NEWS
WATER RESOURCES RESEARCH INSTITUTE
OF THE UNIVERSITY OF NORTH CAROLINA

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EDITORIAL

THE LAKE GASTON CONTROVERSY

By Neil S. Grigg

Why does the Corps of Engineers continue to suggest that North Carolina water be diverted to supply the Norfolk area? Is it really North Carolina's water? Why can't the North Carolina-Virginia Governor's Water Committee solve this? (See Lake Gaston story inside.)

We really shouldn't be surprised at conflicts over water allocation, especially between states. This is old hat in the West, where water is scarce.

All of these water questions, be they Lake Gaston, the Yadkin, the Chowan, Lake Jordan, or wherever, beg for strong State leadership in water management, including planning, development, operation, and regulation.

We would like to see North Carolina develop the finest program of water management in the country. The expertise is here, and now is the time to begin.

EDITORIAL

SAFE DRINKING WATER ACT DEBATE CONTINUES

By Neil S. Grigg

The AWWA August *Journal* reported that EPA's final round of hearings on regulations for organics and water drew "fiery criticism." The level and intensity of the testimony is impressive. The first actor is the American Water Works Association (AWWA), which has taken the position that EPA is acting prematurely in requiring removal of these organics with granular activated carbon (GAC) filters. They support their testimony with experts including medical doctors, prestigious researchers, water officials, and other scientists.

AWWA described support for the EPA position coming through Ralph Nader, who stated that not only was the EPA position correct, but that it did not go far enough.

Sam Baxter, former Water Commissioner for Philadelphia, reported that the original EPA cost figures would probably have to be raised about 400% to cover the actual cost of introduction of these standards. This would represent tremendous expenditures and cost to the American public.

We are glad to see the intensity and level of this debate. It will guarantee that the decision is made out in the open and that the nation's professional and scientific water community is properly involved.

EDITORIAL

INDIA SETS DRINKING WATER GOALS

By Neil S. Grigg

The *New York Times* of August 6 reported that India has set a goal of supplying water to all its villages in the next five years. We are accustomed to the use of five-year plans as goal-setting devices for socialist countries such as the USSR and some developing countries such as India, and in its next five-year plan, the government has set the goal to bring water to every village by 1983 at a cost of one billion dollars.

With our difficulties in the U.S., including such items as inflation, the decline of the dollar, and air and water pollution, we should not forget that the majority of the earth's population do not even have access to a good, safe water supply.

This drastic need has been identified by the United Nations and by practically every other international aid agency in the last five years. The decade of the 80's is being promoted as the "Drinking Water Supply Decade" by the United Nations.

At the same time that we raise questions about the usefulness of international fora such as the United Nations for political purposes, we should not forget that there are many groups working behind the scenes for worthwhile projects such as bringing water to the rural poor.

CHRISTMAN TESTIFIES BEFORE DRINKING WATER GROUP

Russell F. Christman, Chairman of the Department of Environmental Sciences and Engineering, UNC-Chapel Hill, testified on August 22 before the National Drinking Water Advisory Council. Christman is a well-known researcher in the field of drinking water quality and is a former member of the Council. He is currently Editor of the well-known journal, *Environmental Science and Technology*.

To summarize Christman's testimony, he asked the following five questions:

1. Are significant numbers of water consumers exposed to organic chemicals in their drinking water?

2. Is there any reason to believe that this exposure may have any adverse effect on their health?

3. Does the technical capability exist for monitoring and removing these contaminants?

4. Can anything be done to increase public health protection from a reasonable cost perspective?

5. Does the law prescribe certain actions to be taken in the event that the answers to these questions are in the affirmative, and do the proposed regulations reflect this legal mandate?

Christman's written testimony ran into several pages, with the answers summarized as follows:

Regarding the numbers of people exposed to hazards, there are a number of uncertainties regarding this question. Christman states that national cancer experts are comfortable with the conclusions that:

1. Some known human carcinogens have been found in drinking water.

2. Chemicals shown to cause cancers in animal studies are commonly found in drinking water.

3. Exposure to even small amounts of carcinogenic chemicals poses some risk, and repeated exposure amplifies the risk.

4. Cancers induced by exposure to small amounts of chemicals may not be manifested for great periods of time.

5. Portions of the exposed population are at greater risk than others.

This means that the answers to questions 1 and 2 are "yes."

Regarding the question about technical capability and cost of implementing precautionary measures, Christman concluded that the technical capability for monitoring and treating organics in drinking water is present and that the cost would be reasonable, on the order of $10 to $20 per customer per year. This works out to a cost of $1 to $2 per month on a water bill. He stated that alternatives to chlorination were still in the research stage and could not be considered operational.

Finally, Christman stated that the regulations proposed by EPA are reasonable within the framework of law which he has examined.

WORKSHOP ON FEDERAL FUNDS FOR ALTERNATIVE AND INNOVATIVE WASTEWATER SYSTEMS - OCTOBER 18

Under the terms of the Clean Water Act of 1977, the State must set aside 4% of its construction grant monies for FY 79 (approximately $100 million). This set-aside must be used to fund alternatives to conventional treatment works for communities with a population of 3,500 or less. The law also requires the State to create a 2% set-aside to be used to increase the amount of the federal grant from 75% to 85% for projects using innovative or alternative processes.

In FY 79 North Carolina will set aside nearly six million dollars for special support to innovative or alternative wastewater treatment processes. These special incentive funds, if spent in their entirety, would involve projects with total costs in excess of fifteen million dollars.

The federal law specifies a continuing commitment to innovative and alternative wastewater treatment systems. Over the three-year period set forward in the law, the State will be required to direct nineteen million dollars to these two set-aside categories. If all these funds are committed, some seventy million dollars will be spent on total project costs.

To further explain provisions of the federal law and to review specific types of alternative systems, the following program has been developed:

WORKSHOP FOR FEDERAL FUNDS FOR ALTERNATIVE AND INNOVATIVE WASTEWATER SYSTEMS

9:00- 9:15	Welcome - Neil S. Grigg, Director, Water Resources Research Institute

Program Chairman, David Adams, Assistant Secretary of the Department of Natural Resources and Community Development

9:15- 9:35	National Clean Water Goals - A. F. McRorie, Director, Division of Environmental Management
9:35- 9:55	Planning for Implementation - R. W. Van Tilburg, Assistant Director for Planning, Division of Environmental Management
9:55-10:15	What is innovative and alternative technology and why is Congress willing to pay for it? - Coy M. Batten, Local Programs Planning, Division of Environmental Management
10:15-10:45	BREAK

Program Chairman, Marshall Staton, Director, Sanitary Engineering Section, Division of Health Services

10:45-11:10 Alternative Systems for on-Site Disposal and Cluster Developments - Bob L. Carlile, Extension Specialist, Soil Science Department, North Carolina State University

11:10-11:35 Land Treatment - A Cost Effective Alternative - Frank Humenik, In Charge of Extension, Biological and Agricultural Engineering Department, North Carolina State University

11:35-12:00 Question-and-Answer Session

12:00- 1:30 LUNCH - "Clean Water and North Carolina Growth" - Secretary Howard N. Lee, Secretary, N.C. Department of Natural Resources and Community Development.

Program Chairman, Anne Taylor, Policy Advisor on Natural Resources, North Carolina Department of Administration

1:30- 2:00 Practical Consideration in Establishing Cluster Systems - Al Rimer, Department of Civil Engineering, Duke University

2:00- 2:30 Cost Effectiveness - Michael R. Overcash, Department of Biological and Agricultural Engineering and Agricultural Experiment Station, North Carolina State University

2:30- 3:50 Panel of experts responding to innovative and alternative systems

Panel Members:
- Bob Rubin, Agricultural Extension Service
- Frank Humenik, Agricultural Extension Service
- Buck Kennedy, L. E. Wooten Associates
- Steve Steinbeck, Sanitary Engineering, Division of Health Services
- Bob Carlile, Soil Science Specialist
- Dave Reynolds, Triangle J 208 Coordinator
- Coy Batten, Division of Environmental Management
- Al Rimer, Duke University

3:50- 4:00 Closing Remarks - Neil S. Grigg

The workshop, which will be held at the McKimmon Center at N.C. State University, Raleigh, North Carolina, is sponsored by: Water Resources Research University of The University of North Carolina, North Carolina Agricultural Extension Service, North Carolina Agricultural Experiment Station, North Carolina Department of Human Resources, North Carolina Department of Natural Resources and Community Development, North Carolina Association of County Commissioners, and the North Carolina Department of Administration.

NORTH CAROLINA STORMWATER WORKING GROUP MEETS

On September 7, a small group of city, county, and State engineers met to discuss the potential information of a working group to study stormwater management. The purpose of the group would be to develop a program of research and information transfer on the unique problems of stormwater management faced by cities and counties in North Carolina. Convened by WRRI, the meeting was attended by representatives of the State Department of Natural Resources and Community Development and the following local governments: Chapel Hill, Orange County, Mecklenburg County, Guilford County, the City of Gastonia, and the City of Greensboro.

There was discussion about the feasibility of forming a working group in stormwater management. Research would be initiated on a number of practical stormwater management questions which are shared by local governments. An initial list of typical problems which are faced is as follows:

1. How to develop and finance adequate stormwater systems;
2. How to maintain stormwater management facilities;
3. How to assess developers for off-site costs;
4. Whether and how to require detention storage systems, locally or regionally;
5. How to develop master drainage plans;
6. How to work with the State Government and Federal Insurance Administration;
7. How to develop master drainage plans;
8. What kind of construction standards to require for new developments in urban and suburban situations;
9. How to integrate urban runoff quality considerations with stormwater management, urban flood control, and erosion and sedimentation control programs; and

10. How to develop and implement erosion control programs.

As a result of the meeting, WRRI agreed to undertake the following tasks:

1. To locate research resources for a comprehensive program in stormwater management;

2. To develop a program of information collection and dissemination for city engineers and public works directors on new and innovative management approaches to stormwater management;

3. To obtain and test a recent PhD dissertation on the subject of developing integrated stormwater management programs;

4. To enter into discussions with the Town of Chapel Hill on a cooperative research program related to stormwater management;

5. To consider the organization of a State or regional conference on the subject of approaches to stormwater management; and

6. To work with the State Government toward a discussion of potential State legislation, new programs, specific research projects, the development of educational programs, and a possible newsletter for city engineers in stormwater management.

The possible future organization and coordination of the working group is an open question. Representatives of North Carolina cities, counties, the State Government, and the private sector are welcome to communicate with WRRI if they have an interest in participating in a possible extension of the working group.

PCB DISPOSAL A PROBLEM - ARREST MADE

What do you do with PCB- (polychlorinated biphenyls) contaminated soil from the roadside of over 270 miles of N.C. roads? Plans being considered by the North Carolina Department of Human Resources and by the Environmental Protection Agency call for the over 40,000 cubic yards of PCB-contaminated dirt to be removed from the roadside to a depth of three inches and buried in an area buffered by dense clay or lined with plastic. Finding a suitable site has been complicated by the difficulty in obtaining sites which meet the technical qualifications. There are also the problems of overcoming the opposition of property owners near the proposed sites. Governor Hunt called on citizens to offer land for storage of the contaminated soil.

Three New York men have been arrested and charged with illegally dumping PCB-containing wastes they allegedly procured from Ward Transformer Company. The arrest came after a month-long search for the dumpers by the SBI and law enforcement agents in surrounding states. The dumpings are believed to be the result of "waste scavengers" attempting to circumvent the Toxic Substance Control Act, which went into effect August 1.

LAKE GASTON SITE APPROVED BY NORFOLK ARMY CORPS OF ENGINEERS

Despite opposition from North Carolina officials, the Army Corps of Engineers, Norfolk District Office, approved pumping water from Lake Gaston, which straddles the Virginia-North Carolina border, to supply the future needs of southeastern Virginia. The proposal must go through a series of reviews by higher Corps authorities and could take as long as four years before final authorization. If approved, the Lake Gaston plan could be ready by 1988.

While the federal government would finance the project to pipe the water from Lake Gaston to the Tidewater area, customers taking water from the pipeline would have to repay the cost. The Corps has estimated the system will cost $278 million, but could eventually be as much as $400 million.

North Carolina Governor James B. Hunt has stated that "we will go to court to oppose this proposal." A Virginia-North Carolina Water Sources Study Committee had little opportunity for input into the Corps decision. It is anticipated that the Chief of the Corps of Engineers will solicit views from officials in Virginia and North Carolina before sending the proposal to the Secretary of the Army and the President's Office of Management and Budget.

The Norfolk District Engineer for the Corps of Engineers, Colonel Douglas L. Haller, indicated that:

> "Lake Gaston was the more desirable alternative because it could be implemented without construction of a major impoundment. Construction with the [Lake Gaston Alternative] would involve only intake structures, pumping stations, pipelines, and treatment facilities; therefore, it is not anticipated that any families would be displaced or that any highways would be abandoned. The impacts upon agriculture, wetlands, and other fish and wildlife habitat, including that of rare, threatened, or endangered species, would also be minimized."

UNC GROUP GETS NSF GRANT ON FLOOD PLAIN LAND USE MANAGEMENT

Dr. Raymond J. Burby, III, with the Center for Urban and Regional Studies of The University of North Carolina at Chapel Hill will be the principal investigator for a new National Science Foundation-supported project titled "Requirements for Evaluating the Effectiveness of Flood Plain Land Use Management."

Floods are the most widespread geophysical hazard in the United States. In an effort to reduce national flood losses, federal and state policies have increasingly stressed the need for community land use management of flood plains as an alternative and/or supplement to structural flood control measures. However, the effectiveness of flood plain land use management techniques, where adopted, has been questioned on a number of grounds, so that the nation may be pursuing less than optimal flood plain policies. Before these questions can be systematically answered and better policies can be devised, the meaning and measurement of effective flood plain land use management must be better understood.

The primary objective of this research is to provide an improved capability for evaluating the effectiveness of flood plain land use management from federal, state, and local perspectives. The study is expected to take approximately 15 months to complete.

CHOWAN RIVER ALGAE BLOOM MONITORED BY ENVIRONMENTAL MANAGEMENT

During August and September, the Division of Environmental Management undertook intensive sampling efforts at 23 locations on the Chowan River to attempt to isolate possible sources of nutrient input. The algae bloom has in recent weeks been a problem in the lower portion of the Chowan River, especially around the Edenton area and upriver as far as Holiday Island. No specific sources of nutrients were isolated as a result of the recent monitoring.

An Institute report (number 121) by Dr. Donald W. Stanley and Dr. John E. Hobbie titled "Nitrogen Recycling in the Chowan River" points out that much of the summer, nitrogen demand for algae is met by recycling nitrogen already in the river water and sediments.

BARICK DESCRIBES INNOVATION IN STREAM RESTORATION

At a recent Water Resources Research Institute workshop on channelization, Frank Barick of the N.C. Wildlife Resources Commission reported on an innovation called "stream restoration." The workshop, held in Apex, N.C., on August 16, attracted approximately fifty State, federal, and local officials to discuss different approaches to the problem of channelization and to hear research findings from Institute-sponsored research.

Barick presented the stream restoration technique as much superior to traditional drainage. Traditional drainage is understood to be straight line cuts taken for the convenience of property lines rather than with respect to original and natural drainage lines. Barick credited the development of the stream restoration technique to Keith Oates, an engineer with the Division of Human Resources, responsible for parts of the mosquito control program in coastal North Carolina.

Barick stated that the technique balances farming and wildlife interests and has a number of benefits for problems such as the reduction in mosquito breeding, the provision of improved farm drainage, and the alleviation of some septic tank problems.

Basically, the technique follows natural stream channels. It recognizes that natural channels have a channel section which is relatively clear of debris for the conveyance of water, and flood plain sections which are very useful as occasionally flooded wetlands. The approach is to clear the right-of-way on one side only. Berms of excavated material are placed on that side, leaving the other side with a free flood plain to be periodically flooded with flood waters, resulting in benefits of reduced sedimentation and erosion, filtration of the water, and less erosion.

According to Barick, the natural stream channels can be identified by the presence of organic soils rather than sand. These organic soils are more stable and allow stream channels to be restored without resulting instabilities and bank erosion. The channels are only restored to their original capacity and the land use should be adapted to the natural flooding. In other words, instead of digging a large channel which will allow the building of structures right to the water's edge, a small channel comparable to the original one is replaced, and development in the adjacent flood plain is discouraged.

Federal agencies such as the Corps of Engineers and the Soil Conservation Service are moving toward improved channelization programs of their own. They recognize the need to take ecological approaches and to accommodate the demands of the natural stream channel in addition to land use and economic development.

Actually, stable channel theory for rivers has been around for a long time. Back in the 17th century, stable channel theory was being developed in Europe. In the 19th century, British engineers constructed large irrigation canals in Pakistan which needed a careful approach to stability. Parameters exist for calculation of such questions as length between meanders, proper stream width, proper stream slope, and size of sand particles in the bed material. We would like to see the application of some of this early theory and empirical work and the recent North Carolina experiments applied together and analyzed for the benefit of channelization programs everywhere.

EFFECTS OF SUPERFARMS TO BE STUDIED

The Environmental Management Commission has asked the Division of Environmental Management to study the effects of the "superfarms" in Eastern North Carolina. Robert Hester, Commission member from Hyde County, requested that "the Division of Environmental Management initiate action that results in the formation of a study group, consisting of members of all resource-related State agencies as well as any private vested-interest group, for the purpose of obtaining an overview of the environmental effects of corporate farming including water quality, wildlife, as well as any other natural resource-related situation. Further, that these resource problems insofar as possible should be specified and an overall plan of activity be initiated to minimize the impact of corporate farming operations on the natural resources of the Coastal Plain."

NEW INSTITUTE PUBLICATIONS

Proceedings of North Carolina Workshop on Water and Wastewater Pricing. A February 21, 1978, workshop on water and wastewater pricing was held at the McKimmon Center at North Carolina State University for over 150 participants from local and State government, consulting engineering firms, the University, and sponsoring agencies. The pricing of water and wastewater services is going up in most communities. This workshop was designed as an initial effort to provide information for utility managers that could assist them in developing and explaining new rate structures.

Copies of the workshop proceedings can be obtained for $6.00 per copy if prepaid or $8.00 per copy if billed from Water Resources Research Institute, 124 Riddick Building, NCSU, Raleigh, NC 27650.

Research Special: Metals in the Haw and New Hope Rivers. The results of a major study of metals in the Haw and New Hope Rivers are summarized in a six-page leaflet. The leaflets are available free from the Institute. The entire study is also available from the Institute as report #124.

AWWA TO DEVELOP CONSERVATION MANUAL

The AWWA Board of Directors during the Annual Conference in Atlantic City, N.J., June 25 and 30, authorized $38,000 to develop a water conservation manual. The money is expected to be recovered through sales of the manual in two years. The manual will include a variety of approaches to water conservation, such as financial incentives and disincentives, plumbing codes, and customer cooperation.

AWWA SELECTS DAVE PRESTON AS EXECUTIVE DIRECTOR

AWWA Deputy Executive Director David B. Preston has been chosen to fill the position of executive director in January 1979 when Eric F. Johnson retires.

An active member of AWWA since 1953, Preston joined the staff of the Association in 1960 as assistant secretary. He was appointed assistant executive director in 1976.

An engineering graduate of Tufts and Harvard universities, he was a senior sanitary engineer with the Connecticut State Department of Health from 1948 to 1953 and then joined the Miami, FL, Department of Water and Sewers as water production superintendent until 1960.

EPA STUDIES EFFECTS OF SUNLIGHT ON PESTICIDES

The toxicity and persistence of pesticides and their decomposition products are problems of major interest to those concerned with environmental quality. Much information, however, is lacking on the fate of these materials in the environment. Photodecomposition, one avenue by which pesticides are degraded, is investigated in a report published recently by the U.S. Environmental Protection Agency's Environmental Research Laboratory in Athens, GA.

The report, "Surfactant Effects on Pesticide Photo-Chemistry in Water and Soil," describes studies of the sunlight-induced decomposition of 2,4-D, sevin, and parathion on soil surfaces and the influence that surfactants have on the photodecomposition of these pesticides in aqueous solutions. It was written by Dr. Richard R. Hautala of the University of Georgia, Athens. Project officer for the study, which was performed under an EPA grant, was Dr. Richard G. Zepp of the Athens Laboratory's Environmental Processes Branch.

Surface-active agents that are co-applied with pesticides usually enhance the rate of pesticide decomposition in sunlight and the water solubility of otherwise sparingly soluble pesticides, according to the study. Photodecomposition on soil surfaces is inefficient and very slow, however. Surfactants enhance the photodecomposition rates on soil surfaces in certain cases, but the effects are not great. The study recommends additional work to describe the rate and nature of pesticide photodecomposition in water.

The report (EPA-600/3-78-060) is available from the Environmental Research Laboratory, USEPA, College Station Road, Athens, GA 30605.

EPA STUDY ADDRESSES SOIL EROSION FROM FORESTRY

The soil erosion potential of common forestry management practices is assessed in a report published recently by the U.S. Environmental Protection Agency's Environmental Research Laboratory in Athens, GA. The report also provides a method for identifying costs related to the control of this non-point source of pollution as an aid to forestry managers and water quality planners.

The report, "Silvicultural Activities and Non-Point Pollution Abatement: A Cost-Effectiveness Analysis Procedure," was written by a committee of scientists of the U.S. Department of Agriculture, Forest Service. Project officers for the study, which was performed under an interagency agreement with EPA, were Mr. Lee Mulkey of the Athens Laboratory's Technology Development and Applications Branch and Mr. Michael Barton of the USDA Forest Service, Washington, DC.

Silvicultural activities that disturb soil and cause accelerated rates of erosion are associated with increased sediment loads that adversely affect water quality in a watershed. The report broadly summarizes current forestry practices in the United States, indicates the erosion potentials associated with these practices, and presents a cost-effectiveness model for determining the most appropriate controls for reducing erosion. Erosion potentials are presented in the form of "ecoregion" maps and in tables relating each major silvicultural type within the ecosystem to the erosion hazards and potentials.

The report (EPA-600/8-77-018) is available from the Environmental Research Laboratory, USEPA, College Station Road, Athens, GA 30605.

LOW-HEAD HYDROPOWER BOOK AVAILABLE

Experts are taking a second look at the thousands of small, non-power-producing dams that dot the American countryside--irrigation dams, flood control dams, municipal reservoir dams--for their potential as alternative energy sources. Collectively, these dams could make a significant contribution to our power production.

A publication titled "Low-Head Hydro" has been compiled by John S. Gladwell, Director of the Idaho Water Resources Research Institute, and Calvin C. Warnick, a professor of civil engineering and a water resources expert at the University of Idaho.

This book contains papers from a two-day seminar held at the University of Idaho in June 1978. The papers have been carefully edited, and others were added later for the publication. The book is profusely illustrated. The seminar was attended by energy experts and policy makers from across the country. Cost of the publication is $10.00. Copies may be obtained from the Idaho Water Resources Research Institute, Janssen Engineering Building, University of Idaho, Moscow, Idaho 83843.

WATER A SIGNIFICANT CONTRIBUTOR OF ENERGY BY 2000

Policy analysts from thirty federal agencies, assembled at President Carter's request, reported this month on a solar energy strategy for the U.S. According to their report, solar power is projected to meet twenty percent of the energy needs. The term "solar energy" used by the federal planners includes both power from dams, waterfalls, windmills, and biomass, or organic matter. Most of the expected solar contribution is attributed to water power and biomass.

Energy Department officials are expected to ask Congress for nearly double its $500 million fiscal 1979 budget for solar development. The solar energy report contains numerous policy choices for President Carter with associated costs.

CAPE LOOKOUT NATIONAL SEASHORE WATER SUPPLY PROBLEM STUDIED

Cape Lookout National Seashore, which is surrounded by salty water, has been studied by hydrologists of the U.S. Geological Survey, Department of the Interior, to locate supplies of fresh ground water sufficient to meet the needs of visitor facilities planned by the National Park Service.

The study, which was begun and completed in 1977, was initiated at the request of the National Park Service. Park officials need to know where they can install new facilities or expand existing facilities without overdrawing the relatively small supply of freshwater available in the Seashore.

According to M. D. Winner, Geological Survey Project Leader in Raleigh, "fresh ground water occurs beneath the Seashore in a shallow, sandy water-table aquifer and in a limestone aquifer at a depth of about 300 feet. In the shallow aquifer, the fresh ground water lies in a thin layer or 'lens' that floats on denser salty water, which underlies all of the Seashore. The lens of freshwater is generally less than 25 feet thick under the center of the long, narrow islands.

"Rain water that percolates readily into the permeable sands of the islands is the source of freshwater in the shallow aquifer, but this freshwater is not equally available everywhere in the Seashore. Except for the highest parts of Shackleford Banks and at Cape Lookout, all of the Seashore is subject to overwash of salty water from the ocean. When overwash occurs, the freshwater lens in the shallow aquifer becomes contaminated by salty water until rainwater reestablishes the lens.

"Fresh ground water from the limestone aquifer is available everywhere beneath the Seashore, except north of Drum Inlet where the ground water in the aquifer is believed to be too salty for drinking."

The results of the study have been published in the Geological Survey's Water Resources Investigations series (WRI 78-52) entitled, "Ground-Water Resources of the Cape Lookout National Seashore, North Carolina," by M. D. Winner, Jr. The report contains a series of maps showing the most favorable places to develop ground-water supplies in the Seashore. Yields of as much as 30 gallons per minute can be expected from the shallow aquifer, and as great as 500 gallons per minute are obtainable from the limestone aquifer.

The report will soon be available from the National Technical Information Service, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, Virginia 22151. Until it is available from the NTIS, copies are available for inspection at Room 5B410, U.S. Geological Survey, Post Office Box 2857, Raleigh, North Carolina 27602 (a limited number of copies of the report are now available to the public upon request at the Raleigh address).

CANAL SPRINGS LEAK

According to the *London Daily Telegraph* (8/11/78), water in more than a mile of canal was drained recently when a wooden plug was pulled accidentally. The plug has been undiscovered for two hundred years in the Chesterfield Canal at Retford, Nottinghamshire. The plug was originally built into the canal for the purpose of maintenance. All records concerning the canal were destroyed by a fire in Leeds during the Second World War. British waterways engineers will be able to refill the canal. The good news from the whole incident is that now they know where a small leak had been taking place.

EPA TO SPONSOR CONFERENCE ON WATER CONSERVATION AND MUNICIPAL WASTEWATER

The U.S. Environmental Protection Agency will sponsor a two-day National Conference on Water Conservation and Municipal Wastewater Flow Reduction in Chicago on November 28 and 29, 1978. Sessions will be held at Ramada - The O'Hare Inn (Chicago O'Hare Airport).

Conference attendance will be limited to 500, with no registration fee required. Issues covered in the the conference will include:

- Water and wastewater management issues
- Regulations affecting water supply, wastewater and their treatment
- Water and wastewater conservation technology
- Public participation, education and information in water conservation
- Case studies of water conservation, wastewater flow reduction projects.

National leaders will join with state and local officials, water and wastewater managers in presentation formats including speakers, resource panels and workshops during the two-day conference.

This conference is one form of Agency response to help implement the President's national water policy, in which a cornerstone element is attention to conservation of water. Growing Congressional interest in the topic is shared with heightened attention on the parts of many States, regions and local areas facing problems of water quantity, or water quality, or excessive hydraulic loads on wastewater treatment systems, under circumstances of rapidly rising construction and operational costs for potable water systems and for wastewater treatment processes alike.

Persons interested in attending or wanting additional information should write: U.S. Environmental Protection Agency, c/o Enviro Control, Inc., P.O. Box 1687, Rockville, MD 20850, Attn: Richard E. Tucker.

CONFERENCES, SYMPOSIA, AND WORKSHOPS

Flood Plain Hydraulics - The University of Texas at Austin, College of Engineering, announces a five-day short course on October 23-27, 1978. Flood Plain Hydraulics will present basic principles and practical applications of river hydraulics that relate to flood plain studies. It is expected that at the conclusion of this course, participants will be sufficiently familiar with the methods discussed and the computer operations involved that they will be able to apply these methods to their own problems. The course is presented by the Department of Civil Engineering and the Center for Research in Water Resources in cooperation with the Texas Department of Water Resources. For additional details, write Engineering Institutes, Cockrell Hall 2.102, The University of Texas at Austin, Austin, TX 78712. Phone: 512/471-3506.

Southeastern Ground Water Conference - The conference will be held in the Sheraton-Biltmore Hotel in

Atlanta, Georgia, October 4-5, 1978. For details on the conference, contact the Interstate Ground-water Committee, David Swanson, Chairman, Geologic and Water Resources Division, 19 Martin Luther King, Jr. Drive, S.W., Room 400, Atlanta, GA 30334.

The AWWA T&P Research Committee is seeking papers on research work in the water supply field for presentation at the 1979 Annual Conference in San Francisco, CA, June 4-29. As in 1978, two sessions have been requested by the committee for presentation of research papers.

Papers will be chosen from abstracts received no later than Monday, December 4, 1978. All persons submitting abstracts will be notified by January 30, 1978, whether or not their papers were selected. Research papers dealing with water quality control, distribution, management, and water resources are desired.

Eight copies of both an information sheet and a 300- to 1,000-word abstract of the research paper should be submitted to E. F. Spitzer, AWWA, 6666 W. Quincy Avenue, Denver, CO 80235. Abstract information sheets can be obtained from the same source.

WATER RESOURCES CONDITIONS IN NORTH CAROLINA

Streamflow was above normal for the month. Mean flows at index gaging stations ranged from slightly above the long-term average for the Neuse River near Clayton to almost twice normal flow in the French Broad River at Asheville. Heavy rains in the Mountains on August 4-8 caused medium-stage rises on most streams and minor flooding along the upper Cane and South Toe Rivers. At the end of August, flows across the State were slightly below normal.

Ground-water levels contained a slight seasonal decline during the month. Levels remained above the long-term averages in the Mountain and Piedmont regions but dropped below these averages in the Coastal Plain.

.....*U.S. Geological Survey*

POSITIONS AVAILABLE

Four positions available in the Office of Water Research and Technology, U.S. Department of the Interior. Positions include an interdisciplinary position with technical expertise from fields such as chemical engineering, mechanical engineering, chemistry, physical science, and civil engineering.

Duties: The incumbents provide direct assistance to the Assistant Director-Technology Department and senior technical personnel in the conception, planning, development, implementation, and execution of the Office of Water Research and Technology's nationwide water resources related development programs; review and evaluate water resources technology development proposals received from universities, public agencies, private firms, and individuals and recommend initial or continued financial support or abandonment of projects; conduct continuing inspection and evaluation of assigned technology development programs and projects; and, serve as member of one or more technical program management committees or teams formed to deal with program formulation, implementation, and execution in such high-priority areas as development of saline water conversion, water reuse, ground water management, water conservation, or water resources planning technologies or methodologies that have evolved from the Office of Water Research and Technology's research programs. For further information, write re: Announcement Number 78-206B to Chief, Branch of Personnel Operations (B), Office of the Secretary, Room 5458, Department of the Interior, Washington, DC 20240. Telephone: Area Code 202/343-4821.

Research Associate in Hydrology/Water Resources Administration - Candidates are required to have a PhD or MS degree in Hydrogeology Engineering or related fields with a strong background in Hydrology. Two or more years of experience in fields related to the job responsibilities are required, and some experience in computer modeling of hydrologic processes as well as an ability to communicate effectively are desired.

Inquiries from or information concerning qualified applicants should be addressed to Dr. Norwell Harrigan, Director, Caribbean Research Institute, College of the Virgin Islands, St. Thomas, Virgin Islands 00801.

A position of Watershed Specialist in the Bureau of Land Management Eastern States' North Central Alabama Planning Project. Contact should be made with the Hydrologist Register at the Civil Service Commission, Huntsville, Alabama (800/572-2970). Also, an informational copy of SF-171 should be sent to the office manager at the Bureau's Office in Tuscaloosa, Alabama (205/759-5441).

The holder of this position has the responsibility of providing the watershed and hydrological expertise necessary in development of the inventory and planning processes. Special emphasis will be on determining the effects of minerals development and surface reclamation on watershed and water resource values. The person should be able to understand and effectively interpret appropriate laws, departmental regulations, BLM manuals, and policy directives. Further information concerning this position can be obtained from the Bureau's office in Tuscaloosa, Alabama.

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

"The Impact of Energy Resource Development on Water Resource Allocations," 6/78, by J. E. Keith, *et al.*, UT Water Research Lab., College of Engineering, UT St. U., Logan UT 84322. (E&W)

"Hydrologic Engineering Methods for Water Resources Development, Vol. 12, Sediment Transport," 6/77, by W. A. Thomas, Hydrologic Engineering Center, Corps of Engineers, U.S. Army, Davis, CA 95616. (02J)

"Kennebec River Corridor Plan - A Management Plan for a Rejuvenated Resource," 9/74, by E. L. Flynn, Jr., *et al.*, avail. from North Kennebec Regional Planning Commission, 16½ Benton Ave., Winslow, ME 04902:

Appendix I, Demography, 5/75
Appendix II, Water Resources, 5/75
Appendix III, Flow Regulation, 3/78
Appendix IV, Flooding, 2/78
Appendix V, Management Plan, 4/78 (06A)

"Land Acquisition Falls Lake Project," 4/72, avail. from U.S. Army Engineer District, Savannah, Corps of Engineers, Savannah, GA 31401. (Corps-Neuse)

"Mathematical Modeling of a Sociological and Hydrologic Decision System," 6/78, by W. H. Andrews, *et al.*, UT St. U., Logan, UT 84322. (06A)

"A Linear Programming Model for Assessing the Regional Impacts of Energy Development on Water Resources," 7/77, by G. Provenzano, WRC, U. of IL at Urbana-Champaign, Urbana, IL 61801. (E&W)

"Risk Assessment in the Evaluation of Water Resources Projects," 1978, by V.P.P.H. Vieira, Dept. of Civil Engineering, CSU, Ft. Collins, CO 80523. (WP&M)

"State Continuing Planning Process Handbook," 12/75, by EPA, Washington, DC 20460. (208 Prog.)

"Urban Storm-Drainage Systems Planning - Multilevel Approach to Urban Water Resources Systems Analysis-Application to Medium Size Communities," (101), 5/78, by S. A. Dendrou, *et al.*, Purdue U., WRRC, W. Lafayette, IN 47906. (05B)

"Transfer of Systems Technology to Urban Water Management," 4/78, by A. O. Esogbue, *et al.*, avail. from Director, Environmental Resources Ctr., Ga. Institute of Technology, Atlanta, GA 30332. (04A)

"Water Conservation Information Dissemination During the 1977 Drought Emergency," 6/78, by L. D. James, *et al.*, UT Water Research Lab., College of Engineering, UT St. U., Logan, UT 84322. (03D)

"Utah Water Laws Politics Institutions," 6/78, edited by C. E. Israelsen, avail. from Publications, UT Water Research Lab., UMC 82, UT St. U., Logan, UT 84322. (06E)

"A Demonstration of Areawide Water Resources Planning - Users Manual," (EPA-600/5-78-006b), 4/78, by H. C. Torno, avail. from NTIS, Springfield, VA 21161. (208)

Water Quality Management

"Aquaculture Techniques: Water Use and Discharge Quality," 4/78, by G. W. Klontz, *et al.*, ID WRRI, U. of ID, Moscow, ID 83843. (08I)

"Municipal Wastewater Aquaculture," (EPA-600/2-78-110), 6/78, by W. R. Duffer, *et al.*, avail. from NTIS, Springfield, VA 22161. (05D)

"Benzimidazole Fungitoxicants in Virginia Soils: Movement, Disappearance, and Effect on Microorganisms," 6/78, by D. B. Janutolo, *et al.*, WRRC, VPI, 617 N. Main St., Blacksburg, VA 24060. (05B)

"A Symposium on Environmental Effects of Cooling Tower Emissions and Supplement," #9, 5/78, sponsored by WRRC, *et al.*, avail. from WRRC, U. of MD, College Park, MD 20742. (E&W)

"Carbon Adsorption Handbook," 1978, by P. N. Cheremisinoff, *et al.*, avail. from Ann Arbor Science Publishers, Inc., P.O. Box 1425, Ann Arbor, MI 48106. (HB)

"Ground-Water Resources of the Cape Lookout National Seashore, North Carolina," 6/78, by M. D. Winner, Jr., avail. from USGS, P.O. Box 2857, Raleigh, NC 27602. (USGS)

"A Manual On: Evaluation and Economic Analysis of Livestock Waste Management Systems," (EPA-600/2-78-102), 5/78, by R. K. White, *et al.*, avail. from NTIS, Springfield, VA 22161. (05B)

"Alternate Methods of Manure Handling," (EPA-600/2-78-078), 4/78, by F. R. Magdoff, *et al.*, avail. from NTIS, Springfield, VA 22161. (05B)

"Simulation of Nutrient Loss from Soils Due to Rainfall Acidity," (EPA-600/3-78-053), 5/78, by J. O. Reuss, avail. from NTIS, Springfield, VA 22161. (05C)

"Ozone in Water and Waste Water Treatment - A Bibliography," (Vol. 2), 7/78, by WRSIC, OWRT, USDI, Washington, DC 20240. (05F)

"PCB in Water - A Bibliography," (Vol. 3), 7/78, by WRSIC, OWRT, USDI, Washington, DC 20240. (05A)

"First American-Soviet Symposium on the Biological Effects of Pollution on Marine Organisms," (EPA-600/9-78-007), 5/78, by T. W. Duke, *et al.*, USEPA, Office of R&D, Environmental Research Lab., Gulf Breeze, FL 32561. (05C)

"Salinity Management Options for the Colorado River," 6/78, by J. C. Andersen, *et al.*, UT Water Research Lab., UT St. U., Logan, UT 84322. (03A)

"Critical Review of Estimating Benefits of Air and Water Pollution Control," (EPA-600/5-78-014), 6/78, by A. Hershaft, *et al.*, avail. from NTIS, Springfield, VA 22161. (06C)

Water Quantity Management

"Utilization of Numerical Groundwater Models for Water Resource Management," (EPA-600/8-78-012), 6/78, by Y. Bachmat, avail. from NTIS, Springfield, VA 22161. (04B)

"Irrigation Efficiency - A Bibliography," (Vol. 3), 6/78, WRSIC, OWRT, USDI, Washington, DC 20240. (03F)

"Calibration and Sensitivity Analysis of the Continuous Runoff Simulation Model Storm," 5/78, by J. L. Sautier, *et al.*, Purdue U., WRRC, West Lafayette, IN 47906. (04A)

Miscellaneous

"Air Pollution Sampling and Analysis Deskbook," 1978, by P. N. Cheremisinoff, *et al.*, avail. from Ann Arbor Science Publishers, Inc., P.O. Box 1425, Ann Arbor, MI 48106, Price - $29.50. (HB)

"Technical Books and Monographs," (TID-4582-R13), 1978, avail. from Technical Information Ctr., U.S. Dept. of Energy, P.O. Box 62, Oak Ridge, TN 37830. (E&W)

"EPA Publications Bibliography - Quarterly Abstract Bulletin," (NTISUB/D/042-02), April-June 1978, by EPA, avail. from NTIS, Springfield, VA 22161. (EPA)

"Extended Fishery Jurisdiction: Problems and Progress, 1977 (Proceedings on Fishery Management under Extended Jurisdiction)," 1/78, by K. M. Jurgensen, *et al.*, avail. from Office of Marine Affairs, NC Dept. of Adm., 116 W. Jones St., Raleigh, NC 27603. (06E)

"Research Reports Supported by Office of Water Research & Technology," 10/77-6/78, 7/78, avail. from USDI, OWRT, SIC, Washington, DC 20240. (OWRT)

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WORKSHOP ON FEDERAL FUNDS FOR ALTERNATIVE AND INNOVATIVE WASTEWATER SYSTEMS

October 18, 1978

McKimmon Center
Raleigh, North Carolina

A workshop has been scheduled for local government leaders, consulting engineers, and others to provide:

1. An explanation of national clean water goals and how alternative and innovative systems will help meet these;
2. A description of the incentives in the federal law for implementing these systems;
3. A reiteration of the State's commitment to fully utilize these incentive funds; and
4. A discussion of the cost effectiveness of alternative and innovative systems.

Sponsored by: Water Resources Research Institute of The University of North Carolina
North Carolina Agricultural Extension Service
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North Carolina Association of County Commissioners
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The complete workshop program appears on page 3. Please make your reservations by completing and returning one of the forms below by October 12.

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