

WATER RESOURCES RESEARCH INSTITUTE

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ADDRESS TO THE ADVISORY COMMITTEE OF THE WATER RESOURCES RESEARCH INSTITUTE by

Howard N. Lee, Secretary
North Carolina Department of Natural and Economic Resources
March 31, 1977

It gives me great pleasure to appear before this group which has so much to offer to the scientific understanding and sound management of our State's water resources. As a former mayor and a resident of Chapel Hill, I was well aware of the importance of water resources issues before coming to the Department of Natural and Economic Resources. The Chapel Hill Newspaper selected the area's ten top news stories of 1976 just after the new year. Five of these ten stories were about water resources! To list them briefly will show how greatly these issues affect almost every aspect of our lives:

- the summer drought and resulting severe water shortage
- a difference of opinion among local governments over the composition of the water and sewer authority being formed in the county

- a hotly protested sewer moratorium brought about by our growth rate outstripping the capacity of our sewage treatment system
- a controversy over the proposed construction of a water supply reservoir at Cane Creek
- the court battle over closing the floodgates at Jordan Dam

Just to drive the point home to me, the story about my race for Lieutenant Governor was edged out of first place by the water shortage.

Since taking office as Secretary of Natural and Economic Resources, my awareness of the priority of water resources issues has been increased. The weekly collection of news clippings about the Department's activities is often dominated by stories on water quality problems, water resource development projects, and water supply needs. And I can assure you that a large number of the delegations of concerned local officials that come to have prayer with me are brought by water resources problems.

All of this interest, concern, and controversy is easy to understand. In the past, our demands on water resources were relatively small in relation to their availability, and problems were more manageable. We are now moving into a different period, propelled by several forces:

- First, the growth of our population and our economy is placing heavier and heavier demands on our water resources - demands that will increasingly conflict with one another.
- Second, we are now following a much stricter standard of environmental quality which places many restraints on our use of waters and on the way in which we modify and develop our waterways.
- Finally, the result of these first two trends plus our continuing inflation is to greatly increase the cost of water resources management. State and local governments will be bearing heavier financial burdens to provide the necessary sewage treatment, water supply, recreation opportunities, flood protection, and coastal improvements required by our growing population and economy.

These developments pose a serious challenge to the State. If we make bad water resources management decisions, we could stifle our potential for healthy economic growth, degrade our pleasant environment, and impose wasteful and inefficient solutions on our citizens. We must instead find ways to provide for our water needs, to protect the environmental amenities that are among our State's greatest assets, and to do this efficiently, at an affordable cost.

Local government, State government, and the federal government must all work together in the careful stewardship of our water resources. It is in our cities and communities where most of the water resources needs and problems are experienced and where they must ultimately be dealt with. But of course the solution to the problems often requires a statewide or basin-wide approach that is beyond the scope and capabilities of local governments. The federal government can offer us some resources and some help - but the federal agencies cannot always approach our problems in a comprehensive, responsive and timely way. State government therefore has a heavy responsibility for leadership in meeting the present challenge of water resource management.

Within State government, the Department of Natural and Economic Resources bears the main part of this responsibility for leadership. The majority of State water and water-related programs are within the Department. Equally important, the Governor has assigned the lead role in community assistance and in liaison with local governments to the Department of Natural and Economic Resources. As we have begun planning to carry out the Department's role in natural resources and in community development, we have all become convinced that there is no clear-cut separation between these two areas. We usually think of water resources as a natural resources program, and of course, this is true. But water resources program may equally well be seen as a vital part of our State's community development effort. Such problems as water shortages, flooding, and water pollution are experienced by communities and must be solved through cooperative action with our communities.

From this overview of the present situation, the principles that will guide this administration's water resources programs become clear:

- First, the State must begin to take a more active and farsighted role in water resource management, taking the steps that are necessary now to assure the future quality and adequacy of water resources. We can no longer leave things to chance or rely too heavily on the initiatives of federal agencies to solve our problems.
- Second, the State must work very closely and cooperatively with local governments to achieve desirable solutions to water resource problems.
- Third, we must pay very close attention to costs and benefits in this day of multiplying demands for public resources. Our water resource programs must be carefully evaluated against our priorities and our standards of effectiveness.

In line with these directions, the Department is now taking several initiatives. Further steps will follow. I would like to mention several things that are underway now.

I have asked the General Assembly for funds to create a water supply planning assistance program to help local governments evaluate their sources of raw water and to plan for reliable, economical new sources where needed. We estimate that 33 public water systems will need to find substantial new sources of supply before the year 2000.

I have also asked for funds to create a State flood management program, which will help communities take a comprehensive approach to reducing flood damages through the most economical combination of available methods. We suffer an estimated \$90 million in annual flood damages.

State legislation has assigned the Department a large responsibility for both water supply and flood management assistance, but adequate resources have not been available. Detailed planning is now underway for these new programs.

In addition to these plans for the future, I am very happy to announce the accomplishment of a significant effort. Today the Department is starting distribution of the N. C. Water Resources Framework Study. The Study is State government's first attempt to provide a comprehensive and up-to-date overview of all important aspects of the State's water resources in one convenient document. It includes our present legislative policies and proposed administrative policies for water resource management, an assessment of water resource needs and problems in the State, alternative combinations of water resource management measures for each river basin, and priority lists of water resource projects.

The Framework Study has been in preparation for about two years. Drafts have been circulated for review by State and federal agencies, by representatives of numerous groups interested in water resources, and by two broad-based citizen advisory committees. It is now time to circulate the Study to the statewide public to serve as a focal point for the State's effort to improve its management of water resources. Good solutions to the many difficult and controversial problems involved can only come by an informed public acting through its representative institutions.

It should be emphasized that nothing in this Study is unchangeable. In fact, this is a working document designed to inform the public and to obtain wide participation in progressing toward a more fully developed State water plan. The Department invites and welcomes all comments on the Study. To facilitate public understanding and participation, the Department will distribute information on the Study, communicate with interested groups, and work with citizen advisory committees as extensively as resources permit. Within about a year, we will evaluate the comments and suggestions received and issue revisions to the information, policies and priorities contained in the Study.

Genuine public participation in governmental decisions is difficult to obtain, but this Department is committed to work toward accomplishing it. All too often, governmental efforts at public participation are based on obscure technical publications or on a single isolated element of a problem. This approach defeats any meaningful public contribution from the outset. The significance of the Framework Study is that it puts all water resources needs into a common framework, so the many interactions and tradeoffs can be seen. It is technically sound but written to be accessible to the layman. By providing information in this form, we hope to lay the foundation for informed public sharing in water resources decisions.

I want to extend a special invitation to this audience to help in the further development of this Study by offering us the benefit of your extensive experience and knowledge. We will welcome your ideas on improving the Study and on our departmental programs in general.

Looking ahead toward all that we want to accomplish, I am happy to be able to seek the assistance and close cooperation of the Water Resources Research Institute at the very beginning. The Institute's research program is a catalog of the most difficult and important water resources management problems facing the Department. I can mention the studies of the Chowan River, the Pamlico River Estuary, the water quality impacts of the new large coastal farms, and groundwater management in the coastal areas as several examples among many others of valuable contributions to the Department and the State. We will be asking the Institute to continue its present research directions, and also to extend its reach further into the institutional and governmental aspect of water resources programs. These human factors are often as critical as the scientific and engineering factors in seeking solutions to problems. Professor Hufschmidt's study of State Water Resources Planning and Policy is an example of this direction. I expect that we will be seeking further help from the Institute for research on such topics as State-local cooperation in water resources programs and effective regional approaches to water resources problems.

Two of these areas deserve special emphasis. We are now engaged in a pioneering effort to understand and control non-point sources of water pollution, as required by Section 208 of PL 92-500. Determining the relationship between various land use practices and water pollution is a problem equaled by that of devising practical institutions and regulations to control this source of pollution. The second area of what I want to emphasize is that of cost-sharing and financing all types of water resources construction projects and management measures. We need to work out equitable and feasible policies to pay the increasing cost of water resources management.

I expect the staff of our Department to work actively to communicate their research needs to the Institute. I invite the Institute staff and the associated members of the research community to come and spend time becoming familiar with our programs, our problems, and our people. With this joint approach the work of the Institute will continue to make a major contribution to meeting the great responsibilities that the State faces in water resources management. I will be in touch with Director Grigg and others to make sure that we are doing whatever is needed to make this joint effort successful. Thank you very much for inviting me to speak to you.

NORTH CAROLINA WATER RESOURCES FRAMEWORK STUDY RELEASED

Following a long, intensive effort, the Water Resources Planning Section, Department of Natural and Economic Resources, has released the Water Resources Framework Study. This Study is State government's first attempt to provide a comprehensive and up-to-date overview of all important aspects of water resources in North Carolina. It includes our present legislative and administrative policies for water resource management, with proposed new policies; a survey of water resources needs and problems in the State; alternative combinations of water resource management measures for each river basin; and an interim priority list for water resource projects. The purpose of the Study is to bring together all of the specific water resource needs - water supply, water quality, flood management, recreation, fish and wildlife, and others - into a common framework that will guide State actions to meet these needs over the remainder of the century. The brochure in this issue of the *News* presents details on the Study.

Single copies of the complete Framework Study will be distributed free to county and local governments, public libraries and educational institutions. A charge of \$2.00 is made for extra copies and individual requests.

Please send inquiries with payment to: N. C. Water Resources Framework Study, N. C. Department of Natural and Economic Resources, P.O. Box 27687, Raleigh, North Carolina 27611.

If you have any questions, please write or call John Wray or Rosalyn Snyder (919) 733-4740.

WALLACE ELECTED VICE CHAIRMAN OF ENVIRONMENTAL MANAGEMENT COMMISSION

At its April 14 meeting, the North Carolina Environmental Management Commission unanimously elected James E. Wallace Vice Chairman. Professor Wallace has served as President of the Conservation Council of North Carolina and is generally recognized as one of the State's leading environmentalists.

FLOOD PLAIN MANAGEMENT

The Environmental Management Commission took a major step at its April 14 meeting toward a stronger State position on flood plain management.

Staff recommendations on the Black River Flood Control Project were that the Commission approve the final work plan on the condition that the local sponsors take appropriate steps to have the responsible local governments establish floodway regulations. The local sponsor was said to have signed a contract with the Corps of Engineers to the effect that it will prevent encroachment, but the conditions and timetable were not defined. Reliance was also to be placed on Federal Flood Insurance land use control provisions to control encroachment. Members questioned the proposed conditions as not being sufficiently explicit.

Member James Wallace asked about the downstream effects and the need for assurances that downstream zoning will actually take place. Present assurances, he said, cover only encroachment on "the project." It appeared to be the consensus that if it is to give approval it should have firm assurances at that time. Member J. D. Shiffert recommended that the Commission adopt a standard requirement for all flood control projects that downstream zoning be provided.

The Commission adopted a motion by Owen R. Braughler that future approvals of such projects will be subject to the adoption of downstream regulations governing flood plain controls.

Chairman Johnson inquired of Special Deputy Attorney General Bill Raney as to whether the Commission had authority to take this action. Raney replied that he felt it did on a broad discretionary basis. Mr. Raney was instructed to draw up a resolution to provide for this action at the next meeting. Wallace closed the discussion with the opinion that the Corps of Engineers and the Soil Conservation Service have the capability to provide the necessary data to support such a requirement and that this additional information should be associated with all projects in the future.

NORTH CAROLINA 208 PROBLEM ASSESSMENT WORKSHOP

A workshop titled "North Carolina 208 Problem Assessment" has been scheduled for May 4 at the Ramada Inn, Apex, NC. The work session is being held for the purpose of addressing the State's 208 areawide management planning effort. A major goal of the workshop is to mutually explore work requirements and problems that do not appear solvable within existing capabilities and then identify mechanisms to address such items. Short presentations will be made by leaders currently engaged in the 208 program to identify current problems. Mr. Ken Bartel, Chief, Office of Comprehensive Water and Wastewater Planning, Bureau of Water Quality Management, Department of Environmental Resources, will be a great speaker for the workshop.

The Water Resources Research Institute of The University of North Carolina is sponsoring this session.

IRRIGATION PROFITABLE EVERY YEAR

The North Carolina Irrigation Society recently sponsored a tour in Rowan County in which four commercial farming operations were visited by some 93 people of the State interested in irrigation. Some of these stops included irrigation of strawberries, soybeans, corn, tomatoes, and apples. Mr. Murray Corriher of China Grove is a leader in North Carolina in his work in the irrigation of small grains, corn, soybeans, and pasture. He has had eight years of irrigation experience with crops under different weather conditions and has found it to be profitable every year. Mr. Corriher consistently makes 50 bushels per acre yields of soybeans and 160 bushels of corn with the aid of irrigation. The Rowan farmer says that irrigation has paid and been profitable for him every year regardless of the existing weather conditions. One practice that he uses with success is corn followed by small grains and then sod planting soybeans. By having adequate soil moisture he consistently gets higher and more profitable yields from all of the crops in the rotation. Mr. Corriher's success profoundly demonstrated to the North Carolina Irrigation Society group the profitability of irrigation in a good management program.

GROWTH IN IRRIGATION USE EXPECTED IN NORTH CAROLINA

Irrigation in North Carolina is destined for a tremendous growth says Extension Specialist Ronald Sneed, Department of Biological and Agricultural Engineering at North Carolina State University. The growing interest is coming as farmers now realize more than ever that they are paying for irrigation whether they are using it or not. This, according to Charles Ritchie of China Grove, means that farmers are taking a loss either from frost damage to fruit and vegetable crops or from drought and reduced yields caused as a result of not having irrigation. Ritchie and his brothers have a capacity to irrigate 60 acres of strawberries and tomatoes simultaneously.

Currently, there are 125,000 acres irrigated annually in North Carolina. The momentum is increasing and it is anticipated that the acreage will double in the next five years. Some of this increase will come with the irrigation of more corn and soybeans.

In addition to the conventional systems in use, 60 traveler or hose-pulled machines each with a capacity to irrigate 80 acres have been purchased in North Carolina in the past three years. Large center pivot systems are also growing in popularity. There are also increases in the installation of solid-set and permanent systems.

Beyond the increase in irrigation used in North Carolina for standard crop production, there has been an expansion of its use in applying wastes from agricultural, municipal, and industrial operations. New systems going into operation in North Carolina

are larger and more of them are permanent set. These systems have the mains and the laterals buried, making fields more accessible for tractors and other equipment. They also reduce the amount of labor and encourage more timely irrigation.

Evidence points to irrigation being used more extensively and efficiently in 1977 than any previous year.

EPA APPROVES LEASING LAND FOR WASTEWATER, SLUDGE APPLICATION

The use of construction grant funds to lease land for the land application of sewage has been approved by the Environmental Protection Agency. Previous EPA policy required the outright purchase of such lands. The new policy is expected to lead to an increase in the number of sewage treatment plants which apply sewage (wastewater or sludge) directly to the land as part of the treatment process.

Land application in many cases can be more cost-effective than relying solely on expensive conventional technologies, according to the EPA. The technique also preserves open space, returns water and nutrients to the soil, and reduces the amount of sludge that must be disposed of by other means. Under the new policy, leasing may be approved only where it is less costly than outright purchase. Such leases will extend for a term of at least 20 years.

WORKSHOP ON LAND APPLICATION OF WASTES JUNE 1-2 and JUNE 15-16

The North Carolina Water Resources Research Institute, the Agricultural Extension Service, the Agricultural Experiment Station, and the North Carolina Department of Natural and Economic Resources are sponsoring two workshops on the land application of wastes. These workshops will be conducted at the Jane S. McKimmon Center for Extension and Continuing Education on the North Carolina State University campus, Raleigh, N. C. They are scheduled for June 1-2 and June 15-16, 1977, and each workshop is designed to meet the needs of a specific audience. The first workshop is designed for state and local government officials and the second is intended for industrial representatives and consulting engineers.

Participation in these workshops will be limited. The fee for this will be \$25 and includes the cost for two luncheons.

Emphasis in this workshop will be problem solving. Actual case studies of operating systems for municipal wastewater and sludge, industrial wastewater and sludge, and agricultural wastes will be examined. Each of these case studies has been selected to present important principles needed by those engaged in many aspects of land application. Participants will be able to work along with the designers of these existing systems and follow a system from the initial predesign phase through to the actual operational phase. The workshop sessions will be conducted by a panel, each of whom worked with

the subject system. The sessions will last approximately one and one-half hours and ample time has been allotted for questions and answers.

For program information contact Dr. James M. Stewart, Water Resources Research Institute, (919) 737-2815. For registration information contact Kelly Crump (919) 737-2261 at the Jane S. McKimmon Extension and Continuing Education Center, North Carolina State University, Raleigh, N. C. 27607.

EFFORTS MADE TO SIMPLIFY PERMIT-LETTING

Recommendations have been adopted by the N. C. Coastal Resources Commission which are designed to coordinate and simplify permit-letting in the State's coastal counties. The recommendations are contained in an eighteen-page report which will soon be presented to the N. C. General Assembly and appropriate state officials.

"From the viewpoint of coastal citizens, these recommendations could mean the process of obtaining permits would be initiated closer to home and would be simpler," explained Glenn Dunn of New Bern, attorney on the staff of the Commission.

Of chief concern in the report, which was circulated in draft form to local officials earlier this year, is the consolidation of three exclusively coastal permits which are now being administered by state and local agencies. Involved are state dredge and fill permits and coastal wetlands orders; state permits and licenses for the use of state-owned lands (easements related to dredge and fill); and local sand dune permits.

The soon-to-be-implemented Coastal Area Management permit program will attempt to coordinate and simplify these and other state, local and federal permits for development activities within Areas of Environmental Concern. Merging the three existing permits with the new program may require changing state statutes or administrative procedures, Dunn said.

Aware of the confusion which often surrounds coastal development permits, the Commission has recommended the establishment of informational offices throughout the coastal area. Under Commission proposals an applicant could fill out a single pre-application form and receive a complete package of information and necessary forms to apply for all required state permits. Eventually, local and federal permit applications should also be included in the package, according to the report.

Local informational offices would also be able to supply continuing advice and assistance throughout the permit application process.

The study and report are among the objectives of the Coastal Area Management Act of 1974. Most of the recommendations deal primarily with state permit procedures. However, a few recommendations touch on federal programs.

The report emphasizes changes in the state dredge and fill permit program "in order to pursue delegation of the Federal dredge and fill permit program to the State." In recent discussions, members of the Coastal Resources Commission have stated their recognition of the concern that the federal dredge and fill program causes among residents of coastal North Carolina.

"We have to look at federal permits differently," according to Dunn, "because we have no authority over federal agencies." However, Dunn added that the Coastal Resources Commission has made some recommendations in the report which could place the State in a better position in case delegation of some federal permit authorities ever becomes possible.

FLOODS RAVAGE SOUTHEASTERN STATES

In spite of extensive expenditures for flood control, ravages of nature still plague man. Three days of steady rain, particularly in West Virginia, Kentucky, and Alabama brought heavy flooding and left more than 23,000 people homeless and 19 people dead. Flood damage in eastern Kentucky alone was estimated at \$100 million. Numerous towns were completely flooded leaving them without electricity and food, and drinking water was in short supply.

An estimated 16,000 persons were driven from their homes in West Virginia with the worst flooding in decades.

OVERVIEW OF THE TOXIC SUBSTANCES CONTROL ACT

The Toxic Substances Control Act (TSCA) is intended to help control human health risks and environmental hazards caused by the use of chemicals. The serious effects caused by chemicals has received increased attention as chemical production and use has proliferated.

New chemicals continue to be developed and introduced at a rapid rate--up to 1,000 a year--for use in industries and homes. TSCA requires the U.S. Environmental Protection Agency (EPA) to (1) compile an inventory of the number of chemicals produced for commercial marketing and (2) determine the possible risk to human health and the environment from their use.

The inventory of existing chemicals is to be published by November 1977. EPA must be given a 90-day pre-market notification for new chemicals introduced for commercial use after this date. A list of approximately 30,000 chemicals obtained from governmental and private sources has already been compiled by EPA. Proposed rules and reporting forms for the official industry chemical survey were published in the Federal Register on March 9, 1977.

Responsibility for determining the health and environmental effects of new chemicals is placed upon those who manufacture or process the chemicals. Manufacturers and processors of chemicals suspected of being potentially harmful must conduct tests at their own expense according to Federal standards. EPA may limit, prohibit, or require appropriate labeling and safeguards for hazardous chemicals. Chemicals produced and distributed in violation of the new requirements are subject to Federal seizure and those responsible are liable to fines and imprisonment.

Manufacturers and processors are required to maintain records and submit reports on chemicals for which they are responsible. Small firms (to be defined) are exempted from these requirements after supplying pre-market notification and receiving EPA clearance to market the chemicals. Records of harmful reactions to the health of employees are to be made and retained for 30 years. Other adverse reactions are to be recorded and retained for 5 years.

Grants are to be made available to States to establish regulatory programs concerned with chemical hazards for which Federal action is not possible or unlikely. The grants can provide up to 75% of State program costs.

..... Lyle S. Raymond, Jr.

NEW RESEARCH SPECIAL AVAILABLE

Continuing its series of abbreviated summary reports (6 pp. or less) on special research topics, the Institute announces the following report issued this month:

The Trophic State of North Carolina Lakes, by,
Dr. Charles M. Weiss and Dr. Edward J. Kuenzler,
Department of Environmental Sciences and Engineering,
School of Public Health, University of North Carolina
at Chapel Hill.

LAKE RESTORATION PROJECTS FUNDED ON 50:50 BASIS

Sections 314 and 104 (h) of the Federal Water Pollution Control Act Amendments of 1972 authorize the U.S. Environmental Protection Agency to enter into contracts with or make grants to organizations for the purpose of developing and demonstrating new or improved methods for the prevention, removal, reduction, and elimination of pollution in lakes, including the undesirable effects of nutrients and vegetation. Under this law, Congress has appropriated \$38 million to be expended through 1977 for lake restoration and water quality protection activities. The program is designed to encourage corrective measures where non-point sources of nutrients and other pollutants promote the problem conditions.

Lake restoration demonstration projects are being funded by EPA's Office of Water Planning and Standards, Washington, D. C., on a 50:50 cost sharing basis. A variety of restorative techniques are being used; among these are best land use practices, establishment of buffer strips around lakes and along inflowing streams, use of stream filtration systems, diversion, nutrient inactivation (lake side and in situ), dredging and drawdown.

SMALL SEWAGE SYSTEMS MAY BE ELIGIBLE FOR GRANTS

Small sewage systems for clusters of homes may be eligible for federal funding. Because of the expense of central systems, EPA is now considering action which would

provide funds for the smaller systems. New or renovated septic tanks, holding tanks or package plant treatment systems may be more cost-effective than collection, interceptor and treatment networks.

EPA is now in final stages of preparing policy statements regarding this issue under the program. Funding for facilities to serve small groups of homes is available if the following criteria are met:

- A facility provides the most cost-effective method that satisfies all state and federal requirements;
- A project would belong to and be operated by a municipality;
- A project would be "located on public property except where easements will suffice;"
- A facility will provide a minimum of secondary treatment if it discharges to "a stream or other body of water;" and
- Land disposal techniques - including septic tank leach fields - satisfy all water and public health requirements.

THE INFLUENCE OF LAND USE ON STREAM NUTRIENT LEVELS

A U. S. Environmental Protection Agency report covers the first phase of what is believed to be the most comprehensive study ever made on relationships between land drainage areas and nutrient levels in streams. It presents National Eutrophication Survey data for 473 nonpoint source drainage areas in the eastern United States.

Single copies of the report are available free from: Office of Public Affairs, Corvallis Environmental Research Laboratory, 200 S.W. 35th St., Corvallis, OR 97330. Ask for publication number EPA-600/3-76-014.

UNITED NATIONS WATER CONFERENCE

Global water needs in developed and developing countries were discussed in a two-week conference last month in Argentina. The conference created new awareness of the dimension of problems in the water sector, a new consciousness of need for unified action and a sense of commitment. A product of the conference was the adoption of a plan of action urging international efforts to reach water quality and supply goals. A major goal calls for providing safe drinking water and sanitation to all people by 1990.

Charles H. Warren, Chairman of the President's Council on Environmental Quality, addressed the conference pointing out that the United States was "turning away from water development, which suggests increasing withdrawals from an unlimited supply, to water management, which stresses wiser use of a limited resource."

Three water needs and problems were stressed by Warren. In the area of community water and health, Warren recommended that "countries with less than abundant water supplies or with high population growth in areas of marginal water availability emphasize policies to show rates on population growth, encourage resource-oriented

internal immigration, stimulate reclamation and conservation and adopt development technologies appropriate to water supply."

With regard to food and fiber, Warren indicated that emphasis "should not be on the amount of new land and water that might be developed for agriculture, but rather on improving the effectiveness with which water and other production inputs are applied and managed on land already under cultivation." Warren also said that the U. S. pledged aid to people stricken by droughts and floods and called for "ways to expand our cooperative efforts around the globe to predict and then to mitigate such disasters."

SHORT COURSE ON WATER SUPPLY ENGINEERING QUALITY, TREATMENT, MANAGEMENT - MAY 23-25

Recent concern about the quality of our drinking water has led to passage, at the Federal level, of Public Law 93-523, the Safe Drinking Water Act, and has instilled in water supply professionals a renewed awareness of their responsibilities in providing the public with a safe and adequate supply of water. Accordingly, this intensive, 3-day short course in water supply engineering has been developed to provide an overview of the most current information in the field. The course is divided into three components dealing with water quality, water treatment, and water supply planning and management considerations. The course material will be presented from a state-of-the-art standpoint and is directed at consulting engineers, water utility managers, and governmental health and regulatory agency personnel. Previous education and experience in the water supply field is a pre-requisite for the course.

For registration details contact Ms. Cindy Stubblefield, Continuing Education, University of North Carolina at Chapel Hill, School of Public Health, 201 H, Chapel Hill, N. C. 27514.

OTHER CONFERENCES AND WORKSHOPS

Institute on River Mechanics - Modeling of Rivers

The purpose of the Institute is:

- To present knowledge on the variability and prediction of flows, river morphology, sediment transport, measurement techniques, reservoir sedimentation, channel stability and river behavior.
- To present lectures by leading specialists on river models such as the Hydrocomp model, HEC computer models 1-6, Colorado State University models, construction and application of water quality models, thermal pollution models and modeling of ice.
- To illustrate river behavior by laboratory demonstrations.

The session will be held July 5-15, 1977, at the Colorado State University Campus, Fort Collins, Colorado.

Address correspondence to: H. W. Shen, Professor of Civil Engineering, Engineering Research Center, Colorado State University, Fort Collins, Colorado 80523, Telephone (303) 491-8552.

Workshop on Storm Sewer System Design

The purpose of this Workshop is to acquaint participants with the latest computer assisted methods for design of storm sewers. These design methods are useful to engineers for solving problems in urban storm water drainage, municipal flood control and water pollution problems associated with Public Law 92-500, Federal Water Pollution Control Act, Amendments of 1972.

The Workshop will be held May 23-25, 1977, on the campus of the University of Illinois at Urbana-Champaign.

For registration information contact the University of Illinois, Conferences and Institutes OK 555, 116 Illini Hall, Champaign, Illinois 61820.

Environmental Law for Engineers and Administrators

This course is designed for engineers dealing with products or processes with the potential for environmental impact, for administrators in government and business, and for others who interact with governmental agencies or the public on matters of environmental concern.

The course will present the basic federal and related state laws concerning air and water pollution, energy, and land use. The National Environmental Policy Act and its implications for the public and private sectors will be discussed. Federal enforcement policies will also be examined and discussed.

For details apply by letter or telephone Continuing Engineering Education Program, George Washington University, Washington, D.C. 20052, (202) 676-6106, or the toll free number (800) 424-9773.

Waste Heat Management and Utilization Conference

Since the August 1968 National Symposium on Thermal Pollution, much knowledge has been developed on thermal effects by engineers, scientists and government specialists whose expertise touches on this important subject. However, reputable sources forecast that increasing electrical energy demands during the balance of this century will be met in large part by the construction of thermal stations - both fossil and nuclear. At the same time, the pattern of future site development apparently tends toward larger thermal power plants than has been the case in the past. The Federal Power Commission has estimated that approximately 395 new sites will be needed by 1990 for large thermal stations (nuclear and fossil plants). Many of these stations will exceed 1000 MW_e because large stations are generally more efficient and economical than small stations. The effort to "standardize" nuclear units to reduce licensing lead times (currently nearly 10 years) will also encourage large identical-design multi-unit stations (mini-energy centers). This trend heightens the need for environmentally sound waste heat management schemes.

Beneficial uses of waste heat need to be investigated. Aquaculture, greenhouses, home heating and low-temperature difference engines can use the low grade waste heat that is available in abundance.

This conference provides a forum for exchange of ideas between people involved in different facets of the problem. Biologists, physicists, engineers, and administrators should approach the problems from a system viewpoint to achieve consensus regarding environmental standards, utilization and management of waste heat.

The conference will be held in Miami, Florida on May 9-11, 1977.

For conference details contact: Tony Pajares, Conference Services, University of Miami, P.O. Box 248005, Coral Gables, Florida 33124.

Environmental Litigation

American Law Institute - American Bar Association's second annual week-long course of study on *Environmental Litigation* will be one of two programs to be offered on July 17-22, 1977, at the University of Colorado. The course will be presented at and with the cooperation of the University of Colorado School of Law at Boulder.

The intensive week-long course in environmental litigation will deal with the practice, procedures, and techniques in a variety of types of environmental court and administrative actions and proceedings.

WATER RESOURCE CONDITIONS IN NORTH CAROLINA

Widespread rains occurred frequently during the month and flows in most streams increased to near normal conditions. Monthly-mean flows were generally above the long-term average for March in the Mountains, Southern Piedmont, and Coastal Plain regions. Flows in the northern Piedmont were about 25% below normal.

Heavy rains in the Mountains on the 12th and 13th caused moderate rises on most western streams and minor flooding in the French Broad River basin. On March 30, rainfall amounts to 4-1/2 inches in the southern Piedmont caused minor flooding in parts of Gaston and Mecklenburg counties. No deaths or injuries were reported and property damages caused by the flooding were minor.

At the close of the month, most streams were well above normal.---Flows on the 31st ranged from 12% above normal in the Yadkin River at Patterson to over 4 times normal March flow in the Little Tennessee River at Needmore.

Ground-water levels rose during the month. As compared to long-term records for March, levels were above normal in the Mountain and Coastal Plain regions and slightly below normal in the Piedmont region.

POSITIONS AVAILABLE

Faculty positions in water resources and hydraulics in the College of Engineering, University of Iowa: two faculty positions at the Assistant Professor level with joint appointments between the Division of Energy Engineering and the Iowa Institute of Hydraulic Research. One position is available in the area of Water Resources Engineering and involves teaching and research in hydrology, stochastic hydrology, water resources systems and related areas. The second position is in the area of Fluid Mechanics or Hydraulic Engineering. Applications with a detailed resume and four references should be mailed prior to May 15, 1977, to: Faculty Search Committee, Iowa Institute of Hydraulic Research, University of Iowa, Iowa City, Iowa 52242.

California State University, Fresno has two positions open. Soils-Natural Resources: Applicants should have a major emphasis in soil and water management and conservation. The successful candidate will have knowledge of the principles of irrigated agriculture, soil development and classification with interest in environmental management, soil conservation, especially in relation to production agriculture. Vegetable Crops: Applicants need a broad background in vegetable production, plant physiology and/or plant breeding. Correspondence, applications, and confidential papers should be sent to: Dr. Harry P. Karle, Chairman, Department of Plant Science, California State University, Fresno, Fresno, California 93740, Phone (209) 487-2861.

WATER RESOURCES LEGISLATION IN NORTH CAROLINA

Bills Introduced

House

H 383 Septic tank permit appeal procedure

"To amend G.S. 130-166.29 to extend the time period in which the local health director must forward the records to the local board of health in an appeal from an appeal from an adverse decision concerning an improvement permit or certificate of completion for a ground absorption sewage system." Amends cited statute as title indicates; raises from three to fifteen days the time in which local health director must forward record on appeal. Effective July 1, 1977.

H 425 Litter assessment, pop top ban

"To provide for litter control, resource recovery and solid waste management in North Carolina." Adds new Article 13D to GS Ch. 130 to levy assessments against certain types of business for litter they produce, and to provide for the disposition of the funds collected by the assessment. Defines litter as any rubbish, waste material, other discarded materials of every kind. Levies annual litter assessment to be collected by Dep't of Revenue as follows: .015% times gross proceeds of products manufactured and sold within state for manufacturers, with similar assessments to be levied on wholesalers and retailers. Provides that assessment to be calculated upon proceeds from manufacture or sale of food, groceries, tobacco products, soft drinks, wine, beer, alcoholic beverages, newspapers, house-hold paper products, glass and metal containers, plastics, cleaning agents, nonprescription sundry products, tires and batteries. Authorizes dep't to promulgate regulations to further define items upon which litter assessment to be made, according to specified standards. Makes provisions of Schedule J, Article 9 of Chapter 105 (taxation--penalties and remedies) applicable, except that penalty of additional amount equal to unpaid tax to be assessed for any violation set forth in G.S. 105-236(3)-(6) (failure to file return, failure to pay tax when due, negligence, fraud). Establishes non-lapsing "litter control fund" under control of Dep't of Human Resources to be funded by money collected by Dep't of Revenue under new act. Provides that Dep't of Human Resources may authorize disbursements from litter control fund to provide additional receptacles or personnel for controlling litter at state operated facilities other than highways, for grants to local government for purchasing or service of receptacles or collection equipment, to assist anti-littering or resource recovery education programs, to assist programs of research and development in litter control, or to hire additional personnel within Solid Waste and Vector Control Branch of Sanitary Engineering Section of the Dep't of Human Resources to study and promote resource recovery. Authorizes Dep't of Human Resources to adopt anti-littering symbol, adopt specifications for litter receptacles, promulgate regulations for placement and servicing of receptacles, and promulgate regulations to control litter and promote resource recovery.

Adds new G.S. 14-399.1 to prohibit any person, firm, etc. from manufacturing, selling or possessing for the purpose of sale beverage containers having detachable pull-tab tops or held together by plastic retaining loops after April 1, 1979. Violation to constitute misdemeanor punishable by fine of \$100 for first offense and \$1000 for second or subsequent offense with each day's violation to constitute separate offense. Effective January 1, 1978.

H 699 Environmental Policy Act extended

"To continue the North Carolina Environmental Policy Act." Amends Ch. 1203, SL 1971 (Environmental Policy Act) to make it permanently effective. Act originally to expire on Sept. 1, 1973 and Ch. 119, SL 1973 extended act to Sept. 1, 1977. Act requires undertakings financed by state funds to be preceded by environmental impact statement.

WATER RESOURCES LEGISLATION IN THE CONGRESS

Bills Introduced

Senate

- S. 863 To authorize the Secretary to engage in a feasibility investigation
H.R. 4655 of a potential water resource development.
- S. 1028 To extend certain authorities of the Secretary with respect to water
H.R. 4746 resources research and saline water conversion programs.
- S. 1057 To provide a comprehensive program with respect to liability and compen-
sation for damages and cleanup costs caused by oil pollution.
- S. 1143 To assure more adequate supplies of water to the nation.

House

- H.R. 4461 To assure that weather modification activities and the collection of
hydrometeorological information necessary to the management of water
resources can be conducted in conjunction with the management and
administration of wilderness areas and other Federal lands.
- H.R. 4593 To extend until Oct. 1, 1980, Seal Beach, Great Dismal Swamp, and San
Francisco Bay NWR's appropriations.
- H.R. 5630 To amend the Coastal Zone Management Act of 1972 to provide for the
sharing of OCS revenues with coastal states.

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.)

Abbreviations used throughout as follows:

ARS	- Agricultural Res. Service	OWP	- Office of Water Programs
ASCE	- American Society of Civil Engineers	OWRT	- Office of Water Research & Technology
CEQ	- Council on Environmental Quality	RTI	- Research Triangle Institute
DEM	- Division of Environmental Management	SCS	- Soil Conservation Service
EDS	- Environmental Data Service	TVA	- Tennessee Valley Authority
EMC	- Environmental Management Comm.	UCOWR	- Universities Council on Water Resources
EPA	- Environmental Protection Agency	UNC-SG	- University of N.C. Sea Grant
ERC	- Engineering Research Center	USDA	- U. S. Department of Agriculture
ERS	- Economic Research Service	USDC	- U. S. Department of Commerce
GAO	- General Accounting Office	USDI	- U. S. Department of the Interior
IHD	- International Hydrological Decade	USGPO	- U. S. Government Printing Office
IWR	- Institute for Water Resources	USGS	- U. S. Geological Survey
NAS	- National Academy of Sciences	WPC	- Water Pollution Control
NCDNER	- N.C. Dept. of Natural & Economic Resources	WQS	- Water Quality Standards
NERC	- National Environmental Research Center	WRC	- Water Resources Council
NOAA	- National Oceanic & Atmospheric Adm.	WRI	- Water Resources Institute
NPS	- National Park Service	WRRC	- Water Resources Research Center
NSF	- National Science Foundation	WRRRI	- Water Resources Research Institute
NTIS	- National Technical Information Service	WRSIC	- Water Resources Scientific Information Center
NWC	- National Water Commission		

Water Resources Planning

- "Laws of North Carolina Relating to Environmental Management," by N.C. DEM, DNER, Raleigh, NC 27611.
- "A Unified National Program for Flood Plain Management," 7/76, by U.S. WRC, 2120 L. St., N.W., Wash., DC 20037.
- The following reports dealing with Flood Plain Problems by G. R. Wall, *et al*, are avail. from TVA, Home Fed. Bldg., Knoxville, TN 37902:
- "Interdisciplinary Approach to Flood Plain Problems," 1/72, Price - 50¢.
- "TVA - A Theatre of Innovation," 7/75.
- "Administrative Law and the Use of Flood Plain Lands," 1968.
- "Establishing an Engineering Basis for Flood Plain Regulations," 12/69.
- "Two Decades of Flood Plain Management - The TVA Regional Experiences," 5/74.
- "Effect of Antecedent Conditions on Frozen Ground Floods," (A-045-IDA), 1/77, by R. Pedersen, *et al*, WRRRI, U. of ID, Moscow, ID 83843.
- "Interest Group Perceptions of Development Issues in Tidewater Virginia," (Bul. #101), 3/77, by K. E. Smith, *et al*, WRRRI, VPI & St. U., Blacksburg, VA 24061.
- "Land and Water: North Carolina's Vital Resources," (1/77), by USDA, SCS, 310 New Bern Ave., P.O. Box 27307, Raleigh, NC 27611.
- "Florida Water Resources Law: A Bibliography," (OWRT/WRSIC 77-200), 1/77, ed. by R. H. Lasris, avail. from WRSIC, OWRT, USDI, Wash., DC 20240.
- "Water Resources of the Missouri River Basin," (94th Congress, 2d Session), 11/76, by Env. & Nat. Res. Policy Div. Congressional Research Serv., Lib. of Congress, avail. from USGPO, Wash., DC 20402.
- "The National Safe Drinking Water Act," 7/76, by Dr. J. W. Hernandez, *et al*, NM St. U., College of Eng., Box 3449, Las Cruces, NM 88003.
- "Proceedings North Carolina Irrigation Conference," 10/76, ed. by R. E. Sneed, Dept. Bio & Agr. Engr., 211 Weaver, NCSU, Raleigh, NC 27607.
- "Water Resources Research & Education Bicentennial and Beyond (Proceedings)," 7/76, ed. by N. R. Thomsen, *et al*, UCOWR, Nebraska Water Res. Center, 310 Ag. Hall, U. NE, E. Campus, Lincoln, NE 68583.
- "Analysis of Supply and Demand of Urban Oriented Non Reservoir Recreation," (#65-R2), by US Army Eng. Dist., Sacramento, avail. from NTIS, Springfield, VA 22151.
- "User's Manual for the M.I.T. Transient Water Quality Network Model--Including Nitrogen-Cycling Dynamics for Rivers and Estuaries," (EPA-600/3-77-010), 1/77, by D. R. F. Harteman, *et al*, for EPA, avail. from NTIS, Springfield, VA 22151.

Water Quality Management

- "A Model for Oxygen and Biomass Production in a Mass Algal Culture," (TR#84), 1/77, by F. P. Incropera, *et al*, Purdue U. WRRRI, West Lafayette, IN 47907.
- "An Experimental Investigation of Some Combined Flow Sediment Transport Phenomena," (UNC-SG-77-04), 2/77, by L. Bliven, *et al*, UNC Sea Grant College Prog., 1235 Burlington Labs., NCSU, Raleigh, NC 27607.

- "Nationwide Evaluation of Combined Sewer Overflows and Urban Stormwater Discharges Volume II: Cost Assessment and Impacts," (EPA-600/2-77-064), 3/77, by J. P. Heaney, *et al*, for EPA, avail. from NTIS, Springfield, VA 22151.
- "Treatment of Combined Sewer Overflows by High Gradient Magnetic Separation," (EPA-600/2-77-015), 3/77, by D. M. Allen, *et al*, for EPA, avail. from NTIS, Springfield, VA 22151.
- "Validity of Laboratory Tests for Predicting Copper Toxicity in Streams," (EPA-600/3-76-116), 12/76, by J. R. Geckler (Deceased), *et al*, for EPA, avail. from NTIS, Springfield, VA 22151.
- "The Dynamics of an Estuary as a Natural Ecosystem," (EPA-600/3-77-016), 1/77, by F. J. Vernberg, *et al*, for EPA, avail. from NTIS, Springfield, VA 22151.
- "Leather Tanning and Finishing Waste Management Research and Development Program," (EPA-600/2-76-230), 9/76, by J. F. Scaief, for EPA, avail. from NTIS, Springfield, VA 22151.
- "Techniques of Water Resources Investigations of the United States Geological Survey: Guidelines for Collection and Field Analysis of Ground-Water Samples for Selected Unstable Constituents," (Bk 1, Ch. D2), 76, by W. W. Wood, avail. from USGPO, Wash., DC 20402.
- "Industrial Waste and Pretreatment in the Buffalo Municipal System," (EPA-600/2-77-018), 1/76, by T. E. Short, Jr., *et al*, for EPA, avail. from General Services Admin. (8FFS), Centralized Mailing Lists Services, Bldg. 41, Denver Federal Center, Denver, CO 80225, (MCD #31).
- "Massachusetts Lake Classification Program, (9336-11-200-12-76-CR), 12/76, by Dept. of Env. Quality Engr., Div. of Water Pollution Control, Westborough, MA 01581.
- "Lake Drawdown as a Method of Improving Water Quality," (EPA-600/3-77-005), 1/77, by J. L. Fox, *et al*, for EPA, avail. from NTIS, Springfield, VA 22151.
- "Design Parameters for the Land Application of Dairy Manure," (EPA-600/2-76-187), 10/76, by S. D. Klausner, *et al*, for EPA, avail. from NTIS, Springfield, VA 22151.
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- "Nitrogen and Metal Contamination of Natural Waters from Sewage Sludge Disposal on Land," (#89) 12/76, by L. E. Sommers, *et al*, WRRRC, Purdue U., West Lafayette, IN 47906.
- "Toward Simulation and Systems Analysis of Nutrient Cycling in the Okefenokee Swamp, Georgia," (ERC 01-77), 1/77, by E. J. Rykiel, Jr., Env. Res. Center, GA Inst. of Technology, Atlanta, GA 30332.
- "A Study of Nutrient Cycling in a Riverine Swamp Forest Ecosystem in North Carolina," 3/77, by M. M. Brinson, *et al*, Dept. of Biology, ECU, Greenville, NC 27834.
- "Anaerobic and Aerobic Treatment of Combined Potato Processing and Municipal Wastes," (EPA-600/2-76-236), 9/76, by J. K. Neel, *et al*, for EPA, avail. from NTIS, Springfield, VA 22151.
- "Control of Sediments, Nutrients, and Adsorbed Biocides in Surface Irrigation Return Flows," (EPA-600/2-76-237), 10/76, by D. L. Carter, *et al*, for EPA, avail. from NTIS, Springfield, VA 22151.
- "Laws & Rules for Ground Absorption Sewage Disposal Systems of 3000 Gallons or Less Design Capacity, (Section 1900 of the NC Administrative Code, Title 10, Dept. of Human Resources, Chapter 10, Health Services; Sanitary Engineering, Subchapter 10A Sanitation)," 7/77, by NC Dept. of Human Res., Div. of Health Ser., San. Engr. Sec., PO 2091, Raleigh, NC 27602.
- "Rapid Infiltration of Primary Sewage Effluent at Fort Devens, Massachusetts," (#76-48), 12/76, by M. B. Satterwhite, *et al*, avail. from US Army Cold Regions Research and Eng. Lab., Hanover, NH 03755.
- "Treatment of Primary Sewage Effluent by Rapid Infiltration," (#76-49), 12/76, by M. B. Satterwhite, *et al*, avail. from US Army Cold Regions Research & Eng. Lab., Hanover, NH 03755.

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- "Urban Runoff Pollution Control Technology Overview," (EPA-600/2-77-047), 3/77, by R. Field, *et al*, for EPA, avail. from NTIS, Springfield, VA 22151.
- "Determination of Snow Depth and Water Equivalent by Remote Sensing," (#76), 6/76, by H. W. Steinhoff, *et al*, Env. Resources Center, CO St. U., Ft. Collins, CO 80521.

Miscellaneous

- "Cost Sharing as an Incentive to Attain the Objectives of Shoreline Protection," (NBSIR 73-294), 12/73, by H. E. Marshall, Technical Analysis Div., Inst. for Applied Tech., Nat'l. Bu. of Standards, Wash., DC 20234.
- "Federal Cost Sharing Policies for Water Resources," (10 666), 12/71, by H. E. Marshall, *et al*, USDC, Nat'l. Bu. of Standards, Wash., DC 20234.
- "Analysis of Cost Sharing Programs for Pollution Abatement of Municipal Wastewater," (NBSIR 74-479), 9/74, by H. E. Marshall, *et al*, Building Economics Section, Inst. of Applied Technology, Nat'l. Bu. of Standards, Wash., DC 20234.
- "The Dune Book: How to Plant Grasses for Dune Stabilization," (UNC-SG-76-16), 12/76, by J. Seltz, UNC-SG, 1235 Burlington Labs, NCSU, Raleigh, NC 27607.
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- "Soil Water Air Sciences Research," 1976, by USDA, ARS, Beltsville, MD 20705.
- "An Economic Analysis of Solar Water and Space Heating," (DSE-2322-1), 11/76, by Energy Research and Development Administration, Div. of Solar Energy, avail. from USGPO, Wash., DC 20402, Price - \$1.85.
- "United States Directory of Sources: United States International Environmental Referral Center," (EPA-840-76-007), 11/76, by USEPA, avail. from US International Env. Referral Center, US EPA, 401 M St., SW (Rm 2902 WSM), Wash., DC 20460.

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- "Nationwide Evaluation of Combined Sewer Overflows and Urban Stormwater Discharges Volume II: Cost Assessment and Impacts," (EPA-600/2-77-064), 3/77, by J. P. Heaney, *et al*, for EPA, avail. from NTIS, Springfield, VA 22151.
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