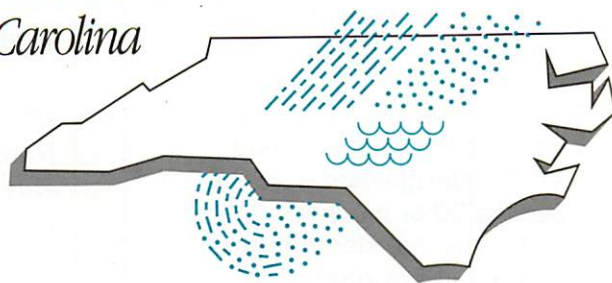


Water Resources Research Institute News

of The University of North Carolina



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Number 275; May/June 1992

Will affect animal waste management and other wastewater disposal systems

PUBLIC HEARINGS SCHEDULED ON NON-DISCHARGE RULES

In March the N.C. Environmental Management Commission voted to send to public hearing proposed modifications of rules that govern waste disposal systems that do not discharge to surface waters (15A NCAC 2H .0200). The rules apply to animal waste management systems, wastewater treatment systems, wastewater sludge application sites, nondischarging sewer systems, solid waste disposal sites and composting facilities, and sites for the treatment and disposal of petroleum-contaminated soils. The proposed changes have been under consideration for several months. Division of Environmental Management staff have been working with outside groups, particularly agricultural interests, to develop the proposed new rules.

The proposals make substantial changes in animal waste management rules, including the following:

- * Requires that to be "deemed permitted" (that is not required to obtain an individual permit) waste management systems serving animal feeding operations larger than 100 animal units must obtain an animal waste management plan approved by the Soil

Conservation Service or the Division of Soil and Water Conservation.

- * New and expanded operations must obtain a plan that complies with certain design, construction, operation and

maintenance requirements before stocking animals.

- * Existing operations serving more than 100 animal units must obtain a plan complying only with operation and main-
(continued)

INSIDE

<i>EMC Will Reconsider Outstanding Resource Waters Rules</i>	4
<i>Water Quality Committee to Review Wetlands Policy</i>	5
<i>Klimek Heads Air Quality Program</i>	5
<i>Take Pride in America Honors Howells</i>	5
<i>Land-of-Sky Regional Council to Conduct Education Program on Surface Water Classifications</i>	6
<i>Albemarle-Pamlico Management Plan Nears Completion</i>	10
<i>New WRRR Reports Available</i>	10

- * Investigation of Multicomponent Sorption and Desorption Rates in Saturated Groundwater Systems
- * Use of Activated Carbon to Remove Radon from Drinking Water
- * Water Reuse in Selected States

EPA Recognizes N.C. Pollution Prevention Program, WRRR 14

ALSO: DIGEST . . . NSF Announces Hydrologic Sciences Research Program . . . Update on Videotex NEWS . . . Upcoming Conferences and Workshops . . . Positions Available . . . Climate Data and Water Resources Conditions . . . New Publications Received

tenance requirements by December 31, 1997.

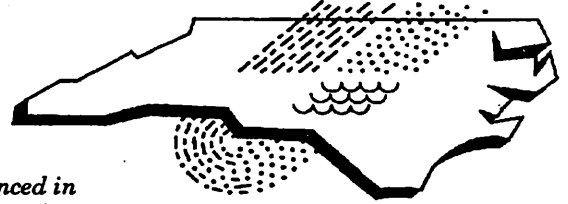
- * To continue to be deemed permitted as built, existing waste management systems serving 50 or more animal units must register with the Division of Environmental Management on or before July 31, 1993.

Among the other major provisions are the following:

- * Provides that no sewer line extensions will be issued to publicly owned wastewater treatment systems unless (1) the system submits a plan for system expansion before reaching 80 percent capacity or shows why it should not be required to do so, (2) the system submits final specifications for system expansion before reaching 90 percent of capacity or shows why it should not be required to do so, or (3) the director determines that additional flow will not result in exceedance of permitted hydraulic capacity and satisfactory progress is being made on expansion specifications.
- * Provides that when wastewater treatment systems that generate residuals (sludge) pay annual administering and compliance monitoring fees, they must submit a written description of current waste minimization and waste reduction activities and project plans for reducing the discharge of wastes and pollutants by source reduction or recycling.
- * Requires all treatment systems that generate residuals (sludge) submit a Residuals Management Plan, including a description of stabilization, an evaluation of storage capacity,

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WRRI Information Resources

Publications

- Technical completion reports on research sponsored by WRRI
- Proceedings of workshops and conferences conducted by WRRI
- Special topics reports
- Directory of Water Resources Research Expertise in North Carolina
- WRRI Program (current research and information activities)

There is a \$10 reproduction charge for the expertise directory. Single copies of other publications are free to federal water resource agencies, state water resources research institutes, and other water research institutions with which exchange agreements have been made. Single copies of publications are available to North Carolina residents at a cost of \$4 per copy prepaid (\$6 per copy if billed) and to nonresidents for \$8 per copy prepaid (\$10 per copy if billed). Out-of-print reports may be borrowed from the Institute for two weeks or a photocopy may be purchased from the Institute for the cost of reproduction. For a list of publications available, call WRRI and ask for the Publications List.

Technical Library

WRRI maintains a library of selected technical publications from many federal and state agencies and other state water resources research institutes. This library is located at 1131 Jordan Hall on the campus of N.C. State University and is open to the public from 8 am to 5 pm, Monday through Friday, except for official university holidays. Documents may be borrowed for two weeks.

Databases

WRRI subscribes to the Selected Water Resources Abstracts (SWRA) database compiled by USGS and the USGS daily values (streamflow, temperature, conductivity, and water quality) for the Southeast and climate data for the central and eastern parts of the United States provided through EarthInfo, Inc. These databases are on compact disk. WRRI also maintains a database of North Carolina college and university faculty with water resources research expertise. Individuals who wish to use the USGS daily values, or research expertise database may do so in the WRRI offices by making an appointment. Limited searches of the research expertise database will be performed by staff and may be requested by phone. SWRA may be used at the Natural Resources Library in Jordan Hall at NCSU.

Videotex

An expanded and frequently updated version of the WRRI newsletter is available on the North Carolina State University videotex system, *Happenings!* For information on content of this videotex newsletter and accessibility, write or call the editor.

and demonstration of adequate disposal/utilization capacity.

- * Requires that facilities that sell composted residuals provide a marketing and distribution plan, copies of materials distributed with the compost giving directions on how it should be used, the label if the compost is packaged, and a detailed description of the system to be used to keep records of the distribution and usage of the residuals. If composted or stabilized residuals are land applied, the project will be required to obtain a nondischarge permit or an exemption from DEM.
- * Requires that any site (not just dedicated sites) where land application of agricultural products and processing residues takes place have a site map, project description, receiver management plan, soils evaluation and recommendations, and information on the location of wells and surface drainage features.
- * Requires that sites used for disposal and/or treatment of petroleum-contaminated soils have plans and comply with new regulations.
- * Adds to the list of nondischarge facilities deemed to be permitted a number of sites and facilities documented in compliance with rules administered by other agencies such as the Division of Environmental Health. Provides that the Director may on a case-by-case basis determine that a facility or class of facilities should not be deemed to be permitted but should be required to obtain individual nondischarge permits.

- * Makes some changes in minimum design requirements for facilities permitted under the section, including specifications for sewer pumping station back-up power, flow equalization, and residual holding capacity.
- * Makes some changes in rules for application of treated domestic wastewater on golf courses and other public access areas, including fecal coliform level of the effluent.

The proposed rules also provide for decreasing current minimum buffers around waste application sites. For animal waste management systems the rules provide:

"the buffer for the land application of animal wastes may be reduced to no less than 25 feet if the buffer is comprised of established vegetation and the method of land application and the slope of the site are such as not to allow run-off or drift from the site during application. The buffer for the land application of animal wastes may be reduced to less than 25 feet if other equivalent controls are approved by the Soil and Water Conservation Commission."

For spray irrigation with wastewater effluent the rules provide:

"the buffer distance for spray irrigation systems and land application systems other than high rate infiltration systems to surface waters and drainage systems [those are specified] . . . may be reduced to no less than 25 feet if the buffer is comprised of established grasses or naturally occurring uncultivated vegetation and the method of land application and the slope of the site are

such as not to allow run-off or drift from the site during application."

According to DEM buffer requirements specified elsewhere in the rules, such as those near residences and drinking water sources are not covered by this exception.

The decrease in minimum buffer size was called for by Commissioner Robert W. Griffith, Jr., who voiced a concern for wastewater disposal problems of towns such as Atlantic Beach. According to Griffith, larger buffer requirements seriously reduce the application area of sites available to municipalities that must use spray irrigation to dispose of wastewater effluent.

The schedule of public hearings on the Nondischarge Rules follows. For additional information call Dennis Ramsey at the N.C. Division of Environmental Management's Water Quality Section, (919) 733-5083.

PUBLIC HEARINGS FOR NONDISCHARGE RULES

Greenville - June 16 - 7 pm
Jenkins Fine Arts Center
East Carolina University

Clinton - June 17 - 7 pm
Main Room
Clinton Civic Center

Morehead City - June 22 - 7 pm
Auditorium
Carteret Community College

Raleigh - June 23 - 1 pm
Ground Floor Hearing Room
Archdale Building

Asheville - June 29 - 7 pm
Humanities Lecture Hall
UNC-Asheville

Statesville - June 30 - 1 pm
Rotary Auditorium
Mitchell Community College

EMC WILL RECONSIDER OUTSTANDING RESOURCE WATERS RULES

At its March meeting the Environmental Management Commission rejected a recommendation from its hearing officers to return to public hearing with rules related to marinas in Outstanding Resource Waters (ORWs) and voted instead to review the entire set of rules governing activities in ORWs.

Commissioners Charles H. Peterson and Michael K. Barnes served as officers for hearings which centered on the definition of "marina" as it relates to coastal Outstanding Resource Waters. The issue is not simple for several reasons.

First, ORWs are designated for different reasons and marinas are not uniformly prohibited or restricted in ORWs. A marina may be appropriate in an ORW if the designation is based on recreational criteria. A marina may be inappropriate in an ORW if the designation is based on shellfish habitat criteria.

Secondly, different rules administered by different state agencies may apply in ORWs. When EMC designates an ORW, an area extending 575 feet from the mean high water line is designated an Area of Environmental Concern by the Coastal Resources Commission. Permits from the Division of Coastal Management (DCM) are required for all development except minor maintenance and improvement in this expanded area. DCM defines a "marina" as docking space for more than ten boats for purposes of permitting marina development in coastal AECs.

On the other hand, where marinas (defined as docking space for more than ten boats) are sited near shellfishing

waters the N.C. Division of Environmental Health (DEH) will close those shellfishing waters, UNLESS the marina has less than 30 slips, no boats over 21 feet long and no boats with heads.

When the EMC adopted rules to protect coastal ORWs in 1989, it chose to adopt the definition of "marina" used by the DEH since this definition was thought to provide ample protection for both shellfish ORWs and recreational ORWs. Therefore, under present ORW definitions, DEM could end up allowing a new marina that meets the 30-boat exclusion even where it prohibits new marinas on a site-specific basis. Moreover, DEH has since deleted the "30-boat exclusion" from its rules even though it continues to use the exclusion in its closure policy.

This problem with the definition of "marina" was brought to light during public hearings on designations of coastal ORWs in 1989. In subsequent public hearings, the "marina" definition and numerous other issues relating to the ORW classification were also raised. According to the hearing officers' report, these issues include "consideration of the cumulative impacts of coastal development as well as other complex economic and social issues pertinent to multiple use of public trust resources." However, when notice was published for the most recent public hearings the only issue included was that of clarifying the procedure for siting marinas, not the definition or any other issue related to ORWs.

Based on their feeling that the definition of "marina" needed to be changed to delete the 30-boat exclusion, the hearing officers recommended that the issue go back to public hearing. Other members of the commission disagreed. Commissioners Douglas S. Boykin and

Robert W. Griffith said they wanted a more broad-ranging review of ORW rules. Griffith said that 70 percent of the coastal ORWs are in Carteret County, and during the debate on watershed rules in February he linked ORW designations with depressed growth in Carteret County.

Commissioner Charles A. Brady said the move to revisit the entire set of ORW rules reminded him of the commission's action on the watershed protection rules. "The public ought to be aware that there is sentiment now to revisit all the special water classifications," said Brady.

Griffith and Boykin asked if any scientific evidence had been presented during the public hearings to support the contention that the 30-boat exclusion would result in degradation of water quality in ORWs. Peterson said he could provide scientific evidence that marinas degrade water quality but he could not provide a per-boat loading rate. Boykin countered that little boats without heads do not introduce fecal coliforms, and Griffith asserted that without maintenance activities, a 30-boat slip does not constitute a marina.

In the end, the commission voted 8 to 5 to instruct the staff to bring the ORW rules to the Water Quality Committee for reconsideration.

May Action of the EMC

Among the actions taken by the N.C. EMC at its regular meeting on May 14 were the following:

- * Approved reclassification of water supply watersheds across the state.
- * Approved holding public hearings on modifications of rules governing wastewater discharges to rivers and streams.
- * Approved extending the requirement for vehicle tailpipe emissions testing to seven additional counties.

WATER QUALITY COMMITTEE TO REVIEW WETLANDS POLICY

At its April meeting, the EMC Water Quality Committee instructed staff of DEM to schedule a committee review of the division's wetlands policy, including goals of wetlands regulation and changes in regulations of headwaters and isolated wetlands.

DEM is involved in wetlands regulation because, under Clean Water Act Section 401, wetlands are considered "waters of the state." DEM's Water Quality Section must certify that activities overseen by the federal Corps of Engineers and the state Division of Coastal Resources will not result in water quality degradation in order for the activities to be permitted.

In April, DEM staff presented to the Water Quality Committee an explanation of the division's water quality certification procedures. The presentation was occasioned by the Corps' reissuance of its Nationwide permits, which required DEM concurrence. John Dorney, who manages wetlands issues for the Water Quality Planning Section, made the presentation and was questioned closely by commissioners on several points.

Commissioner Douglas S. Boykin said it is his understanding that EMC is to drive state environmental policy and that in the case of wetlands, the staff seems to be assuming that role.

Boykin requested that the Water Quality Committee instruct the Water Quality Section to bring the wetlands issue back to the committee. Committee chairman Virgil L. McBride instructed staff to prepare for a discussion of wetlands policies and procedures in July.

WRRRI FACT SHEETS AND PUBLICATIONS AVAILABLE

WRRRI has produced and will make available in limited quantities the following Water Facts Sheets. For large quantities, we ask that you photocopy the fact sheets. To request copies and/or copy masters, call WRRRI at 919/515-2815.

Fact Sheet #1.
Facts about Major River Basins in North Carolina

Fact Sheet #2.
Facts about Principal Aquifers and Groundwater Use in North Carolina

Fact Sheet #3.
Water Resources Quiz
(with answers)

Fact Sheet #4.
Water Use Quiz (with answers)

Fact Sheet #5.
Water Conservation with Low-Flush Toilets (includes instructions for calculating water savings from new low-flush toilets)

Fact Sheet #6.
Do I Need a Home Water Treatment Device? (includes information on water quality, drinking water regulations, and water testing)

Also available from WRRRI at a cost of \$1 to cover handling and mailing is *Xeriscape North Carolina*, a handbook for water-conserving landscaping.

NAME CHANGE: *The Water Pollution Control Federation has changed its name to the Water Environment Federation. The Water Environment Federation is a not-for-profit technical and educational organization founded in 1928. Its 38,000 members are water quality specialists from around the world, including engineers, government officials, treatment plant managers and operators, technicians, college professors, equipment manufacturers and others.*

KLIMEK HEADS AIR QUALITY PROGRAM

Alan Klimek, formerly head of the Planning Branch of N.C. Division of Environmental Management's Water Quality Section, has been appointed chief of the division's Air Quality Section. The appointment comes at a critical time for the state's air quality program, which will implement numerous requirements of the new federal Clean Air Act over the coming six to eight years.

Klimek, a professional engineer who holds degrees in both aerospace and environmental engineering, has 19 years of experience with the Water Quality Section Planning Branch. He had a leadership role in developing stream classifications, water quality standards, regulatory changes, nonpoint source pollution control, new program initiatives such as wetland protection and stormwater control, annual program planning, and trend analysis.

TAKE PRIDE IN AMERICA HONORS HOWELLS

David H. Howells, director emeritus of the Water Resources Research Institute, was among those honored during North Carolina's fifth annual Take Pride in America awards ceremony in April at Research Triangle Park. Howells received a statewide individual award for his volunteer work in researching and writing *Quest for Clean Streams: An Historical Account of Stream Pollution Control in North Carolina*. He devoted more than 1,500 hours to the history, which was published as part of WRRRI's technical report series.

**WCU joins network,
Happenings! terminal installed
in Jordan Hall library**

UPDATE ON VIDEOTEX NEWS

Faculty, staff, and students at Western Carolina University can now access the videotex version of the WRRRI NEWS through the "Other Information Systems" option on the WCU videotex service. With the addition of Western Carolina, The University of North Carolina videotex service now includes six campuses: WCU, NCSU, UNC-CH, UNC-Greensboro, UNC-Wilmington, and ASU. Off-campus readers may access the videotex system at NCSU by modem (for information call the WRRRI NEWS editor at 919/515-2815).

At NCSU, students, faculty and staff may now access the NEWS on *Happenings!*, the NCSU videotex service, through a dedicated terminal in the Natural Resources Library in Jordan Hall.

The videotex version of the WRRRI NEWS includes more in-depth discussion of issues covered in the printed newsletter, some articles not included in the printed NEWS, and timely information on calls for papers, workshops and conferences, research opportunities, and professional positions available.

Single hard copies of individual articles on the videotex NEWS may be obtained by calling the editor.

NAME CHANGES

The National Water Well Association has become the National Ground Water Association.

The International Association of Water Pollution and Research is changing its name to the International Water Quality Association.

WRRRI SEMINARS

The following seminars remain in WRRRI's 1992 seminar series. All seminars begin at 10 am and are presented in the ground floor hearing room of the Archdale Building in Raleigh.

May 26: Effect of Landfill Containment Systems on Surface and Ground Water Contamination in N.C., Robert C. Borden, NCSU

June 23: Improved Indicators of Fecal Contamination and Treatment Process Efficiency to Meet New Drinking Water Regulations, Mark D. Sobsey, UNC-CH

LAND-OF-SKY REGIONAL COUNCIL TO CONDUCT EDUCATION PROGRAM ON SURFACE WATER CLASSIFICATIONS

The Land-of-Sky Regional Council is currently developing an education program for government officials, economic developers, environmentalists and others on surface water classifications in North Carolina. There is much confusion among officials and the public about the intent and impacts of the various classifications used to protect our state's streams, rivers and lakes.

Under a Division of Environmental Management water quality planning grant, Land-of-Sky staff and an advisory committee are developing a brochure, a guidebook and two regional workshops explaining the classifications. Information will be provided on freshwater classifications/designations including Water Supply (WS I-V), Class B & C Trout waters, Nutri-

ent Sensitive Waters, High Quality Waters, Outstanding Resource Waters, N.C. Natural and Scenic Rivers and federal Wild and Scenic Rivers.

The brochure and handbook will be available this summer. The regional workshops are tentatively planned for late August in Raleigh and Asheville. Workshop details and a registration form will appear in the next WRRRI newsletter. For more information, contact Bill Eaker, Land-of-Sky Regional Council at (704) 254-8131.

NSF ANNOUNCES HYDROLOGIC SCIENCES RESEARCH PROGRAM

The President's budget request for Fiscal Year 1993 includes a request for \$2.5 million to begin a new basic research program in hydrologic sciences at the National Science Foundation. The program will provide funding for basic research dealing with the Earth's hydrologic cycle and the role of water on and near the continental surfaces of the Earth.

Research proposals relating to water in the form of precipitation, lakes, streams, and groundwater, and their interactions with landforms, climate, weather, the biosphere, and the Earth's crust will be eligible for submission to the new program. Subject to appropriation of funds by Congress, it is expected that the new program will receive proposals from university and college investigators beginning in May 1992 for funding during FY 1993. PROPOSAL DEADLINES ARE EXPECTED TO BE 1 JUNE 1992 AND 1 DECEMBER 1992.

For further information, contact James Hays, Director, Division of Earth Sciences, National Science Foundation, Washington, DC 20550 (Tel: 202/357-7958).



DIGEST

N.C. TAKE BACK OUR WATERS CAMPAIGN.

In April a coalition of North Carolina environmental organizations announced an effort to strengthen the state's watershed protection rules. The Sierra Club N.C. Chapter, the N.C. Wildlife Federation, and the N.C. Alliance for Conservation Action issued a statement saying they will ask the N.C. Environmental Management Commission and Administrative Rules Review Commission for more public hearings on the watershed regulations; lobby the EMC against an across-the-board WS-IV reclassification of the state's water supplies reportedly being sought by development interests; and lobby the 1992 and 1993 General Assemblies to strengthen the Watershed Protection Act. The groups also intend to urge local governments to adopt watershed ordinances stricter than statewide minimum standards adopted by the EMC in February and to restrict industrial and commercial development in critical areas of watersheds. They say they will also lobby the General Assembly to enact ethics and lobbying laws that apply to the Environmental Management Commission and state agencies.

N.C. CLEAN WATER SUPPORT.

In a poll conducted by Independent Opinion Research Corporation of Wrightsville Beach for the *Raleigh News & Observer*, the *Winston-Salem Journal*, and WRAL-TV, respondents agreed overwhelmingly that North Carolina needs to protect its water supplies even if that inhibits growth. Although the poll indicated that environmental protection in general receives somewhat weaker support (74.5

percent said that if forced to chose, they would pick jobs over the environment), 90 percent of those surveyed said that protecting the state's water supplies is more important than growth. This support was found across all regions of the state and across all demographic and political groups. *Winston-Salem Journal* Mar 15, 1992.

ENVIRONMENTAL REGULATIONS AND HOUSING COSTS.

According to *Water Reporter* (Jan 1992) many housing and financial experts disagree with assertions in a Housing and Urban Development Department (HUD) study that environmental regulations significantly diminish the supply of land for and drive up the costs of residential development 25 to 30 percent. Witnesses at a congressional hearing on the report, titled "Not in My Backyard," criticized it as lacking quantifiable data and using far-fetched examples. Daniel R. Mandelker, a land-use expert from Washington University in St. Louis, said the cost of environmental regulation would be about five percent and said his studies show such costs are not borne by buyers but by landholders who sell to developers. Jack Bredman, president of an environmental firm that provides services to financing institutions, is quoted as saying "Anything in the neighborhood of 20 to 35 percent would be outrageous. Besides, you don't build affordable housing in the . . . areas that most developers are interested in."

CANCER AND ENVIRONMENTAL CONTAMINANTS.

A statement released February 4 in Washington by the nonprofit corporation Food & Water and signed by more than 60 independent scientists and doctors asserts that the nation is in the midst of an epidemic of preventable cancers

caused by carcinogens in food, water, air, and the workplace. In an interview on WUNC radio's Peoples Pharmacy in April, Dr. Samuel Epstein, one of the signers of the statement said that the overall cancer rate, even when adjusted for the aging population, has increased by 44 percent since 1950, that the incidence of breast cancer and male colon cancer has increased by about 60 percent, and that the incidence of testis, prostate, and kidney cancer and other less common cancers has increased by 100 percent since 1950. Epstein, professor at the University of Illinois School of Public Health, and other signers of the statement charge that the cancer establishment has "continuously minimized the evidence for increasing cancer rates which it has largely attributed to smoking and dietary fat, while discounting or ignoring the causal role of avoidable exposures to industrial carcinogens." They further claim that the inflationary impact of cancer (estimated at \$110 billion a year or nearly 2 percent of the GNP) is a major factor in the current health care crisis, with the per-case Medicare payments exceeding those of any other disease. The doctors and scientists recommend that programs of the National Cancer Institute should give cancer cause and prevention equal emphasis with diagnosis, treatment, and basic research. Food & Water Inc. news releases

ASHEVILLE WATER SUPPLY DEVELOPMENT.

According to reports in *Greenline* (Jan, Feb 1992) the Asheville-Buncombe Water Authority, which serves one of North Carolina's most popular mountain resort areas, is exploring both conservation and leak repair as part of its efforts to develop additional water sources for the service area. Faced with a need for additional water

and citizen opposition to use of the French Broad River as a source of drinking water, the Authority is considering a multi-faceted approach to water supply development. It is thought that a leak repair effort, including replacement of water lines dating back to 1900, could recover 80 percent the 5.63 million gallons lost per day (about 31 percent of the total pumped). However, indications are that replacing deteriorated water lines could cost more than the \$3 million set aside for that purpose, and the Authority has directed its staff to determine the comparative value of saved water and water from a new source. Meanwhile, the Authority has approved a \$50,000, six-month pilot water conservation program to gather information. The pilot program will include distribution of 1,500 free water-reduction kits, a public education campaign, and a survey of commercial and industrial water users. Some citizens on the Authority's Water Conservation Task Force are complaining that the pilot project does not include many of its recommendations, including changing the water rate structure to reward conservation.

CLEAN WATER PRICE TAG. In its 1990 Needs Survey, EPA estimates that federal, state and local government costs for building new and improving existing publicly owned sewage treatment facilities is \$80.4 billion over the next 20 years. EPA's total estimate is \$57.5 billion lower than the \$137.9 billion figure released by the Association of State and Interstate Water Pollution Control Administrators last October. EPA points out municipalities can significantly lower wastewater treatment costs by using water more efficiently. *U.S. Water News* Mar 1992

SOUTHEAST WATER RESOURCES CONFLICT. In a move that has quelled for the time being a simmering interstate water conflict, the governors of Alabama, Florida, and Georgia and the Corps of Engineers have agreed to conduct a three-year study on water needs and their economic and environmental impact in the Alabama-Coosa-Tallapoosa and Chattahoochee-Flint-Apalachicola river systems. The states have also agreed to restrict increases in water uses to bare necessity while the study is being completed. A battle over water resources in the shared river systems has been brewing since 1989 when the Corps agreed to reallocate to Atlanta water supply capacity in three reservoirs in the two river systems. Fearful that decreased water availability could prevent its economic growth, Alabama sued to block the reallocation. Florida entered the fray when it became concerned about the effects on Apalachicola Bay of lower water levels in the Flint River. Georgia intensified friction when it announced plans to build a reservoir on the Tallapoosa River. Under the agreement, Georgia will put all reservoir plans on hold until the study is completed. Meanwhile, South Carolina is keeping a suspicious eye on Georgia after reports that Atlanta is considering using the Savannah River as a water source. *U.S. Water News* Sept 1991, Nov 1991, Feb 1992; *Colorado Water* Oct 1991.

FOOD-PRODUCTION/WATER USE STUDY. The Sacramento, CA-based Water Education Foundation has released the results of a study it commissioned to determine the amount of water used to produce a variety of foods in California. Water inputs were analyzed from planting to cooking. Beef steak at 1,200 gallons per 8-ounce boneless

steak was found to be the most water-consumptive, and lettuce at under 3 gallons per cup, the least. Some other food items and their water usage were: an 8-ounce portion of chicken - 165 gallons; one-half cup of soybean tofu - 60 gallons; a 4-ounce hamburger - 600 gallons; a slice of white bread - 10.6 gallons; a slice of wheat bread - 7.3 gallons; a 2-ounce serving of pasta - 35.9 gallons; 8 fluid ounces of whole milk - 48.3 gallons; a 2.1-ounce chicken egg - 62.7 gallons. The 162-page study, "Water Inputs in California Food Production," is available from the Water Education Foundation at 717K Street, Suite 517, Sacramento, CA 95814. *U.S. Water News* Feb 1992.

RECYCLING INTERFERENCE. An article in the Spring 1992 issue of *Forum for Applied Research and Public Policy* expresses bewilderment over the Bush administration's solid waste policies. According to the article by Daryl Ditz of the Waste Management Institute at Cornell University, the President's Council on Competitiveness in December 1990 intervened in EPA rule making to delete recycling requirements in waste incinerator regulations. Federal regulations on municipal waste-combustion facilities are called for by the Clean Air Act. Following a congressionally mandated study of the risks of incinerating municipal solid wastes, EPA concluded that emissions from such facilities could "endanger public health or welfare." The agency then wrote into proposed municipal waste-combustion facility regulations a requirement that 25 percent of the waste destined for incineration be separated for recycling. The requirement was aimed at (1) eliminating noncombustibles such as metals, and therefore some of the worst air pollutants, from waste going

to incinerators and (2) dampening the demand for incineration capacity. Following consideration of the public hearing record, in which the separation and recycling requirement received intense attention, EPA stood by its mandatory 25-percent requirement. However, following a December 19, 1990, meeting with the Council on Competitiveness, EPA completely deleted materials separation requirements. According to the article, pressure was brought to bear on EPA by municipalities and the waste-combustion industry through the Council on Competitiveness. Florida, New York, and the Natural Resources Defense Council have filed suit to reinstate mandatory separation in the incinerator rules.

NO EXEMPTION FOR HYPOTHETICAL GROUNDWATER POLLUTION CASE. The U.S. Court of Appeals for the District of Columbia ruled in July 1991 that the U.S. Environmental Protection Agency cannot be required to create an exemption for a hypothetical case of groundwater contamination. The decision came in a challenge from the American Petroleum Institute (API) and others of EPA regulations establishing groundwater monitoring and cleanup standards for any waste disposal site above an aquifer. The API asserted that regulations requiring cleanup of a polluted aquifer that is useless and isolated from other waters are arbitrary and capricious and in excess of EPA's authority. EPA responded that no evidence was provided proving the existence of such an aquifer and that if such a situation did exist it would be extremely rare. The agency refused to write a special rule for a speculative circumstance, and the court upheld EPA's position. *Journal AWWA*, March 1992.

USED OIL REGULATION. A group of environmental organizations is asking Congress to amend the Resource Conservation and Recovery Act (RCRA) to designate used oil as a hazardous waste and prevent its unregulated use as a fuel. The Natural Resources Defense Council, Hazardous Waste Treatment Council, Izaak Walton League and Sierra Club say their investigation reveals that only 8 percent of the 1.4 billion gallons of waste oil generated each year in the United States is being recycled. They say 500 million gallons are being discarded in landfills and storm sewers, and 800 million gallons are being blended with virgin oil and burned as fuel in residential and industrial furnaces. This combustion releases 600,000 pounds of lead into the air each year and is the largest industrial source of airborne lead pollution in the United States. Even though EPA prohibits the burning of hazardous waste containing more than 10 parts per million lead, used oil containing as much as 100 parts per million lead may be burned. *Environment* Jan/Feb 1992

GROUND-LEVEL OZONE AND ALLERGIES. According to *Environment* magazine (Mar 1992), researchers at the University of Toronto have found evidence that ground-level ozone increases people's sensitivity to airborne allergens. Their studies revealed that when people breathe air with an ozone concentration of 120 parts per billion (ppb), EPA's standard limit, they are twice as sensitive to pollen as when they breathe pure air. Ozone, produced by photochemical reactions of pollutants from auto exhaust and other sources, often increases during peak allergy seasons. Several North Carolina counties (including Wake, Mecklenburg, Forsyth and Guilford) are "non-

attainment areas" for ozone, meaning that ambient ozone concentration exceeds the National Ambient Air Quality Standard. About 50 percent of ground-level ozone can be attributed to auto exhaust, and the Clean Air Act amendments require vehicle inspection and maintenance programs in ozone nonattainment areas.

PARTICULATE POLLUTION AND INCREASED MORTALITY. A recent study in Philadelphia indicates that federal standards for particulate air pollution are not strong enough to protect people over 65 and those with lung or heart disease. Results of the study appearing in the *March American Review of Respiratory Disease* show that for every 100 microgram increase in total suspended particles (TSP) per cubic meter of air, Philadelphia death rates rose by 10 percent among residents over age 65 and three percent in younger residents. The strongest effects were seen on deaths from lung disease. Each 100 microgram jump in TSP brought a 19 percent increase in deaths from chronic obstructive pulmonary disease and an 11 percent rise in pneumonia deaths, along with a 10 percent increase in heart disease deaths. The study, which analyzed eight years of mortality and pollution data in Philadelphia, suggests that federal standards for particulate pollution are dangerously lax. The standards, adopted in 1987, state that particles smaller than 10 microns in diameter (PM₁₀) must not exceed a level of 150 micrograms per cubic meter of air during any given 24-hours period. However, the Philadelphia data show that death rates start to inch upward when particles reach levels as low as a third of the current standard. *American Lung Association* news release

OMB BLOCK OF POLLUTION PREVENTION ASSESSMENT.

According to a speaker at the National Roundtable of State Pollution Prevention Programs held recently in Raleigh, the federal Office of Management and Budget is preventing the release of a form that industries need to comply with requirements of the Pollution Prevention Act of 1990. Manik Roy, a pollution prevention specialist with the Environmental Defense Fund, said that OMB's refusal to release EPA's "Form R" leaves industries in the position of being required to report on source reduction and recycling of toxic chemicals by July 1, 1992, but not knowing how to structure their reports to comply with eventual reporting requirements. Under the Pollution Prevention Act of 1990, all facilities that must report toxic wastes under the Superfund Amendments and Reauthorization Act (SARA) Title III Section 313, must provide new information, including the quantity of chemicals entering any wastestream or released into the environment, the quantity of chemicals recycled or treated, source reduction activities and methods used to identify those activities, and the production ratio or activity index for the chemicals. The Paperwork Reduction Act requires that OMB clear all new federal data collection requests, and, according to Roy, OMB has refused to approve "Form R," which was structured to provide standardized reporting procedures for measuring actual waste reduction and assessing whether facilities are in fact accomplishing pollution prevention.

NEW USDA RESOURCE CONSERVATION & DEVELOPMENT AREAS. The USDA Soil Conservation Service has announced the establishment of 27 new Resource Conservation and Devel-

opment Areas. The new areas are now qualified to receive federal technical and financial assistance for land conservation, water management, community development, and other environmental concerns. USDA provides each area with a project coordinator to assist the local RC&D council in its work. Local councils include representatives of county government, soil and water conservation districts, towns, water districts, private conservation organizations and other nonprofit groups. North Carolina received one new RC&D area, the Blue Ridge Resource Conservation and Development Area, which includes Alleghany, Ashe, and Watauga counties. There are now 236 active RC&D areas. The 1990 Farm Bill calls for increasing the number to 450 by the year 2000. *Tuesday Letter Mar 1992*

ALBEMARLE-PAMLICO MANAGEMENT PLAN NEARS COMPLETION

The Albemarle-Pamlico Estuarine Study is now drafting a Comprehensive Conservation Management Plan (CCMP) for the Albemarle and Pamlico sounds and the lands draining to those sounds (about 23,500 square miles). The plan will recommend improved management strategies to protect fisheries, water quality, and critical habitat areas. It is expected to address issues of growth and development, storm-water runoff, malfunctioning septic tanks, habitat degradation, and overfishing. The CCMP is scheduled for release and public review in late August with a final document due in February 1993. For additional information contact Randall G. Waite, study coordinator, at (919) 733-0314.

NEW WRRRI REPORTS AVAILABLE

WRRRI has recently published reports on research for which it provided funding. Single copies of WRRRI reports are available free to federal/state water resource agencies, state water resources research institutes, and other water research institutions with which exchange agreements have been made. Single copies of publications are available to North Carolina residents at a cost of \$4 per copy prepaid (\$6 per copy if billed) and to nonresidents for \$8 per copy prepaid (\$10 per copy if billed). Send requests to WRRRI, Box 7912, North Carolina State University, Raleigh, NC 27695-7912 or call (919) 515-2815.

REPORT 263: Investigation of Multicomponent Sorption and Desorption Rates in Saturated Groundwater Systems

by Cass T. Miller, Joseph A. Pedit, Angela M. Levert, and Alan J. Rabideau, Department of Environmental Sciences and Engineering, University of North Carolina at Chapel Hill

The sorption-desorption process is one of the most important processes influencing movement of contaminants in groundwater systems. Similar to all interphase mass-transfer processes, the sorption-desorption process can be defined by the final-phase equilibrium of the solute between the two phases and the time required to approach final equilibrium.

The fraction of organic matter of a soil is the dominant characteristic influencing the sorption of a given neutral, low polarity, hydrophobic, organic compound from an aqueous solution. There is evidence that sorption for such systems is absorption of the organic solute into the organic matter of the soil. However, little work has been done on typical aquifer soils with low total organic carbon content. Definition of the sorption-desorption, mass-transfer process also requires a determina-

tion of the rate at which equilibrium is approached. It is now understood that the sorption-desorption process may require months to years to achieve "true equilibrium" in some hydrophobic solute-soil systems. Since most cases of groundwater contamination include more than one constituent, of additional concern for the description of the sorption-desorption process, is the influence that multiple components have on both system equilibrium and the rate of sorption-desorption. The small amount of work that has been done suggests that competition exists between solutes at equilibrium with the solid phase, especially for high solute concentrations.

The overall goal of this project was to determine the influence of sorption-desorption rates and equilibrium on the movement of multi-component, hydrophobic, organic constituents in saturated groundwater systems. The specific objectives were (1) to investigate the equilibrium and rate of sorption-desorption for single and multicomponent hydrophobic organic solutes to aquifer materials; (2) to evaluate the relationship between sorption-desorption rates and equilibria for a variety of solute-aquifer material systems; (3) to develop and apply mathematical models to describe sorption-desorption processes; (4) to evaluate the significance of the sorption-desorption rates determined as a function of contaminant source relationship; (5) to investigate the significance of sorption-desorption rates for typical heterogeneous aquifer conditions.

Four nonionic organic chemicals served as solutes for the sorption-desorption experiments: biphenyl, diuron, lindane and TCB. Two subsurface materials, both considered sands but with a significant contrast in the organic carbon content, were used. The work included consideration of both single and multisolute systems. Experiments were performed in both batch and one-dimensional column reactor systems.

Sorption and desorption rates were found to be slow compared to the typical time allowed for equilibration

in most other experimental work published to date—on the order of a few to several months was required for equilibrium to be approached. Experimental work and surface diffusion modeling were used to show that slow sorption and desorption processes can be the cause of an apparent lag in laboratory desorption experiments which do not allow sufficient time for attainment of equilibrium. Bolute batch experiments performed for both of the subsurface materials showed no evidence of competitive effects on either sorption equilibria or sorption rates. Column experiments did, however, show evidence of competitive sorption effects—suggesting that column experiments are more sensitive experiments for observing such phenomena. A variety of numerical models was developed to simulate sorption and desorption processes for single and multisolute systems in batch, one-dimensional, and two-dimensional systems. These models simulated nonlinear sorption equilibria using the single-solute Freundlich equilibrium model and ideal adsorbed solution theory.

REPORT NO. 260: Use of Activated Carbon to Remove Radon from Drinking Water

James E. Watson, Jr., and Douglas J. Crawford-Brown, Department of Environmental Sciences and Engineering, University of North Carolina at Chapel Hill

The U.S. Environmental Protection Agency has announced its intention to issue a standard for radon (^{222}Rn) in public drinking water supplies, and it is expected that many drinking water sources in North Carolina will require radon removal. This project studied the feasibility of using granular activated carbon (GAC) as a point-of-entry treatment method to remove radon from individual drinking water supplies. Aeration is the recommended method for treatment of public water supplies.

When radon is adsorbed on GAC, it decays with a half-life of 3.8 days to produce a series of radioactive decay products. The first 4 decay products of radon have short half-lives—all less than 30 minutes. The fifth decay product in this series is

^{210}Pb which has a half-life of 22 years. The build-up of ^{210}Pb could require the GAC to be disposed of as radioactive waste.

At the present, there are no federal regulations specifically applicable to the disposal of GAC containing natural radionuclides. EPA is currently considering the development of regulations controlling the disposal of waste containing naturally occurring radionuclides in excess of a concentration of 2,000 pCi/g. EPA has also recently published "suggested guidelines" for the disposal of naturally occurring radionuclides generated by drinking water treatment plants that recommend restrictions on disposal of waste with substantially lower concentrations of ^{210}Pb .

This project included an experimental determination of the removal fraction for radon from drinking water by GAC. The experimental design consisted of flowing radon laden water through a GAC column, measuring the inlet and outlet concentrations of radon in the water, and measuring the activity of ^{210}Pb in slices of GAC from the column. The results of this work indicated a removal fraction of radon from drinking water of approximately 0.95. The results also indicated that nearly 100% of the ^{210}Pb produced from the decay of the radon was retained on the GAC.

Calculations were performed of the build-up of ^{210}Pb on GAC used to remove radon from water. The build-up of ^{210}Pb is a function of the radon concentration, water use rate, radon removal efficiency, decay product retention, and length of exposure of the GAC to radon. Assuming a 15 kg mass of GAC, a radon concentration of 10,000 pCi/l, use rate of 1,000 l/day, 95% removal efficiency, and 100% decay product retention, it was calculated to take over 25 years for the GAC to reach a concentration of 2,000 pCi/g. Thus, for these conditions, and a limit of 2,000 pCi/g, GAC could be used for radon removal without becoming low-level radioactive waste if it were replaced within approximately 25 years. For higher radon concentra-

tions and/or larger use rates, the replacement of GAC would be required at more frequent intervals. However, the majority of individual water sources in North Carolina that are likely to exceed the standard for public water supplies have concentrations less than 10,000 pCi/l.

It appears that GAC systems could be used to remove radon from most individual North Carolina water supplies without the GAC being classified as low-level radioactive waste (based on a criterion of 2,000 pCi/g) if the GAC occasionally is replaced. More restrictive requirements on the disposal of solid waste containing natural radionuclides would limit the feasibility of using GAC to remove radon from drinking water.

Special Report Series No.8: Water Reuse in Selected States

by Kathy Norcross Watts, Research Associate, Water Resources Research Institute

This special report reviews water reuse practices and regulations in several western and southwestern states, Florida, Georgia, and North Carolina. In the western and southwestern states, the incentive to directly reuse water after it has passed through a wastewater treatment system is a scarcity of water. However, these states also cite supporting reasons for water reuse. Wastewater must be treated to such a high level, it is wasteful to mix it with surface water that may be polluted by chemicals, then to have to treat it again to remove the chemicals. In nutrient-sensitive areas, it makes more sense to use the nutrients in the wastewater to grow crops than it does to add treatment processes to remove nutrients from the wastewater. Finally, reusing rather than discharging wastewater is consistent with the Water Pollution Control Act goal of zero discharge of pollutants.

In the arid states of Texas, Arizona, Colorado, and California, treated wastewater is reused for several non-potable purposes, most commonly agricultural, golf course and landscape irrigation, in order to increase the amount of higher quality

water available for potable uses. California was the first state to develop standards for effluent that will be directly reused, and most other states that have planned reuse have based their regulation on California's. Regulations generally require various levels of effluent quality (either by specifying treatment or effluent standards) according to the type or reuse: the greater the possibility of human contact, the stricter are the regulations. In addition, there may often be restrictions on the kinds of crops that can be irrigated with reclaimed water and prohibition of spray irrigation of crops for human consumption.

Several actual and possible uses for reclaimed water in addition to irrigation are identified: aquifer recharge, industrial cooling, industrial processing, filling of artificial lakes, and in residences, toilet flushing. Arizona encourages use of reclaimed water for aquifer recharge because it allows the water to be stored during lower demand periods and made available when demand is high.

Major concerns about water reuse are health threats from metals and pathogens, and the potential for reduction of downstream flows. The major barriers to water reuse are lack of federal standards, which leads some to think reuse is prohibited and leads to ad hoc decisions by regulatory agencies on specific projects; legal and institutional barriers; and public perception.

In North Carolina, irrigation with effluent is still viewed as a treatment method rather than water supply augmentation. There are a number of sites where reclaimed water is being used, including some agricultural fields growing livestock crops, and the state has adopted standards for irrigation with wastewater effluent. Spray irrigation is a very expensive way of discharging wastewater in North Carolina. Large buffers are required, and as a result, single family homes must have a minimum of six acres in order to discharge 360 gallons per day. The state requires secondary treatment for effluent that is to be used for irrigation. When the irrigation is

planned for public access land, such as a golf course, the state requires tertiary treatment and allows no fecal coliforms. Under current regulations, the state would not approve any irrigation with effluent of food crops for direct human consumption.

The report concludes that in North Carolina, wastewater disposal problems and stringent effluent standards may prove to be an increasingly strong incentive for water reuse, and, as part of the state's long-term water resources planning, agricultural irrigators should be examined as possible users of reclaimed water.

SOUTHEAST CLIMATE SYMPOSIUM CALL FOR POSTER PAPERS

The Southeast Regional Climate Center and others will sponsor a symposium titled CHANGING CLIMATE AND WATER RESOURCES Oct 27-29, 1992, at the College of Charleston Conference Center in Charleston, SC. The following sessions will include presentations and poster displays:

1. Regional implications of climate change and the impact on water resources.
2. Investigative research on climate and water resources.
3. Data-driven analysis of hydro-climatic variability in the Southeast.
4. Public policy, water resources, and climate change.

Poster papers are now being accepted on all topics relating water resources and climate, with specific application on the southeastern United States. Abstracts should be less than 250 words and should be submitted by June 15, 1992. Authors are requested to provide a printed copy of the abstracts and a copy on disk in ASCII format. Some papers may be selected for oral presentation. Abstracts should be sent to: Mr. D.J. Smith, Southeast Regional Climate Center, 1201 Main Street, Suite 1100, Columbia, SC 29201 (Tel: 803/737-0849).

UPCOMING WORKSHOPS AND CONFERENCES

The Dept. of Civil Engineering at the University of Texas at Austin will present BIOMONITORING FOR NPDES PERMIT COMPLIANCE July 13-15, 1992, and TOXICITY REDUCTION: EVALUATION AND CONTROL July 15-17, 1992, on the University of Texas campus. For information on content call Dr. Neal E. Armstrong at (512) 471-4616. For information on registration call Continuing Engineering Studies at (512) 471-3506.

The University of Notre Dame Center for Bioengineering and Pollution Control and Miles, Inc. will present HAZARDOUS WASTE CONFERENCE Aug 31, 1992 - Sept 4, 1992 at Notre Dame, IN. The conference will focus on current research and state-of-the-art activities in biological processes, assessment/modeling, waste minimization/pollution prevention, and photolytic/radiolytic processes. Richard L. Sauer of NASA will discuss waste management in NASA's planned Lunar/Mars habitats. Papers, panel discussions and posters will be presented by invited speakers. Others interested in presenting a poster will be considered. For conference content information call the Center at (219) 239-8376. For registration information call Continuing Education at (219) 239-6691.

The U.S. EPA, the National Center for Ground Water Research at Rice University, and others will present SUBSURFACE RESTORATION CONFERENCE June 21-24, 1992, in Dallas, TX. The conference will bring together the world's leading researchers and practitioners to summarize the state of knowledge in the restoration of groundwater and the associated subsurface environment. For information contact Susan McSpadden, Environmental Science & Engineering, Rice University, P.O. Box 1892, Houston, TX 77251 (713/285-5429)

The International Test and Evaluation Association will present GOVERNMENT, INDUSTRY, AND COMMUNITY: A PRACTICAL APPROACH FOR ENVIRONMENTALLY COMPATIBLE TEST AND EVALUATION, a forum to increase the awareness of environmen-

tal issues and their impact on test and evaluation activities, Sept 15-17, 1992, in Arlington, Virginia. For additional information contact workshop coordinator Thomas Metz (703) 697-4813 or International Test and Evaluation Association at (703) 631-6620.

The Environmental Policy and Studies Center at Catawba Valley Community College will present HEALTH AND SAFETY TRAINING FOR HAZARDOUS WASTE OPERATIONS AND EMERGENCY RESPONSE, a 40-hour course June 1-5, 1992; and a 24-hour course, Sept 14-16, 1992, at the Clement Conference and Exhibition Center in Hickory, NC. For specific course information contact Sallye Hopper (704/327-7000); for registration and hotel information contact Judy Griffin (704/328-6111).

The Environmental Policy and Studies Center at Catawba Valley Community College will host AIR TOXIC DISPERSION MODELLING WORKSHOPS: Screen Modeling, May 20-21, 1992; Refined Modelling, May 22, 1992, at the CVCC campus in Hickory, NC. For information contact Judy Griffin at Hickory Chamber of Commerce (704/328-6111). Registration deadline May 8.

POSITIONS AVAILABLE

The University of California Cooperative Extension Service seeks candidates for the position of Specialist in Hydrology/Hydrogeology. This is an academic career-track, 12-month position located at the Kearney Agricultural Center at Parlier (near Fresno), Ca. The position stresses applied research and extension activities in the area of groundwater contamination and will be available July 1, 1992. Applications and inquiries should be directed to Larry Schwankl, Search Committee Chair, Department of Land, Air, and Water Resources, University of California, Davis, CA 95616 (916/752-1130). Applications will be accepted until May 31, 1992.

The Water Resources Center at the University of California, Berkeley seeks candidates for the position of HEAD LIBRARIAN, WATER RESOURCES CENTER ARCHIVES. Responsible for overall management and direction of

the WRC Archives. Supervises paraprofessional library assistants and student assistants. Manages the archival library and collection development and assures excellence of user services, outreach and fund development programs. MLS from ALA accredited school and minimum 4 years related experience required. Experience or education in field of natural resources desirable. Applicants should apply in writing, including a complete statement of qualifications, full resume of education and experience and names and addresses of three references to Margaret I. Leong, Division of Agriculture & Natural Resources Personnel, University of California, 300 Lakeside Drive, 6th Floor, Oakland, CA 94612-3560 (510/987-0087). Closing date: July 1, 1992.

University of Wisconsin Cooperative Extension seeks candidates for the position of STATE PROGRAM LEADER FOR COMMUNITY, NATURAL RESOURCE AND ECONOMIC DEVELOPMENT. Responsibilities are to provide overall leadership, direction and evaluation for a comprehensive set of programs including such areas as economic development, business development, local government education, environmental issues and public policy education for people at county, area and statewide levels. An earned doctorate and experience in outreach education programming at county or state levels are required. Submit letter of interest, resume and three references to Cooperative Extension Personnel, 619 Extension, 432 North Lake Street, Madison, WI 53706 (608/263-1945) no later than July 31, 1992.

Penn State Harrisburg seeks candidates for a TENURE-TRACK POSITION IN ENVIRONMENTAL ENGINEERING starting as early as August 1992. Individual will teach in programs leading to BS in environmental engineering technology, Master of Engineering, and Master of Environmental Pollution Control. PhD and relevant experience in environmental engineering and/or sciences. Apply to Dr. Charles A. Cole, Science, Engineering & Technology, Penn State Harrisburg, 777 W. Harrisburg Pike, Middletown, PA 17057. Closing date: June 1, 1992, or until position is filled.

EPA REGION IV RECOGNIZES N.C. PROGRAM, WRRRI FOR POLLUTION PREVENTION EFFORTS

The Pollution Prevention Program of the N.C. Office of Waste Reduction and WRRRI have been recognized by U.S. EPA Region IV for outstanding efforts in the field of pollution prevention.

The N.C. Pollution Prevention program was recognized regionally in the category of State Programs, and the Waste Reduction Resources Center for the Southeast, operating from the N.C. Office of Waste Reduction, received regional recognition in the Intergovernment category of the Administrator's Pollution Prevention Awards Program.

WRRRI received regional recognition in the Educational Institutions category of the awards program for technology transfer in applying pollution prevention techniques to reduce wastewater toxicity. Technology transfer efforts recognized included a statewide conference and a handbook, *Using a Waste Reduction Approach to Meet Aquatic Toxicity Limits*. The handbook was compiled and edited by WRRRI Associate Director Robert E. Holman and Technology Transfer Specialist Jeri Gray. The project was completed under a contract with the N.C. Pollution Prevention Program.

According to EPA officials, 800 entries in the Administrator's Pollution Prevention Awards competition were submitted to EPA's 10 regional offices, and 230 received regional recognition and went forward for national competition.

CLIMATE DATA AND WATER RESOURCES CONDITIONS

Winter Recap













The United States experienced its warmest winter (Dec, Jan, Feb) on record (record is 97 years) in 1991/92. In the Southeast, 1991-92 was the 20th warmest, which follows the 13th warmest in 1990-91. North Carolina had its 12th warmest winter, South Carolina, its 15th warmest, and Virginia, its 8th warmest. Winter precipitation




across the Southeast was near normal.

The National Weather Service 90-day forecast had indicated that the winter of 1991-92 would likely be colder and wetter than normal in the Southeast. This was the second consecutive winter for which the National Weather Service 90-day forecast for the Southeast was incorrect.

National data through February showed drought still affecting several large areas of the country. For example, New York City Reservoir system contents fell to 59 percent of capacity.

North Carolina Precipitation/Water Resources

	March	April
Rainfall		
Asheville	3.52* (-1.61")	3.99* (+0.15")
Charlotte	4.93* (+0.10")	2.51* (-0.76")
Greensboro	2.74* (-1.14")	5.83* (+2.67")
Raleigh	2.95* (-0.74")	1.93* (-0.98")
Streamflow		
Blue Ridge Province		
Piedmont Province		
Coastal Plain Province		
Groundwater		
Blue Ridge Province	 ↑	 ↑ ↓
Piedmont Province	 ↑	 ↓
Coastal Plain Province	 ↑	 ↓
Reservoir Levels (Bridgewater, High Rock, Narrows combined)		
	↑ 84% capacity 5.2% less than average 15% greater than a year ago	↑ 98% capacity 8.1% greater than average 1.7% greater than a year ago

"-" indicates below normal; "+" indicates above normal
 Excessive, or above average
  Normal
  Deficient, or below average

Source: U.S. Geological Survey *Water Resources Conditions in North Carolina*

ity at the end of February, 40 percent lower than the same time last year. In California, total streamflow, reservoir contents, and groundwater levels remained well below average. In Ohio, extreme drought conditions in three of the state's 10 climatic regions continued from the summer into the early part of 1992.

February and March

March was the fourth consecutive month of consider-

able or much above average nationwide temperatures. However, February and March temperature readings averaged across the Southeast did not display the much-above-normal nationwide trend. February in the Southeast ranked only as the 22nd warmest on record; March, as the 47th (record is 97 years). March also displayed an interesting contrast with above average temperatures during the first part of the month and below average

temperatures during the latter half.

February precipitation for the region ranked 39th wettest; March, 49th wettest, but South Carolina recorded its 43rd driest February and reported below average precipitation for March.

*USGS National
Water Conditions,
Jan & Feb 1992
and
Southeast Climate
Center Summaries*

NEW PUBLICATIONS RECEIVED

Residents of North Carolina may borrow these publications from the Institute for two weeks. If you need copies to keep, please request them from the organizations issuing the publications. Addresses are provided for this purpose.

Drinking Water

Private Drinking Water Supplies: Quality, Testing, and Options for Problem Waters. ND. By Karen Mancl, Martin Sailus, and Linda Wagenet. Cooperative Extension Service, Michigan State University. Available from Plan Service, Room 217, Agricultural Engineering Department, Michigan State University, East Lansing, MI 48824-1323. (60 pages) (05-F)

Water Quality

Surface Water Quality Trends in Southwestern Virginia, 1970-1989: I. Seasonal Kendall Analysis. 1992. By Carle E. Zipper, Golde I. Holtzmand, Sungsue Rheem, Gregory K. Evanylo. Bulletin 173 of the Virginia Water Resources Research Center, VPI&SU, 617 North Main Street, Blacksburg, VA 24060-3397 (703/231-5624) \$10 per copy outside Virginia (100 pages). (05-G)

Hazardous Material Management

Hazardous Material Spill Control in Water Supply Watersheds: A Guide for Local & Regional Officials. 1991. by William M. Eaker. Land-of-Sky Regional Council, 25 Heritage Drive, Asheville, NC 28806 (704/254-8131) (40 pages plus appendices). (05-B)

Law, Policy and Education

Water Rights East and West: Environmental and Allocation Issues. 1991. '91 Annual Meeting Proceedings of the Universities Council on Water Resources. UCOWR Executive Director's Office, 4543 Faner Hall, Southern Illinois University at Carbondale, Carbondale, IL 62901 (182 pages). (06-I)

Economics

Environmental Investments: The Cost of a Clean Environment (Report of the Administrator of the Environmental Protection Agency to the Congress of the United States). 1990. Available from the National Technical Information Service, Springfield, VA 22161 - # PB91-153783. (06-C)

Ecology

Restoration of Aquatic Ecosystems: Science, Technology and Public Policy. 1992. National Research Council, National Academy of Sciences. National Academy Press, Washington, DC. (552 pages) (02-I)

Miscellaneous

Water Resources Activities of the North Carolina District of the U.S. Geological Survey, 1988-90. Compiled and edited by Rebecca J. Deckard. U.S. Geological Survey Open File Report 91-475. Available from USGS Open-File Reports - ESIC, P.O. Box 25425, Denver, CO 80225 (98 pages) (Annual Reports)

National Research Program of the Water Resources Division, U.S. Geological Survey, Fiscal Year 1991. U.S. Geological Open File Report 92-38. Available from USGS Books and Open-File Reports Section, Federal Center, Box 25425, Denver, CO 80225 (314 pages) (10-B)

Report of Activities 1990-1991. Institute for Environmental Studies University of Illinois at Urbana-Champaign. 101 West Peabody drive, Urbana, IL 61801. (40 pages) (Annual Reports)

The 1992 Information Please Environmental Almanac. 1992. World Resources Institute. Houghton Mifflin Company, 2 Park Street, Boston, MA 02108. (606 pages; \$9.95 softback) (unclassified)

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