive. University retirement, group life and health insurance plans available; sick leave and vacation. Send resume to: Dr. Millard W. Hall, Director, Water Resources Research Institute, 310 Ag. Hall, University of Nebraska, Lincoln, Nebraska 68503. The University of Nebraska is an Equal Opportunity Employer. Applicants will be considered without regard to color, race, age, religion, sex or national origin.

GRADUATE RESEARCH ASSISTANTSHIPS AVAILABLE

University of Rhode Island

The Department of Civil and Environmental Engineering at the University of Rhode Island has several openings for graduate research assistantships in the area of water pollution control engineering, each carrying a stipend of $2,900/9 months plus a supplement to offset the cost of tuition. There is also opportunity for summer employment with a stipend of $1,800/3 months. Job assignment is to assist project investigators to do research. Credits are given for such research work towards his or her Master or Ph.D. degree in Environmental Engineering. Those who are interested in applying should contact:

Chairman
Department of Civil and Environmental Engineering
University of Rhode Island
Kingston, Rhode Island 02881
Tel: 401-792-2692

THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY'S PROFESSIONAL TRAINING PROGRAM IN WATER POLLUTION CONTROL

A statement presented on behalf of the ASSOCIATION OF ENVIRONMENTAL ENGINEERING PROFESSORS to the SUBCOMMITTEE FOR HUD - INDEPENDENT AGENCIES OF THE COMMITTEE ON APPROPRIATIONS OF THE HOUSE OF REPRESENTATIVES on May 15, 1975.

Introduction

The purpose of this testimony is not to find fault with the past actions of the Federal Government, State Governments, private industry, the professional community or the general public. The purpose of this testimony is to make a positive recommendation with respect to Federal Support of Professional Manpower Training for Water Pollution Control under Section 104 (g) 3 (A) and (B) of Public Law 92-500. Without such continuing support now, it can be predicted that the war on water pollution control

will be prolonged and most probably lost.

I am N. Bruce Hanes, Professor and Chairman of the Department of Civil Engineering at Tufts University located in Medford, Massachusetts. I have worked as a professional concerned with Water Pollution problems for the past two decades. Since 1962 I served as Director of the Tufts University Graduate Program of Environmental Health Engineering. It is important to note that the Professional Training Grant Program made it possible for Tufts University to develop a graduate training program which included expanding its staff capabilities in this area from one to four full time professors as well as a sizable commitment in funds for facilities, equipment and operating supplies. The continuation of the operation of this program at its current level is dependent on support of graduate students by the Professional Training Grant Program. The case of Tufts University is not unique. I am appearing here today on behalf of the Association of Environmental Engineering Professors.

Summary

The Federal Water Pollution Control Act (P.L. 92-500) charters a ten year program whose goal is to restore and maintain the biological integrity and chemical balance of our natural water systems. Unless professional manpower capable of achieving this goal continue to be trained at a rate of at least that in fiscal years 1971 and 1972 there is a high probability that:

1. The goals of the 1972 Amendment to the Water Pollution Control Act will *not* be met;
2. There will be *inadequate* professional manpower available to meet the needs of federal, state and regional agencies and of the private sector;
3. Innovative research and development necessary to achieve least cost, technically effective pollution control objectives will be *curtailed.*

It must also be recognized that environmental engineers and scientists who solve the water pollution and drinking water problems *represent the public segment of society and their efforts are directed to the protection rather than the utilization of resources.* Hence public agencies have the responsibility of assuming a primary role in the education of these men and women. In spite of this responsibility and the current need for more professionally trained personnel, Federal support of the Water Pollution Control Training Program is now being phased out and will be terminated June 30, 1976. It is therefore respectively requested that Federal support for the United States Environmental Protection Agency's *Professional Training Program in Water Pollution Control* under Section 104(g) (3) (A) and (B) of Public Law 92-500 be increased from $1,200,000 to $4,700,000 in fiscal year 1976. It is further requested that the program be continued at this level, or preferably at an expanded level of funding, in the future rather than being terminated as of fiscal year 1977.

History

The Professional Training Program in water pollution control was initiated by an appropriation of $700,000 in fiscal year 1962. Table I shows the funds appropriated, number of awards made and the trainees supported throughout the history of the training grant program.

It became apparent early in 1966 that the professional manpower force to wage the war on water pollution was inadequate and that Federal support of the training program must be increased. This point of view was expressed to Congress with positive results.

Exhibit 1, a communication from Senator Edward M. Kennedy, is an example of one such positive result. The manpower problem in 1966 is summarized in an article entitled "Manpower to Fight the War on Water Pollution" which appeared in the August 1967 issue of Water and Sewage Works (Exhibit 2). The Federal Government responded positively and a sustained period of increased federal support existed between the fiscal years of 1966 and 1972. (Table I). In fiscal year 1973, the support level for the Water Pollution Control Training Grant program decreased significantly, reflecting the decision by the Federal Government to phase out its support of this program. This decrease would have been even greater in fiscal year 1973, if Congress had not restored $3,000,000 to the entire training grant effort, including Air Pollution Control, of the United States Environmental Protection Agency.

The impact of the reduction of funding has been both immediate and dramatic on the total number of students being trained as well as new students starting programs in Water Pollution Control. Table II presents the results of surveys conducted by the Association of Environmental Engineering Professors, which includes over ninety-five percent of the schools with graduate programs in sanitary engineering.

The full implementation of Public Law 92-500 and the Safe Drinking Water Act of 1974 will not be possible if the current decline in the number of students being trained each year continues.

TABLE I

FISCAL YEAR	APPROPRIATION DOLLARS	AWARDS	TRAINEES SUPPORTED
1962	$ 700,000	23	—
1963	1,100,000	35	83
1964	2,000,000	54	177
1965	2,000,000	57	291
1966	2,500,000	65	364
1967	2,910,000	71	391
1968	3,365,000	84	509
1969	3,300,000	79	633
1970	3,800,000	88	792
1971	4,565,000	91	944
1972	4,650,000 (1)	103	1243
1973	2,800,000+1,800,000	87	1296
1974	2,770,000	73	845
1975	2,105,000 (3)	52	616
1976	1,200,000 (2) (4)	33 (2)	372 (2)
1977	None (2)	None (2)	None (2)

(1) $1,800,000 of 1972 fiscal year funds supplied in early fiscal year 1973
(2) Projected
(3) 29 Fellowship Awards Funded from total training appropriation
(4) 53 Fellowship Awards funded from total training appropriation.

TABLE II
GRADUATE STUDENT ENROLLMENT SURVEY
(105 Programs in 101 schools)
ENGINEERS TRAINING IN WATER POLLUTION CONTROL

YEAR	TOTAL GRADUATE STUDENTS	NEW M.S. STUDENTS
1971-72	2406	1271
1972-73	2424	1203
1973-74	2211	1108
1974-75	1635	722

The United States Water Pollution Control Effort Today

A publication entitled "National Policy Issues-Water Pollution Control" was published in August 1974 by the Association of Environmental Engineering Professors. This document is made up of six papers which address the following policy issues:

1. National Water Quality Goals and Objectives;
2. Research and Water Pollution Control;
3. Educational Needs and Training Support Water Pollution Control ;
4. Manpower Needs in Water Supply and Pollution Control;
5. Administration and Implementation of Pollution Control Policy;
6. Financing of Waste Water Facilities.

This document is entered as Exhibit 3. Briefly this publication defines what needs to be done and what resources will be required to meet these needs. It documents the current shortage of manpower with professional training as well as documenting the fact that the numbers of students with adequate professional trainees graduating each year is less than half the number of positions becoming available. If this trend is allowed to continue, the design of wastewater treatment facilities will be performed, in some cases, by engineers without adequate education. This will result in over-design and greatly increased costs for wastewater treatment facilities which may not provide an adequate level of performances. Furthermore, the properly designed increasingly complex Waste Water Treatment Plants required to comply with Public Law 92-500 will have to be operated by professionally trained engineers and scientists if they are to achieve the new effluent standards. In addition, engineers, planners and scientists are required to work on the development of water quality and effluent standards, the NPDES permit program as well as monitoring and enforcement. It is already apparent that the lack of an adequate number of well educated professionals in water pollution control has resulted in difficulty defining realistic standards, meeting deadlines and obtaining compliance. If the enrollment trends shown in Table II are permitted to continue current conditions will deteriorate further.

Evaluation of the Effectiveness of the Professional Training Programs in Water Pollution Control

A document entitled "An Evaluation of Environmental Engineering Education" is entered as Exhibit 4. This document, dated February 1975, was prepared for the Register Committee of the Association of Environmental Engineering Professors and American Academy of Environmental Engineers. It is noted in this document that for fiscal year 1976 the proposed level of support for this program is less in a real value than that available in 1963. The report questioned the advisability of reducing an effective program just before the largest demand will occur for manpower. The report noted that the Professional Training Grant program has matured and reached an efficiency level that has reduced the mean costs to the EPA per total student enrollment from $8,600 in 1968 to less than $2,000 in 1973. The improved cost benefit ratio of this program for Federal dollars invested is a result of better management as well as the assumption of a large portion of its cost by the Universities, States and the private sector of our society. For example, in the case of Tufts University, the contribution to the Professional Training Program by the University increased by 100.2% during the period between the 1968-69 and the 1975-76 academic years while the corresponding increase by the Training Grant Program was 6.2%. The large increase of the Universities contribution was possible *only* because the professional training grant support of students provided larger student numbers which justified an expansion of both staff and facilities by Tufts University. Conversely, if student numbers decrease, as they surely would with the elimination of the EPA Professional Training Grant Program, the University contribution would decrease until the critical number of students is reached. At that time the University would be forced to abandon its graduate program in water pollution control because it is no longer cost effective. The case of Tufts University is *not* unique but rather typical of the 100 or so schools, both private and state, that have received support from the EPA Professional Training Program in Water Pollution Control. I wish to emphasize again, that Public Law 92-500 and the Safe Drinking Water Act of 1974 are Federal Laws and that the Federal Government has the primary responsibility for their implementation as well as the education of environmental engineers and scientists. Today, EPA is providing only 30.2% of the necessary funds at Tufts University of which most are used for direct student support.

Exhibit 4 concludes "It appears that the decision to phase out training support is premature and governmental agencies will suffer an even more severe shortage of qualified manpower within the next two to five years if the phase-out is complete."

Conclusion

The national need for the continuation of the Training Program in Water Pollution Control has been presented. This need has been recognized by the professional workers in the field and has been documented in Exhibits 1 through 4. In addition two States (California and Wisconsin) have recognized the need and the appropriate State Boards have passed resolutions in support of the EPA Training Grant Programs.

Exhibits 5 and 6. A similar resolution is currently being considered by the New England Interstate Water Pollution Control Commission, of which the six New England States and New York are members. This resolution will be acted on in June 1975. In the past, Congress has recognized the need for adequately trained manpower and has provided the support that has made possible the present manpower force. If Congress had not acted in the past the Water Pollution Control Program in the United States would still be in the dark ages. Again, it is up to Congress to assure adequate manpower to implement P.L. 92-500 and the Safe Drinking Water Act of 1974.

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LOOKING AHEAD IN ENVIRONMENTAL EDUCATION

Note. The following article was written by Dr. Russell F. Christman, Head, Department of Environmental Science & Engineering, University of North Carolina in observing the 10th Anniversary of ESE NOTES. (Reprinted from ESE NOTES, Vol. 11, No. 2, April, 1974)

Looking ahead is much more difficult. Certainly the trends we have observed in the last decade are likely to continue with increased pressure for a) more scientific rigor in estimating the often subtle geochemical effects through which pollution is expressed, b) new waste treatment and emission control technology and c) coordination of our graduate curricula with relevant disciplines such as economics, regional planning, and particularly the "softer" social sciences. In addition, the growing costs of higher education will force us to examine very closely the actual functions that will be required of our graduates in the job market of the future. Whether they be in teaching, in government, university or private research, management or administration, or in private business we will need to make increasingly effective use of student time investment in university experience. These needs coupled with our growing understanding of the learning process may result in the emergence of entirely new patterns of university service, complementing the traditional masters and doctoral programs. Individual and self-paced instruction, on-the-job training, regional centers for the development of well defined skills, packaged training programs for particular employment categories may all be more effective pathways of university cooperation with private and government enterprise.

The style of our business is not the only aspect that is likely to change. If we have learned any lesson at all from past environmental efforts it is that we have a genuine propensity for underestimating the scale and severity of environmental problems. Rooted in our institutional environments and shackled with attendant bureaucratic "necessities" we have seemed unable to fully appreciate the knowledge that unlike any living thing preceeding him, man is potentially able to control all future evolutionary development on this planet. Shrouds of smog over our cities, pesticides telescoping their effects through world wide food chains, threats to global climate through carbon dioxide and particulate emission all testify to our shortsighted use of this ability. As Barbara Ward so aptly stated—anyone may assemble his own list of evils and add the despondent conclusion that none of them is self corrective.

Perhaps we are slowly learning, even though the lessons are expensive. We are learning for example that large-scale domestic sewage treatment facilities cannot be considered apart from regional land use planning, that pollution control is not a problem restricted to the developing nations, that newer and bigger is not always better, that certain individual rights may be superseded by group rights, and that the concept of growth itself may be a disastrous idol to worship. While we are keenly aware of the assault on traditional values caused by these lessons we are left bouncing from crisis to crisis because we have not had an effective means for evaluating public policy alternatives. The different futures resulting from the implementation of various alternative policies (nuclear power vs. coal, highway vs. mass transit, no discharge vs. regulated discharge, etc.) are simply too vital for us to rely on disjointed studies or in the territorial posturing of state and federal agencies. Furthermore all reasonable policy alternatives must be designed to achieve mutually agreeable goals. The more well defined the goal — the easier it becomes to evaluate candidate policies. Until recently (Clean Water Act 1972) we have had virtually no stated goals with respect to environmental quality in the United States. Since current legislation "forbids" water pollution by 1985, but says nothing about air quality, land use, population density, consumption levels or life styles it could be argued that we still do not have any well defined goals that enjoy wide-scale public acceptance.

Given these two failings, the lack of goals and the means to evaluate alternative future strategies, no great insight is required to predict continued muddling through a lengthy series of unforeseen crises. Writing in the *Law Review,* Charles Johnson supposed that restoring environmental quality boils down to a simple "search and destroy" mission against ecologic villains, or string up the ten most wanted polluters. What it does involve, is something far more difficult— it means initiating, in our society, an orderly system of making choices that has no precedent in all of human history.

The decisions that shaped the world of the present—at least in its physical aspects—were not the result of any painful weighing of alternatives, nor did they, for the most part, involve society as a whole. They were decisions made by individuals or groups on the basis of what, in their time and place were clearcut and valid—but limited—goals.

An awareness of these needs will in the years ahead give new dimensions to environmental engineering and scientific research. We can expect our research to be increasingly "multidisciplinary", focused on social problems and very much oriented toward questions of human value. Our research endeavors must help build the data base needed to establish desirable and practical goals for environmental quality and to experiment with evaluative mechanisms for public decision making. Some would suggest that engineers and scientists should stick to their slide rules and laboratories, and insofar as this is needed to maintain technical competence there is merit in this view. However, we cannot hide behind complex jargon and formulae as the need is too great. Decisions will be made and our input in the dialog will be an important factor in distinguishing between the feasible and the infeasible, the costly and the less costly. Stripped of a social conscience we are

relegated to the role of hired hand, as Charles Sleicher has said.

The real excitement in future research therefore revolves around learning how to work cooperatively with other disciplines in broadening our research questions beyond technical description to include analyses of need, value and effect. Whether the problem is transportation, water pollution, noise, power generation or food production, environmental research of the coming decade should include the following range of inquiry.

Need Perception: Studies of human motivation, goal and value discrimination as a function of culture, personality and experience, focused on human values for space, food, shelter, mobility, etc.

Resource Description & Technical Development: Studies of the quantity, quality and characteristics of any material useful to man; the ocean, forest, fish and atmospheric resources, etc., and devices employed to extract, convert or use these resources.

Public Policy: Studies of the institutional characteristics, governmental and agency strategies for implementation or regulation of actions affecting use of resources.

Effects Analysis: Studies of the impact on resources or users of resources resulting from activities undertaken to satisfy perceived needs. Development of indicators of environmental quality.

We face many exciting challenges learning to participate in research of this kind and as a result of our efforts, entirely new perceptions of the role of environmental studies may emerge. Each of us is a part of an even greater challenge, which extends to all mankind. We know that unrestricted growth of man's numbers on a planet with finite capacity to provide for his needs and absorb his waste, coupled with an attitude of exploitative dominance of the natural environment will have predictable and unattractive results. The challenge facing mankind in the eighth decade of the twentieth century is how to respond to this information.

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