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**EDITORIAL  
RESEARCH IN WATER REUSE**

*By Daniel A. Okun*

The reclamation of wastewaters for reuse has moved to center stage -- stimulated by the increasing demand for water and by the excellent quality of effluents that are too valuable to discard.

Yet the direct reuse of wastewaters for water supply is hardly new. Effluents have been used for industrial purposes at Bethlehem Steel plant in Baltimore and for lawn watering and toilet flushing at Grand Canyon Village for 40 years, and hundreds of other reuse projects are serving a wide variety of *nonpotable* uses throughout the country. What is new is the push for direct reuse for *potable* purposes. This has culminated in a bill in Congress, HR5101, which would *require* EPA to use almost 10% of its \$263 million 1978 research budget for the development and demonstration of the feasibility of *direct* reuse of wastewaters for drinking.

Such an effort is misguided.

Research into the *indirect* reuse of wastewaters for drinking deserves a far higher priority, as it would be of immediate benefit to the many millions of people who are now obliged to ingest waters drawn from polluted rivers, where water-treatment facilities are not now designed to remove the myriad synthetic organic chemicals that are the contaminants at issue. Such research would reveal their presence and concentration, would develop monitoring and analytical protocols, would establish

Continued

the efficacy of treatment processes to remove these contaminants, and would attempt to identify the health significance of exposure to these chemicals as we seek to reduce this exposure.

Research on direct reuse for drinking would do none of these. A specific urban wastewater that is used to demonstrate the feasibility of its conversion to drinking water is likely to contain only a few of the hundreds of chemicals that are troublesome, and a demonstration that they can be removed would not be applicable to other urban situations. Furthermore, the standards against which to measure the performance of the demonstration plant are not yet established, nor are they likely to be available soon. Also, the fact that a wastewater can be made to meet the "Drinking Water Standards" is misleading, as the standards were established on the assumption that the most desirable sources would be used, not wastewater treatment plant effluent.

The latency period for the diseases that are attributable to chemical contaminants is on the order of decades. A demonstration plant that would expose a population needlessly is unconscionable. Meanwhile it is unacceptable to conclude, as did the Corps of Engineers in recommending that New York City obtain additional water supply from the Hudson, that communities have already used the Hudson for drinking "without ill-effects."

The proportion of our total water needs that is required for drinking is small. If sufficient water from protected sources is not available for all purposes, water reuse is entirely appropriate for the many nonpotable uses to which water is put. The UN Economic and Social Council stated this philosophy well in 1958: "No higher quality water, unless there is a surplus of it, should be used for a purpose that can tolerate a lower grade."

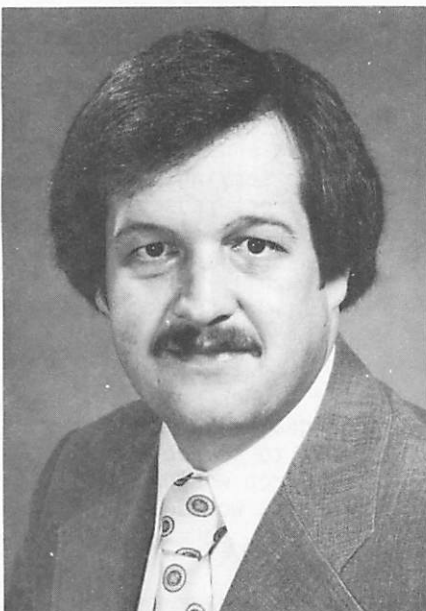
One wonders why agencies responsible for promoting the public health, such as EPA and AWWA, press to foist wastewaters on the public for drinking. Their efforts might better address improving the quality of waters now being consumed, and identifying the limited number of unpolluted sources in upland tributaries and underground, and protecting them against despoilation by uncontrolled urban and industrial development.

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### FRED K. PFAENDER RECEIVES WRRRI APPOINTMENT

Dr. Frederic K. Pfaender, associate professor in the Department of Environmental Sciences and Engineering, UNC School of Public Health, has been appointed an Associate Director of the Water Resources Research Institute (WRRRI) of The University of North Carolina.

Dr. Pfaender's appointment to the associate position with WRRRI, housed on the campus of North Carolina State University, was effective February 15. Dr. Neil S. Grigg, WRRRI director, envisions the appointment on the UNC-CH campus as a move to support the general objective of WRRRI to develop and operate a research program that is responsive to state needs and supportive of the program of the United States Office of Water Research and Technology.



Specifically, Dr. Pfaender is charged with working to develop high quality, relevant research proposals from the UNC-CH campus; serving as the UNC-CH coordinator for WRRRI activities; preparing regular contributions on a monthly basis for the Institute newsletter publicizing UNC-CH water activities of interest to state agencies, and disseminating information to UNC-CH faculty interested in Office of Water Research and Technology programs.

Dr. Russell F. Christman, chairman of the Department of Environmental Sciences and Engineering, stated, "We are proud to have the opportunity to be a party to this agreement and to cooperate this closely with the Water Resources Research Institute. We are also particularly pleased that a scientist and a faculty member of Dr. Pfaender's caliber has agreed to accept the position."

An environmental microbiologist, Dr. Pfaender joined the UNC faculty in 1971. He received both his BS and MS degrees from California State University at Long Beach, Ca., and his Ph.D. in microbiology from Cornell

University. On the UNC campus Dr. Pfaender has served on Departmental and School of Public Health committees. He is also a faculty member in the UNC curriculums in Marine Sciences and Ecology. Currently, he is a member of the WRRIs Technical Committee and the Water Pollution Control Federation's Standard Methods Committee.

Dr. Pfaender has twice been selected as a participant in Gordon Research Conferences. In 1976 he participated in the Environmental Sciences-Water session and in 1977 the session on Microbial Degradation. He is also a member of numerous professional and honorary societies: Phi Kappa Phi, Sigma Xi, American Association for the Advancement of Sciences, American Society of Limnology and Oceanography, American Society of Microbiology, Association of Environmental Engineering Professors and the N.C. Chapter of the Water Pollution Control Federation.

Dr. Pfaender is presently a team member on two departmental research projects sponsored by the U.S. Environmental Protection Agency: "Chlorination of Aquatic Humic Substances" and "Assessment and Control of Wastewater Contaminants Originating from the Production of Synthetic Fuels from Coal."

Among his recent publications is WRRIs Report No. 126, "Monitoring Heavy Metals and Pesticides in the Cape Fear River Basin of North Carolina." The publication reports on the research effort of Pfaender, environmental sciences and engineering professor M. S. Shuman and students H. Dempsey and C. W. Harden to examine new methods for monitoring heavy metals and pesticides in natural waters of North Carolina.

### NORTH CAROLINA WATER RESEARCH CONFERENCE

March 29 is the day for the North Carolina Water Research Conference. The WRRIs Advisory Committee will be gathering in the afternoon for their

meeting, and the morning will be devoted to comprehensive presentations about N.C. water problems and research now in progress. This is a good chance to get a good total picture of research programs in progress. For reservations, call Eva McClung at 737-2815 by March 24.

The program is as follows:

#### NORTH CAROLINA WATER RESEARCH CONFERENCES March 29, 1978

McKimmon Center, NC State University

- 8:00 REGISTRATION
- 9:00 Opening Remarks - *Ralph E. Fadum, Chairman, WRRIs Board of Directors*
- 9:15 Water Resources Research Institute Program - *Neil S. Grigg, Director, WRRIs*
- 9:30 Water Resources Research and Agriculture - *James E. Legates, Dean, NCSU School of Agriculture and Life Sciences*
- 9:45 Water Resources Research and Coastal Development - *B. J. Copeland, Director, UNC Sea Grant*

- 10:00 Water Resources Research and Forest Resources - *Eric L. Ellwood, Dean, NCSU School of Forest Resources*
- 10:15 BREAK
- 10:45 Panel on Current National and North Carolina Water Problems  
Drinking Water - *Russell F. Christman, Head, Department of Environmental Sciences and Engineering, UNC-CH*  
Water Quality Management - *David H. Howells, Professor Emeritus, Department of Biological and Agricultural Engineering, NCSU*  
Floods and Droughts - *Ralph C. Heath, District Chief, U.S. Geological Survey*
- 12:00 LUNCHEON  
Address: "North Carolina State Water Management: Current Status" - *Howard N. Lee, Secretary, N. C. Department of Natural Resources and Community Development*
- 2:00 CONCLUSION of Conference
- 2:00 WRRIs ADVISORY COMMITTEE MEETING  
Chairman Presiding: *Howard N. Lee*
- 5:00 ADJOURNMENT of Committee Meeting

### BIOLOGICAL MONITORING WORKSHOP - MARCH 22-23

A two-day workshop on biological monitoring has been scheduled at the Hilton Inn in Raleigh on March 22-23 to provide a forum for those involved in research, monitoring, legislative development, and in the regulatory aspects of biological monitoring of environmental quality. Federal, state, academic and industrial scientists will have an opportunity to exchange their thoughts and formulate recommendations on technical and policy issues in this rapidly growing field.

The consensus of many of those involved is that at this time, there is a need to identify the utility of a wide array of bioindicators and biological monitoring techniques available for determining both the short and long-term effects and trends of man's activities upon our ecosystem and the quality of our environment.

Biological monitoring and physical-chemical monitoring of our environment are at times regarded as separate and competitive. This is unfortunate, because, in almost every way, they complement one another. The response of sensitive indicator organisms to an environmental stress provides early warning of potential hazards before damaging or irreversible effects may result. Organisms are uniquely sensitive to multiple environmental stresses over time. The ability to selectively accumulate, biomagnify, and show the synergistic effects to exposure from environmental stresses give bioindicators uniquely useful properties.

Sponsors of the workshop are:

- Water Resources Research Institute of The UNC Research Triangle Institute*
- Environmental Studies, NCSU*
- Environmental Studies Council of The University of North Carolina*

Inquiries regarding the workshop should be directed to Douglas Worf at the Water Resources Research Institute (919) 737-2815.

**WATER CONSERVATION  
PRIORITY SYSTEM  
CONSIDERED**

The Division of Environmental Management at its February meeting discussed the possibility of adopting a new policy for awarding priority for State grant applicants which practice water conservation methods.

The policy when adopted would contain the following point system:

- 1. **WATER CONSERVATION (Maximum Value - 50 points)**  
Applicant must have at least 90% of its service connections metered to be eligible for award of priority points for (a), (b), and (c):
  - (a) Applicant has adopted and placed into effect a water rate schedule which does not provide quantity discount based on volume of water used- - - - 15
  - (b) Applicant has adopted and placed into effect a water rate which provides for increasing rates based on the volume of water used - - - - - 5
  - (c) Applicant has adopted and placed into effect a water rate which provides for amortization of the capital cost of the wastewater treatment facilities-10
  - (d) Applicant has adopted or revised its plumbing code to require the installation of water conservation fixtures in all new construction within the applicant's jurisdiction - - - - - 15
  - (e) Applicant has a continuing program of water conservation education and information- - - - - 5

The current ranking system has a possible 100 points. This proposed system would add 50 points upon which a municipality could be ranked. The Environmental Management Commission will circulate the proposed policy to interested agencies prior to its next meeting. At its March 9 meeting, the Commission will vote on the proposed policy change, and if approved, it will go through a public hearing process.

**CAPACITY-USE  
STUDY OF  
SANDHILLS AREA**

The North Carolina Environmental Management Commission has authorized an investigation of water problems in the Sandhills area. The investigation, known as a Capacity-Use Study, will be undertaken by the Department of Natural Resources and Community Development.

Based on the findings of the investigation, the EMC will determine whether or not all or part of the

region should be declared a "Capacity-Use Area," subject to coordination or regulation of major withdrawals of water from the ground or surface sources.

The study area consists of 567 square miles in Moore, Montgomery, Richmond and Hoke Counties.

The study will determine whether there is enough water in Drowning Creek to supply the projected water supply demands for the region and meet downstream water needs. The need to maintain enough downstream flow during drought periods to meet water quality standards and support fish and wildlife will also be considered.

The effect of proposed withdrawals from Drowning Creek for a regional water system in Moore County will also be investigated. The proposed water system would serve the cities of Southern Pines, Pinehurst, Aberdeen, and Whispering Pines.

A regional wastewater treatment plant is under construction on Aberdeen Creek, which flows into Drowning Creek downstream of the proposed withdrawal point. The capacity-use study will investigate the effect of upstream withdrawals on the ability of Drowning Creek to assimilate the treated wastewater discharged from this plant.

The study will also investigate available groundwater resources to determine to what extent projected water demands could be met by wells.

An interim report will be presented to the EMC at their March 9 meeting in Raleigh. For further information contact John Wray, Water Resources Planner, (919) 733-5501.

**NORTH CAROLINA  
WILL PARTICIPATE  
WITH THE CORPS ON  
LITTLE RIVER PROJECT**

The North Carolina Environmental Management Commission has approved State financial participation in the U. S. Army Corps of Engineers Little River navigation and inlet stabilization project and in the emergency dredging of Calabash Creek.

Total project costs will be approximately \$13 million.

The State will pay \$271,200 or 80 percent of the non-federal costs of the two projects. The Brunswick County Commissioners voted December 19 to pay the remainder of the non-federal share. The non-federal costs consist of land acquisition and disposal of dredging spoil.

The Little River Inlet project will require purchase of 27 acres of land and a 1.7-acre easement on Bird Island in North Carolina.

The South Carolina share of project costs will include land acquisition on the southern tip of Bird Island and on Waties Island south of the inlet. South Carolina has made assurances to the federal government that it will provide its share of project costs.

In a letter requesting state assistance with the projects, Pearly Vereen, chairman of the Brunswick County Commissioners, said, "The two projects will improve navigation and reduce damages to boats and risk to lives by providing easy, safe passage from the ocean to protected waters and harbors."

State officials estimate annual damages to boats at \$34,000.

"The reliable channel will benefit commercial fishing vessels and stimulate the seafood handling business in the area," according to Vereen's letter.

Vereen noted that "Plans are currently underway for the development of a modern marina facility on Calabash Creek to provide services for the expected increase in boating traffic."

These undertakings will greatly enhance the economic future of this relatively depressed area of the State," continued Vereen's letter.

Maintenance of the Little River Inlet project will be provided by the Corps of Engineers.

The EMC entertained a motion to withhold approval of funds for the Calabash Creek project subject to assurance that the Corps would maintain it.

However, the Commission voted to approve funding for both projects when they learned that the Corps had indicated their intent to seek federal sponsorship of the Calabash Creek project.

For further information contact John Morris, Water Resources Development Coordinator, (919) 733-4064.

**DEPARTMENT OF HUMAN RESOURCES AND EPA DEVELOP MEMORANDUM OF UNDERSTANDING**

The North Carolina Department of Human Resources (DHR) and the U.S. Environmental Protection Agency (EPA) have developed a "Memorandum of Under-

standing" enabling the State to oversee that portion of the Safe Drinking Water Act relating to the public water supply supervision program for community water supplies. Legal enforcement responsibility for the act remains with EPA, however, since the State does not have primary enforcement responsibility.

The National Interim Primary Drinking Water Regulations, promulgated under the Safe Drinking Water Act, became effective June 24, 1977. They require an increased monitoring program for many of North Carolina's public water supplies. Each supplier will soon be notified of the number and types of samples needed for their system. The suppliers must keep records of the results of this sampling program and regularly submit them to DHR's Sanitary Engineering Section.

In addition, the public must be notified of any violation of the National Interim Primary Drinking

Water Regulations. Notifications will be included in water bills, by separate mailings, and through radio, TV, and newspaper announcements. The State is available to assist the suppliers in the development of a public notification program.

The purpose of the public notice is to allow the consumer to be alerted to the problems confronting the water supplier. Usually, there is no cause for alarm when a notice is received. However, if there is an immediate health hazard, the notice will contain suggestions on how consumers can assure their protection. The Sanitary Engineering staff is available for immediate technical assistance.

Any questions regarding the Safe Drinking Water Act should be directed to the North Carolina Division of Health Services, Sanitary Engineering Section, Water Supply Branch, P.O. Box 2091, Raleigh, North Carolina 27602, telephone (919) 733-2321.

**INTERIM DRINKING WATER STANDARDS SIGNED**

On January 25, EPA Administrator Costle signed proposed interim drinking water regulations. Issued under the Safe Drinking Water Act, the proposed regulations would set maximum levels for trihalomethane compounds and would establish granular-activated carbon as the treatment standard for removing synthetic organic chemicals from drinking water supplies. Final regulations would require water supply agencies serving over 10,000 people to monitor for trihalomethane and other synthetic organic compounds in water supplies. For water agencies serving over 75,000 people, a maximum contaminant level for trihalomethanes of 100 parts per billion, or 0.10 milligrams per liter of water would be established under the proposed regulations. The trihalomethane compounds would be removed by granular-activated carbon or equivalent treatment.

**PRESIDENT'S BUDGET EMPHASIZES ENVIRONMENTAL HEALTH**

President Carter's proposed budget for EPA puts priorities on prevention of health damages rather than after-the-fact pollution cleanup. The emphasis in protection of the environment is evident in the 33 percent budget increase projected for EPA. Expansion in health-related programs includes \$25.5 million for the toxic substance control program, \$14.5 million for the safe drinking water program, and \$13.7 million for the pesticide program.

EPA Administrator Douglas Costle says that resources for enforcement would be increased by \$21.5 million to provide "quick, fair, and effective enforcement."

**EPA POLICY STATEMENT ON NONPOINT POLLUTION AROUND TREATMENT PLANTS**

A recent EPA policy statement says that erosion control measures must be included with all plans and construction activities related to sewage treatment construction grants. The policy states that sewage treatment plant plans must identify and evaluate the potential for erosion and sediment runoff which could occur as a result of project

construction and operation. EPA says that plans should be designed in a way that treatment systems fit local topography and soil conditions. Treatment plant construction activities are to be coordinated and "appropriate structural or agronomic practice to control runoff and sedimentation should be provided during and after construction." The new policy applies to construction activities now.

### GAO REPORT SAYS MORE NONPOINT POLLUTION CONTROL DATA NEEDED

The General Accounting Office has recommended that additional data be gathered on the effects of non-point

pollution control measures by the Environmental Protection Agency. In a report issued in December, the GAO said planning agencies need information concerning the impact of non-point pollution control measures on overall water quality, in order to formulate comprehensive control plans.

The GAO had prepared a report entitled "National Water Quality Goals Cannot be Attained Without More Attention to Pollution From Diffused or Non-Point Sources." The publication is available for \$1.00 from the General Accounting Office Distribution Section, Room 4522, 441 G Street, N.W., Washington, D.C. 20545.

### "NO-TILL" AGRICULTURE GROWS

State Conservationist Jesse Hicks, head of the Soil Conservation Service

in North Carolina, says that minimum tillage or "no till," as most farmers call it, is a fast-growing practice in North Carolina. In 1977 this practice was applied to 37,840 acres, bringing the total in the state to an estimated 625,000 acres.

"This practice grows every year," Hicks said, "and we believe it will continue to increase. While it is used mostly for corn and soybeans, we also have significant plantings of grain sorghum, cotton, small grains and other crops."

The research of the Agricultural Research Service indicates that the minimum tillage practice applied during the spring months is a most-effective technique for controlling erosion.

### NON-POINT '83

The National Association of Soil Conservation Districts has

prepared a 30-minute film titled "Non-Point '83." The film contains a description of some methods of controlling non-point pollution such as no-till farming and runoff impoundments.

Copies or information regarding the film should be directed to NACD Environmental Film Service, P.O. Box 855, League City, Texas 77573.

### IMPACT OF WATER-SAVING DEVICES ON CONSERVATION REPORTED

A recently completed study by William C. Sharpe and Peter W. Fletcher of the Institute on Land and Water

Resources at Pennsylvania State University evaluated the impact of water-saving devices on water use, energy saved, and cost on lot sewage disposal with and without conservation.

The water saving programs of the Washington Suburban Sanitary Commission (WSSC) were evaluated and found to have been effective in reducing customer water use. A study of the effectiveness of bathing shower flow controls in college dormitories showed savings in shower water use of up to 60 percent were possible with commercially available devices. Gross savings to The Pennsylvania State University for such a program were estimated to be \$100,000 annually. A comparison of costs for on-lot sewage disposal facilities with and without minimum water use fixtures was made. Cost savings were shown for elevated sand mound and holding tank systems using minimum water use technology based on calculated wasteflow reductions. The report may be purchased for \$4.00 from the Institute on Land and Water Resources at Pennsylvania State University, University Park, Pa. 16802.

### DUKE MARINE LABORATORY HAS COOPERATIVE PROGRAM WITH EGYPT

The Duke University Marine Laboratory will participate in a cooperative program on marine pollution

resulting from a research agreement between the U. S. Environmental Protection Agency and the Academy of Scientific Research and Technology of Egypt. The five-year program provides for a variety of programs in Egypt geared to studies on marine pollution in the coastal waters of the Mediterranean and the Red Sea. Staff of the Duke University Marine Laboratory, Beaufort, North Carolina, will be involved in four aspects of the program initially, two of which will begin in 1978. The first phase of the program will be a two-month training period involving eight Egyptian scientists in day-to-day laboratory and field studies on marine pollution, using the facilities of the Laboratory and the estuarine conditions of the Beaufort-Morehead City area of eastern North Carolina. In addition to becoming familiar with recent scientific literature dealing with estuarine and coastal pollution, the Egyptian participants will become familiar with modern instrumentation used in the detection and analysis of a variety of pollutants that might be found in coastal waters of Egypt and bioassay studies using live fauna and flora of the Beaufort area as a means of associating the effects of certain pollutants with the marine animals and plants of that area. A number of visiting lecturers will be invited to the Laboratory to present up-to-date information on their own studies in marine pollution, talk with the participants about the way in which experiments can be designed and implemented, and generally make

the Egyptian participants more familiar with the large body of experimental and field data available within the United States.

A second major portion of the program scheduled for 1978 will be a series of oceanographic cruises within the Mediterranean coastal waters of Egypt using the R/V Eastward, the 120-foot research vessel operated by the National Science Foundation and Duke University and berthed at Beaufort. The general theme of these cruises will also be marine pollution and is being designed to provide U. S. and Egyptian scientists with an opportunity to determine the distribution of a variety of pollutants within the coastal Egyptian waters not normally available to scientists from several Egyptian research institutes and universities.

**UNITED NATIONS PUBLICATIONS RELATED TO WATER RESOURCES AVAILABLE**

Publications of the United Nations system related to water resources are available through UNIPUB, Box 433, Murray Hill Station, New York, NY

10016, telephone 212:686-4707. The UNIPUB brochure contains a listing of a number of interesting water resources publications related to agriculture, hydrology, meteorology, irrigation and drainage, economics and regulations, development and management, quality and pollution, and others. If you are interested in obtaining these international publications, contact UNIPUB for their catalog.

**COMPUTER SEARCHES FOR WATER INFORMATION INCREASE**

The Southern Water Resources Information Center (SWRSIC), operating out of the D. H. Hill Library with support from the OWRT and the Institute, has been extremely active during the past month. Thirteen computer literature searches of water resources literature were requested and completed last month according to Jean Porter, who operates the Center as a part of her duties in the Library Reference Department.

A SWRSIC search is a most efficient way of assembling what has been written on a particular water resource topic. The search will quickly provide the abstracts, titles, authors, and other information on your topic from over 100,000 articles, reports, proceedings and other literature in the Oak Ridge information base. Call Ms. Jean Porter, Southern Water Resources Scientific Information Center (919) 737-2683 and describe your topic for your water resources literature search. Let a telephone call initiate your next search for information.

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**SEMINARS ON URBAN STORMWATER RUNOFF AND NON-POINT SOURCES OF WATER POLLUTION**

Duke University is sponsoring a seminar series on "Urban Stormwater Runoff and Non-Point Sources of Water Pollution." Sessions are at 4 p.m., Engineering Building, Duke University. The program is:

- 30 Jan. "Urban Stormwater Pollutant Inputs to Surface Waters - *Dr. Judith Carberry, Dept. of Civil Engineering, Univ. of Delaware*
- 6 Feb. "Coordination of Urban Stormwater with Flood Control, Drainage and Sedimentation Programs" - *Dr. Neil S. Grigg, Director, Water Resources Research Institute of UNC, NCSU, Raleigh, N. C.*
- 27 Feb. "Water Quality Ramifications in Estuaries of Converting from Forest to Intensive Agriculture" - *Dr. William Kirby-Smith, Duke Marine Laboratory, Beaufort, N. C.*
- 13 March "Erosion and Sediment Control Design" - *Michael Ports, Chief of Watershed Permits Section, State of Maryland Water Resources Administration, Annapolis, Maryland*
- 20 March "Application of Models in U.S. EPA's Research and Development Programs" - *Harry Torno, Office of R & D, U.S. EPA, Washington, D.C.*
- 27 March "The U.S. EPA & Urban Runoff Pollution Control Technology" - *Richard Field and Anthony Tafuri, Storm and Combined Sewer Section, U.S. EPA Municipal Environmental Research Laboratory, Edison, New Jersey*
- 3 April "Problematic Hydrologic Modeling for Stormwater Management" - *Dr. Roy Burke, III, Dept. of Civil Engineering, University of Virginia, Charlottesville, Virginia*
- 10 April "Kinematic Wave Approximation to Forested Watershed Overland Flow with Urban Hydrologic Models" - *Dr. Miguel A. Medina, Jr., Dept. of Civil Engineering, Duke University, Durham, N. C.*

**ENDANGERED AND THREATENED PLANTS AND ANIMALS OF NORTH CAROLINA**

Publication of a new book, "Endangered and Threatened Plants and Animals of North Carolina," edited by John E. Cooper, Sarah S. Robinson, and John B. Funderburg, has just been announced.

North Carolina State Museum of Natural History, Raleigh, N. C. 444 + xvi pp. 1977. This book contains information on a great number of aquatic species and systems, and is available from Mrs. Dawn Newkirk, State Museum, P.O. Box 27647, Raleigh, NC 27611, for \$8 (checks to "Museum Extension Fund, Department of Agriculture").

### "LAND APPLICATION" BEING USED IN GEORGIA

"Land Application," or spraying secondary-treated water onto the land, which acts as a natural filter and purifier, is now being considered by many cities and businesses in Georgia. Braselton turned to land application a year ago; Covington plans to have such a system by 1980; Clayton County is planning the largest land application system in the South by 1980; and a number of other areas are seriously considering this method. Dr. Wade Nutter of the University of Georgia has been instrumental in the local interest which has surfaced in land application. Four years ago, he established the system in Unicoi State Park as a research project. He feels that the Unicoi project has been important in area acceptance of the process, since it provides a place for people to see it operating and that there has been no harm to the ecosystem. Side benefits to the process include the use of nitrogen and phosphorous for plant growth.

. . . *Georgia Waterline*

### OXIDATION POND SYSTEMS FOR WASTEWATER TREATMENT IN SMALL COMMUNITIES

Oxidation pond systems are used in the treatment of wastewaters by many small municipalities and numerous industries in the nation. These systems can provide reliable and economical treatment of wastewaters. Although use of these systems in design practice has been curtailed in the past few years, interest in their application has increased recently due to changes in the definition of secondary treatment systems in Federal and State regulations. Further, oxidation ponds in conjunction with tertiary treatment systems have been found capable of providing the highly reliable and efficient treatment needed to meet the emerging water quality standards for organic material, suspended matter and ammonia nitrogen.

Dr. F. Michael Saunders at Georgia Tech has just prepared a technology transfer report on the technical information currently available on oxidation pond systems. The publication includes the physical, chemical, and biological characteristics of these systems and their design. The capabilities of subsequent treatment systems used for effluent polishing is also included. The product is Georgia's contribution to a regional technology transfer project supported by the Office of Water Research and Technology.

Copies of the report are available from the Environmental Resources Center, GIT, 205 Old Civil Engineering Bldg., Atlanta, GA 30332.

### WOMEN IN ENGINEERING

Women have long been significantly underrepresented in the scientific work force. The field of engineering, in particular, has traditionally been perceived as inappropriate for women, to the extent that women currently comprise fewer than one percent of the one million engineers in the United States.

Most efforts to increase the representation of women in engineering have focused on encouraging college students to elect engineering majors. A virtually ignored, yet potentially valuable source of women engineers is that group of women previously trained in the physical sciences who have not entered the scientific work force in positions commensurate with their abilities. The Women in Engineering Career Facilitation Project at California State University, Northridge, is designed to tap this resource. For additional information, contact Professor Bonita J. Campbell at the School of Engineering, California State University, Northridge, California 91330.

### POSITION AVAILABLE

There is an immediate opening for the position of Director, State of Washington Water Research Center. The Center is a joint entity of the University of Washington and Washington State University and is located on the Washington State University campus in Pullman, Washington. Inquiries should be sent to: C. J. Nyman, Dean, The Graduate School, Washington, State University, Pullman, Washington 99164.

### WATER RESOURCES CONDITIONS IN N.C. FOR JANUARY

Streamflow during January was considerably above normal. Average flows on many streams were the highest for the month of January since 1937. As compared to long-term records for January, monthly mean flows at USGS index gaging stations ranged from 2 1/2 to 3 times normal flow. Although no major flooding was reported, minor flooding occurred on numerous Piedmont and Coastal Plain streams as a result of heavy rains on the 25-26th, augmented by high carryover flows from previous rains. The most significant flooding occurred in the upper Cape Fear and Dan River basins but was limited primarily to brief inundation of low-lying pasture and barren crop lands.

For the fourth consecutive month groundwater levels rose during the month and were near record levels (for January) in shallow observation wells in parts of the Coastal Plain region. Except for several areas affected by heavy pumping, water levels were generally above long-term averages for January.

. . . *U. S. Geological Survey*

## NEW PUBLICATIONS RECEIVED BY THE INSTITUTE

(Residents of North Carolina may borrow these from the Institute for a two-week period. Where individual copies are desired, readers are encouraged to request copies from the organization issuing the publication. The addresses are provided by the *News* for this purpose.)

### Water Resources Planning

- "Conservation of Water, Chemicals and Energy in Dyeing Nylon Carpet," (ERC-07-77), 11/77, by W. C. Tincher, Env. Res. Center, GA Inst. of Tech., Atlanta, GA 30332.
- "Concepts and Techniques for Evaluation of Energy-Related Water Problems," 12/77, by F. C. Wang, *et al*, Center for Wetlands, U. of FL, Phelps Lab., Gainesville, FL 32611.
- "A Computerized Method for Abstracting and Evaluating Environmental Impact Statements," (Bul. #105), 12/77, by G. F. Martel, *et al*, WRRRC, VPI & SU, 617 N. Main St., Blacksburg, VA 24060.
- "Economic Analysis of Selected Features of Municipal Wastewater Construction Grant Legislation," (EPA-600/5-77-011b), 8/77, by M. Rose, *et al*, for EPA, Office of R & D, Wash., DC 20460.
- "Promising Strategies for Reserving Instream Flows," (FWS/OBS-77/29), 10/77, by G. A. Gould, *et al*, avail. from Cooperative Instream Flow Service Group, 333 W. Drake Rd., Ft. Collins, CO 80521.
- "Stochastic Trade-Offs for Reservoir Operation," (ISWRI 90), 1/77, by T. E. Croley II, *et al*, WRRRI, IA St. U., 355 Town Engr. Bldg., Iowa St. U., Ames, IA 50011.
- "State Laws and Instream Flows," (FWS/OBS-77/27), by R. L. Dewsnup, *et al*, avail. from Cooperative Flow Service Group, 333 W. Drake Rd., Ft. Collins, CO 80521.
- "Multiobjective Water Resource Planning," (AGU Monograph #4), 1977, by D. C. Major, avail. from AGU, 1909 K St., N.W., Wash., DC 20006.

### Water Quality Management

- "Economics and the Environment: Impacts of Erosion Restraints on Crop Production in the Iowa River Basin," (#75), 12/77, by K. F. Alt, *et al*, Center for Ag. & Rural Dev., Iowa St. U., Ames, IA 50011.
- "Hydrocarbons in Sediments and Benthic Organisms From a Dredge Spoil Disposal Site in Rhode Island Sound," (EPA-600/3-77-092), 11/77, by P. D. Boehm, *et al*, for EPA, avail. from NTIS, Springfield, VA 22161.
- "Rotifer Sensitivity to Combinations of Inorganic Water Pollutants," (Bul. #92), 12/77, by A. L. Buikema, Jr., *et al*, WRRRC, VPI & SU, 617 N. Main St., Blacksburg, VA 24060.
- "Septic Tank Disposal Systems as Phosphorus Sources for Surface Waters," (EPA-600/3-77-129), 11/77, by R. A. Jones, *et al*, for EPA, avail. from NTIS, Springfield, VA 22161.

### Water Quantity Management

- "Hydraulic Fracturing of Drilled Water Wells in Crystalline Rocks of New Hampshire," by G. W. Stewart, WRRRC, U. of NH, Durham, NH 03824.
- "Storm Characteristics and Rainfall Intensity in West Virginia," (#8), 1977, by R. E. Trent, *et al*, WRI, Center for Ext. & Continuing Ed., WV U., Morgantown, WV 26506.
- "Modeling and Analysis of Hydraulic Interchange of (Flow) Surface and Groundwater," (#34), 7/77, by A. B. Cunningham, WRC, Desert Research Inst., U. of NV, Reno, NV 89506.

### Miscellaneous

- "An Economic Analysis of Eel Farming in North Carolina," (UNC-SG-77-16) 10/77, by J. E. Easley, Jr. *et al*, for UNC Sea Grant, 105 1911 Bldg., NCSU, Raleigh, NC 27650.
- "Technical and Regulatory Status of the Placement of Sanitary Landfills in Iowa," (ISWRI-87), 9/77, WRRRI, IA St. U., 355 Town Engr. Bldg., Iowa St. U., Ames, IA 50011.
- "Characterization of Shrimp Baculovirus," (EPA-600/3-77-130) 11/77, by M. D. Summers, for EPA, avail. from NTIS, Springfield, VA 22161.

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## NORTH CAROLINA WATER RESEARCH CONFERENCE

*March 29, 1978*  
*McKimmon Center, N.C. State University*

Come to this Conference from 9 a.m. - 2 p.m. on March 29 to hear the latest about water research by the Institute, in the Agricultural, Forestry and Coastal areas. You will also hear about current North Carolina and U.S. problems in the areas of drinking water, water pollution, and floods and droughts.

At lunch, Howard Lee, Secretary of Natural Resources and Community Development, will describe current North Carolina activities.

Reservations are necessary for the lunch and may be made by calling Eva McClung at 737-2815 by March 27.

