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OVERVIEW OF CORPS OF ENGINEERS' PERMITS EXPANDED

In a series of public meetings this month the U. S. Army Corps of Engineers reviewed its responsibility to regulate the disposal of dredged or fill material, the basis of which is the Federal Water Pollution Control Act Amendments of 1972. Section 404 of that Act charges the Secretary of the Army, acting through the Chief of Engineers, to regulate the discharge of dredged or fill material in the water of the United States. Initially, the Corps of Engineers limited its regulatory authority under Section 404 to waters which are presently used, were used in the past, or could be used by reasonable improvements to transport interstate commerce.

Limiting the Corps' authority under Section 404 to navigable waters of the United States was successfully challenged in the U. S. District Court for the District of Columbia. On March 27, 1975, the Court directed the Corps of Engineers to extend its responsibility to regulate the discharge of dredged or fill material under Section 404 to all waters of the United States (including the territorial seas) and to revise its regulation accordingly.

Purpose. The purpose of this program, which is part of the Corps of Engineers' overall regulatory authority, is to insure that the chemical/biological integrity of waters of the United States is protected from the irresponsible and unregulated discharges of dredged or fill material that could permanently destroy or alter the character of these valuable resources.

As part of its responsibility to protect water quality, the Corps of Engineers' Section 404 permit program will be extended to many areas that have never been regulated before.

Phased Program. The Corps of Engineers will expand its authority in a three-phase program over the next two years.

Phase I, effective July 25, 1975, extends the Corps' regulation of disposal of dredged or fill material to the traditional "navigable waters of the United States" and contiguous or adjacent wetlands. Phase II, effective July 1, 1976, will expand the Corps' permit program into primary tributaries of navigable waters of the United States, lakes, and the contiguous or adjacent wetlands. After July 1, 1977, the Corps will exercise its Section 404 authority over all waters of the United States.

Moderate, Reasonable Approach. The Corps of Engineers stresses that it plans to use common sense, good judgment, and moderation in carrying out the purpose of the Section 404 permit program. The Corps and the Environmental Protection Agency will coordinate efforts to develop a meaningful, manageable program to protect the quality of waters and preserve the environmental assets of coastal and inland waters and wetlands. Public cooperation and voluntary compliance will be encouraged, and prosecution will be recommended only when all other options have been exhausted.

Activities Included. Along with the discharge of material which has been dredged or excavated from any waters of the United States, the following additional types of activities will also be regulated by this program: site developmental fills for recreational, industrial, commercial, residential, and other uses; causeways or road fills; dams and dikes; artificial islands; property protection and/or reclamation devices such as riprap, groins, seawalls, breakwaters and bulkheads and fills, beach nourishment; levees; sanitary landfills and backfill required for the placement of structures such as sewage treatment facilities.

Farming Exempt. The Section 404 permit program does not apply to normal farming practices such as plowing, cultivating, seeding, and harvesting. Nor does it apply to such farm and ranch conservation practices as terracing, land levelling and the construction of check dams unless they occur in a water of the United States. However, damming of major streams, diking, and the discharge of dredged or fill material in wetlands associated with farm practices will require permits.

Grandfather Clause. Discharges of dredged or fill material which occurred in waters other than traditional navigable waters before July 25, 1975, or which are less than 500 cubic yards and will be completed within six months of that date will generally

not require permits. In addition, discharges of dredged or fill material which are completed before an effective phasing date or which generally involve minor bulkhead and fills of less than 500 feet in length and 500 cubic yards in volume will not require individual permits provided certain conditions can be met. Water quality and coastal zone management certifications must be obtained before such discharges can occur, however. And the District Engineer may still require an individual to submit an application for a particular discharge falling within one of these exceptions if he feels the interest of water quality requires it.

Where to apply for a Permit. Application for a permit under this program should be made to the nearest district office of the Corps of Engineers. Application forms and instructions are available at all district offices of the Corps of Engineers.

URBAN DRAINAGE AND FLOOD CONTROL

A new report on *Urban Drainage and Flood Control Projects - Economic, Legal and Financial Aspects*, has been released by Colorado State University's Environmental Resources Center.

Techniques for evaluating minor and major Urban Drainage and Flood Control (UDFC) Projects are described. Economic, political, engineering, financial and legal problems must be faced prior to implementation of proper levels of these projects. The measurement of tangible benefits is described while a literature review revealed no direct objective techniques for quantifying intangibles. Some methods for establishing the relative rankings of intangible contributions show promise for improvement of evaluation techniques, however. The legal problem of establishing benefits is described and a copy of recently enacted Colorado legislation is included. Information on the estimation of flood damages and the selection of discount rates is presented for use by the analyst. Careful coordination of land use and drainage control measures is stressed. Related recent legislation and regulations are included.

Written by both university and practicing engineers and lawyers, the report will be useful to the following groups:

1. Engineers who are making UDFC project plans or evaluations. The report should give them specific guidance on the issues involved and the "how to" of certain techniques.
2. Public Works Managers. The report should provide them specific information on programming UDFC according to a rational selection process as well as to give them guidelines for the political, legal, and financial aspects of the problem.
3. Attorneys. The report should give them a background in the legal issues and provide an introduction to the engineering-economic aspects of drainage in order that they might better serve on drainage teams.

Inquiries should be addressed to the Environmental Resources Center, Colorado State University, Fort Collins, Colorado 80521.

URBAN STORMWATER - A WASTE OR RESOURCE

The proper management of stormwater has been a neglected activity in many communities. The U.S. Environmental Protection Agency claims that essentially every metropolitan area of the United States has a stormwater problem (*Urban Stormwater Management and Technology*, 1974). It is evident that new emphasis must be placed on providing solutions to the complex and varied problems presented by both the quantity and quality of stormwater runoff.

Urbanization, and the alterations to the natural landscape which it brings, has a tremendous effect on stormwater runoff. Parking lots, streets, sidewalks, buildings, and other impervious surfaces reduce infiltration of precipitation and increase the volume and rate of runoff.

The customary method for handling this runoff involves a stormwater drainage system composed of curbs, gutters, and storm sewers. Conventional stormwater drainage systems increase the drainage efficiency of watersheds and result in more rapid removal of stormwater to receiving streams. Research by Luna Leopold has indicated that improved drainage efficiency created by storm sewers, coupled with increased volume of stormwater runoff from impervious surfaces, may significantly increase flood flows in the receiving stream (*Hydrology for Urban Land Planning*, 1968). Although storm sewers, curbs, and gutters are used to remove runoff from areas where it may cause an inconvenience, they may merely shift the problem to downstream property owners.

There is growing interest in stormwater management alternatives that diminish the impact of urbanization on flooding and recognize the potential of stormwater as a resource rather than a nuisance. Management of stormwater at or near the point of rainfall through various detention or retention facilities has been demonstrated as economically and environmentally sound. Detention is the temporary storage of stormwater to retard its movement toward a receiving stream. Retention involves extended storage of stormwater.

When considering stormwater as a resource, it is necessary to give careful consideration to its quality. The Council on Environmental Quality reports that the first flush of stormwater from sewers and gutters has a chemical and biological quality similar to raw sewage (*Total Urban Water Pollution Loads: The Impact of Stormwater*, 1974.) Pollutants, such as oil and gasoline, are deposited on the impervious surfaces of the city and are carried by storm sewers to streams. Efforts are under way to discover ways of dealing with stormwater pollution, and the answer may be found in employing stormwater management methods that minimize runoff from urban development.

Innovative stormwater management is reflected in the design and construction of a large industrial plant in Bensenville, Illinois. The site chosen by company officials presented three major obstacles: the site was prone to flooding, downstream flooding was a problem, and Bensenville did not have an adequate water supply for the plant. The company solved all three problems by constructing stormwater retention basins. In each case the material excavated for the basin was used to raise the plant above flood levels. The basins stored stormwater runoff from the site and helped prevent downstream flooding. In addition, a source of industrial water supply and a recreational facility for employees was created by on-site management of stormwater.

To be effective, stormwater management must be integrated with land use planning, a concept employed in the planning and design of Woodlands, Texas, a new town near Houston. The developers of Woodlands are committed to harmonizing development with the natural drainage of the site. The key features of the natural drainage system include: preservation of floodplains, drainageways, and highly permeable soils;

construction of shallow, grassed drainageways in lieu of curbs, gutters, and storm sewers; and construction of retention ponds to minimize increases in runoff. While providing greater open space, recreational opportunity, and aesthetic appeal through the preservation of floodplains and construction of retention ponds, the Woodlands natural drainage system has actually saved the developers the substantial expense of installing storm sewers.

Urban stormwater management provides a classic example of a problem that requires consideration on a regional scale. The problems associated with the quantity and quality of stormwater cannot be confined to a single municipality within a metropolitan area.

Section 208 of Public Law 92-500 (Water Pollution Control Act Amendments of 1972) authorizes the development of wastewater management plans for urban industrial areas with substantial water pollution problems. A major output of 208 planning is to provide areawide control of non-point sources of pollution resulting from stormwater runoff, a task that will require a great deal of cooperation among local governments within 208 regions.

Drainage standards and practices that have encouraged disposal of stormwater should be reevaluated to minimize the impact of urbanization on stormwater. Many communities have already adopted performance-oriented development standards designed to limit the amount of stormwater runoff permitted to leave a development site. Performance standards establish a maximum amount of runoff that will be tolerated. Generally, the volume of runoff after construction may not exceed the volume of runoff from the site in its natural or undeveloped state. The techniques employed to limit runoff are left up to the discretion of the designing engineer.

Many communities have progressed significantly in developing stormwater management techniques that lessen the environmental impact of development while adding valuable amenities such as greater open space and recreational opportunity. Recognition of stormwater as a potential resource makes alternatives to conventional stormwater drainage systems not only environmentally attractive but economically feasible. In addition, urban stormwater management offers great opportunity for cooperation among local governmental units where other issues have failed to receive regional agreements.

-- Richard K. Carlisle
Great Lakes Basin Commission

INDUSTRIAL WATER CONSERVATION

A recent analysis of five industries that are major users of public water supplies was conducted by the General Electric Corporation for the Office of Water Research and Technology, U.S. Department of the Interior, to determine whether their demands for public water are affected by water rates. The industries covered were: fluid milk processing, poultry dressing, malt brewing, paper mills, and paperboard mills.

Sixty-three percent of the 90 plants responding indicated that they had been forced to limit or reduce water use due to a combination of factors. Water intake cost was second only to wastewater volume constraints as a factor in restricting water use.

No evidence was found to support the prevailing water utility industry view that water demand does not decrease with an increase in price. In fact, the general conclusion of the study was that for industries in which public water is a significant

input to the production function and in which economically feasible technical alternatives exist for reducing intake demand, management does indeed respond to water price increases by reducing demand.

A copy of the report - Technical Information Series No. 72 SD257, *The Impact of Public Water Utility Pricing Policy on Industrial Demand and Use*, by the G. E. Re-Entry and Environmental Systems Division, is available at the Institute reading room.

INDUSTRIES' COST TO MEET EPA GUIDELINES

A recent report to the National Commission on Water Quality indicates that capital costs of \$44.2 billion and annual operation and maintenance costs of over \$9.5 billion will be required by industries to meet EPA's best practicable technology and best available technology effluent guidelines.

WATER ACT POSES PROBLEM

The current job of issuing more than 50,000 permits under the Federal Water Pollution Control Act is "unmanageable and unworkable" says Gordon J. MacDonald, Chairman of the Commission on Natural Resources, National Research Council, National Academy of Sciences. Speaking at the International Water Quality Forum, Gordon said that the permit system is inefficient and inequitable and that we have not made the progress in improving water quality in spite of EPA statistics.

According to Gordon user charges have not received the attention they deserve and he believes that it makes economic sense for polluters to pay. Gordon stated that "a user charge will take fewer people to provide checks than it will to administer 50,000 permits under current law."

REGULATIONS ON AREAWIDE (208) WASTE TREATMENT PLANNING

EPA has recently proposed new amendments setting forth policies and procedures to be followed in the designation of areawide waste management planning areas and responsible planning agencies for section 208 of the Federal Water Pollution Control Act.

Under the 208 provisions the Governor is required to designate specific areas and agencies capable of establishing and operating an areawide waste treatment management planning process and developing the plans required by the Act.

Criteria used in the designation of planning areas for example are those areas which, as a result of urban-industrial concentrations or other factors, have substantial water quality control problems which require a regional approach to planning for and implementing corrective action.

Areas which are not officially designated by the Governor to be conducted at the regional level will become the State water quality management planning area. Planning for this area in North Carolina will be conducted by the Division of Environmental Management, Department of Natural and Economic Resources.

EPA FEEDLOT PERMIT PROGRAM UNDER STUDY

A June 10, 1975, Court Order held that EPA could not exempt entire classes of point sources from its water clean-up permit program. Four classes which were previously exempt were small animal confinement operations (which include beef cattle, dairies, sheep, swine, chickens, turkeys, ducks, horses, and livestock auctions), storm sewers, silvicultural (forestry) operations, and agricultural operations.

A major issue is the undefined term *concentrated animal feeding operation*, which was identified by Congress as a *point source* and thereby needing a permit. With no current distinction between point and non-point sources of pollution, every livestock production operation could be required to obtain some type of permit.

EPA Regional Administrators are seeking comments on alternative approaches for addressing the issue.

MODELING THE EFFECT OF WASTE DISCHARGE IN SMALL MOUNTAIN STREAM

Three Virginia Tech. civil engineering faculty members recently completed a report on how to adapt a computer model used for predicting dissolved oxygen content in river systems for use with mountain streams. The study is reported in Virginia Water Resources Research Center Bulletin 76 titled *Modeling the Effects of Waste Discharges in a Small Mountain Stream*. Findings are expected to be applicable where many small streams receive treated sewage effluent.

The computer-based mathematical river model used in the research was developed by the Virginia State Water Control Board. Adaptations for small streams were done by Robert C. Hoehn, Mitchell R. Childrey, and Dinshaw N. Contractor of Virginia Tech. A copy of the bulletin can be borrowed from the Institute or purchased from the Virginia Water Resources Research Center, 225 Norris Hall, VPI and State University, Blacksburg, VA for \$4.00.

REORGANIZATION MODIFIES THERMAL POLLUTION RESEARCH STRUCTURE

The recent reorganization of EPA's Office of Research and Development has changed the structure of the agency's thermal pollution research program. Work on control technology for heated water from electric power plants will be under the direction of Mike Maxwell, Chief, Emissions & Effluent Technology Branch, Industrial Environmental Research Laboratory, Research Triangle Park, North Carolina. A field

station in Corvallis will provide program execution of some of this research. Research on industrial process waste heat control and conservation as well as work on advanced power systems, including geothermal, has been transferred to the Industrial Environmental Research Laboratory in Cincinnati, Ohio under the direction of Mr. Alden Christianson, Director, Division of Energy Systems Environmental Control. Research on the environmental impact of cooling systems, including prediction of dispersion and degradation of heat and secondary pollutants will remain in Corvallis and be executed within the context of the new structure of the Corvallis Environmental Research Laboratory. Every effort is being made to effect an orderly transfer of research on thermal pollution within the new organizational arrangements.

EPA ENERGY FUNDS TO SUPPORT TVA RESEARCH PROJECTS

In accordance with a memorandum of agreement signed by both EPA and TVA, several projects related to the environmental impact of energy development will be conducted by TVA with EPA *pass through* funds. Among these projects are several negotiated by the Thermal Pollution Branch Staff:

- 1) Simulation of thermal dispersion in streams and reservoirs.
- 2) Thermal impacts on freshwater biota.
- 3) Demonstration of a wet/dry cooling tower.
- 4) Demonstration of a thermal rotor cooling device.
- 5) Laboratory testing of membrane technology for treatment of power plant wastes.
- 6) Evaluation of technology to divert fish from power plant intake structures.
- 7) Demonstration of soil heating to extend crop growing season.
- 8) Biological recycling of nutrients in livestock wastes.

LAND USE LEGISLATION

The Department of Agricultural Economics of VPI has just released a report *Southern United States Land Use Legislation: A Legal Inventory*, by S. S. Batie, B. F. Long, and D. S. DeJong. This report provides a general legal overview of existing legislation of 13 southern states and Puerto Rico. It is preliminary to further analysis of various existing statutes in terms of objectives, incentive mechanisms, and expected impact. Inquiries concerning copies of the report should be addressed to Research Division, VPI, Blacksburg, VA 24061.

A STATEWIDE SURVEY OF LAND-USE AND ENVIRONMENTAL OPINIONS

Dr. James A. Christenson, Associate Professor and Extension Community Specialist, North Carolina State University, has recently completed an extensive study of how

North Carolinians think about the availability and quality of services in their communities, how they want tax dollars spent, kinds of land-use controls they want, and other important issues. The opinion study is one of the most comprehensive ever conducted in North Carolina.

From a statewide proportional sample of 3054 respondents, 40 percent said that state government should spend more for water pollution control and 8 percent were in favor of more taxes for the purpose. Forty-three percent said the spending should be the same and 6 percent said spend less.

When citizens were asked to give their opinion of community services, 24 percent of those surveyed said the effectiveness of water pollution controls was poor, 44 percent fair, 25 percent good, and 2 percent excellent.

In the area of land-use planning, of those surveyed 57 percent said they knew nothing or very little about what is called *land-use planning*. A majority or 78 percent, said they had never attended a meeting specifically related to land-use planning. In most land-use planning areas the respondents tended to prefer local controls. With subject areas such as control of billboards, air pollution control, and water pollution control respondents tended to prefer more state and federal controls.

A series of 10 booklets will be developed to examine the study in depth and to provide data for counties and multi-county planning regions. The study was conducted under the auspices of the North Carolina Agricultural Extension Service.

Copies of the preliminary summary of results may be obtained from Dr. Christenson.

ON THE VALUE OF PLANNING

The world moves into the future as a result of decisions, not as a result of plans. Plans are significant only in so far as they affect decisions. Planning may be defined in such a way that it is part of the total decision-making process; but if it is not part of a decision-making process, it is a bag of wind, a piece of paper, and worthless diagrams.

- Kenneth E. Boulding
Technology Review

WATER SUPPLY AND WASTEWATER IN COASTAL AREAS PROCEEDINGS AVAILABLE

Proceedings from the Southeastern Conference on Water Supply and Wastewater in Coastal Areas are now available. The Proceedings contain 17 presentations on water supply and wastewater disposal, management and financing alternatives, disposal alternatives, wastewater reuse, public participation in planning, and the impact of water supply and wastewater management on the coastal and marine environments. The Proceedings includes the extensive discussion period following each session. Copies

of the Proceedings are available from the Institute at a cost of \$8.00 per copy prepaid and \$10.00 per copy if billed.

The Conference was sponsored by the Coastal Plains Center for Marine Development Services, Coastal Plains Regional Commission, Water Resources Research Institute of The University of North Carolina, and the University of North Carolina Sea Grant Program.

CONFERENCE ON LAND APPLICATION OF WASTEWATERS AND SLUDGE

The National Science Foundation has announced a special conference on research relating to land application of municipal wastewater and sludge. The conference will be cosponsored by the Hampton Roads Sanitation District, Colorado State University, and the National Science Foundation. Planned dates are November 13 and 14, 1975. Location of the conference will be the Ramada-West Motel, Williamsburg, VA. A field-demonstration of the soil-injection technology is planned as part of the conference/workshop program. In addition, the tentative program includes the following topics:

High Energy Electron Irradiation of Wastewater Liquid Residuals

Control of Virus Pathogens in Municipal Wastewater and Treatment Residuals by Irradiation with High Energy Electrons

Virus Survival in Soils Injected with Municipal Wastewater Treatment Residuals

Process Selection for Optimum Management of Regional Wastewater Treatment Residuals

Legal Aspects of Land Application of Wastewater and Its Treatment Residuals

Land Application - International Aspects

Potential for Integration of Soil Injection into Management of Sludge in the Hampton Roads Sanitation District

EPA Guidelines for Ultimate Disposal

Local arrangements are being coordinated by: Mr. D. R. Wheeler, Director of Water Quality, Hampton Roads Sanitation District, PO Box 1741, Norfolk, Virginia 23501.

NEW INSTITUTE REPORTS

Report No. 108

The Effects of Stream Channelization on the Distribution
of Nutrients and Metals

by

Charles R. O'Rear, Jr.
Department of Biology
East Carolina University

The project was designed to determine the distribution patterns of nutrients and metals in channelized and unchannelized stream segments and to determine if modifications occur in the distribution of nutrients. Adjacent segments of Swift Creek, Pitt County, North Carolina were used as the sites. An upstream segment channelized in 1937 was used as a representative natural stream while a segment approximately one

kilometer downstream, channelized in 1965, was used as a representative channelized stream. Sampling was performed from September, 1973, through November 1974.

Water temperatures in the natural segment tended to be lower than in the channelized segment due to a greater canopy cover in the natural segment. Dissolved oxygen in the channelized segment was consistently higher during low flow periods with average differences exceeding 2 mg/l.

Most of the nitrogen and phosphorus moved through both stream segments during the high flow periods. The highest concentrations were observed during the low flow period of October through December. Ammonia-N accounted for most of the increased nitrogen concentrations while particulate phosphorus accounted for the rise in total phosphorus. Nutrient concentrations in Chicod Creek were lower than the unchannelized segment of Swift Creek. Modification of the nutrient distribution patterns could not be directly determined from the measured nutrient concentrations and flows.

Dissolved metal concentrations between the two segments showed no significant differences.

Report No. 109

A Bargaining Approach for Programming Least-Cost
Waste Treatment Along a River

by

Lalita D. Airan, J. A. Seagraves, and Damodar S. Airan
Departments of Economics & Business and Civil Engineering
North Carolina State University

A model is developed for minimizing waste treatment costs to achieve a given stream standard. An optimum set of treatment levels is calculated using available information about the cost of waste treatment and the effects of waste in different reaches with an assumed procedure for bargaining among waste dischargers. Each discharger is assumed to be responsible for the quality of water in his reach. The optimum solution suggests an optimum set of discharge permits and charges. However, it does not favor any one administrative system or distribution of costs.

The model is run to find optimum or least-cost waste treatment levels for the Neuse River of North Carolina. The optimum solution has much less treatment than is currently being used. The costs of present waste treatment are estimated to be \$3.7 million per year while the cost of the optimum set of treatment levels is only \$1.09 million.

THESIS ON A PREDICTIVE PHOSPHORUS MODEL FOR LAKES WINS AWARD

The Association of Environmental Engineering Professors (AEEP) has given the 1975 AEEP Engineering Science Award to Dr. William Snodgrass for his doctoral thesis entitled *A Predictive Phosphorus Model for Lakes - Development and Testing*. This research was conducted at the Department of Environmental Sciences and Engineering under the direction of Professor Charles R. O'Melia. The award is made annually by AEEP for the outstanding Ph.D. dissertation in Environmental Engineering completed during the preceding academic year. Dr. Snodgrass and Dr. O'Melia will each receive a cash award of \$500 from AEEP at the national meeting of the Water Pollution Control Federation at Miami, Florida in October, 1975.

The thesis was completed as a part of OWRT-WRRI project, *Phosphorus Cycling in Lakes*. The completion report is available as WRRI No. 97.

DARE CITIZENS OFFERED COASTAL RESOURCE SEMINAR

Dare County citizens and their neighbors are being offered a 12-session course on coastal resources. Lectures are being held on the first and third Thursday of each month at the Dare Marine Resources Center.

The series will be co-sponsored by the National Park Service, the Pamlico Soil and Water Conservation District, the Dare Marine Resources Center, East Carolina University, and the Dare County Planning Board.

The themes of the lectures will be the geologic, natural and cultural history of coastal North Carolina and how these elements have interacted with each other up to the present. A final lecture will discuss the role of planning.

"Continuing Education Units" will be granted by East Carolina University to anyone attending a minimum of ten lectures. These educational units can be applied towards renewal credit for teachers. They will be signified by a certificate of completion awarded to individuals fulfilling attendance requirements. Any Dare County teachers interested in receiving CEU's should contact Steve Basnight of the Board of Education.

For further information on the seminar, contact Henrietta List at the Pamlico Soil and Water Conservation District; office in the Dare County Administration Office.

POSITIONS AVAILABLE

The Department of Civil Engineering at West Virginia University, Morgantown, West Virginia, is seeking a faculty member interested in Water Resources Engineering. Position available January 1, 1976, or August 16, 1976.

Applicant should have a strong interest in systems analysis and modeling as related to water resources and environmental engineering and be interested in teaching various aspects of water resources engineering at the undergraduate and graduate levels and interaction with other members of the environmental group concerned with water pollution, air pollution, and solid waste disposal.

Qualified applicants should send a complete resume, preferably including both courses taken and courses taught, along with names and addresses of three references to: Dr. William J. Wilhelm, Chairman, Department of Civil Engineering, West Virginia University, Morgantown, West Virginia 26506, Telephone: (304) 293-3031/2.

The University of Maine at Orono has a vacancy for the Director of the Environmental Studies Center. The Director is the principal officer of the Environmental Studies Center with responsibility for coordinating the program within the various units of the University.

Submit a letter of application, including complete resume of educational background, experience, and qualifications to: Dr. Frederic E. Hutchinson, Acting Vice

President for Research and Public Service, 21 Coburn Hall, University of Maine, Orono, Maine 04473.

The Water Resources Research Institute, University of Nebraska-Lincoln is seeking a research associate who will assist the Director in all aspects of the Institute's research programs related to groundwater. Primary responsibility will include assistance in planning, promoting, administering, coordinating, conducting and supervising research in groundwater hydraulics and hydrology. Also responsible for assisting with the dissemination of research results and the training of water resources specialists in the areas of planning, design, operation and management of groundwater systems.

Resume should be sent to Dr. Millard W. Hall, Director, Water Resources Research Institute, 310 Agricultural Hall, University of Nebraska, Lincoln, Nebraska 68583.

WATER RESOURCES CONDITIONS IN NORTH CAROLINA FOR SEPTEMBER

Heavy rains generated by the remnants of Hurricane Eloise caused sharp rises on most streams throughout the State during September. The rains caused minor flooding in the upper French Broad River basin and several low-lying urban areas in the Charlotte area. Rainfall amounts up to about 9 inches were reported during the September 24-25 storm. There were no flood-related deaths reported and property damages appear to be minor.

Monthly mean flows during September were considerably above normal. Flows at the USGS index stations ranged from $1\frac{1}{2}$ times normal for September in the Neuse River at Clayton to over $2\frac{1}{2}$ times normal flow in the French Broad River at Asheville. Flows at the end of the month were generally receding but were also well above normal.

Groundwater levels declined slightly statewide but remained slightly above the long-term averages in the Mountains and western Piedmont regions. Levels in the eastern Piedmont were near the long-term average, and levels in the Coastal Plain region were below average.

... *U. S. Geological Survey*

WATER AND AIR POLLUTION CONTROL LEGISLATION

Editor's Note: This is the second of a two-part series summarizing the environmental legislation considered this year by the North Carolina Legislature. The summary was prepared by Professor Milton S. Heath, Jr., Associate Director of the Institute of Government, University of North Carolina at Chapel Hill.

Departmental Bills. This year's water and air pollution legislation was dominated by a package of departmental bills proposed by Secretary James Harrington for the Department of Natural and Economic Resources and sponsored by the chairmen of the Senate

Committee on Natural and Economic Resources and the House Committee on Water and Air Resources, Senator William Staton and Representative Carl Stewart. Five of the seven departmental bills ultimately passed with amendments; the other two bills were dropped by the Department in the face of strong opposition. Committee handling of these bills and the departmental forestry bills (see below) kept the Senate and House environmental committees busy for most of the session. Sen. Glenn Jernigan chaired the Senate subcommittee that screened these bills at length.

Taken as a whole, the departmental bills (1) should qualify North Carolina to administer the NPDES (National Pollution Discharge Elimination System) water pollution permits; (2) enable the Department to eliminate paperwork on state pollution control permits that duplicates federal requirements; (3) coordinate the state's regional sewage disposal planning grants with federal sewage treatment construction grants; (4) empower the Department to charge limited fees for processing permit and grant applications; (5) direct the Department to delegate administration of water pollution permits for single-family dwellings to local health departments; (6) spell out the basis for classifying groundwaters under the water pollution control law; and (7) extend the availability of civil penalties imposed by the Environmental Management Commission to the enforcement of the capacity use areas law, the dam safety law, and the water and air quality reporting law.

Ch. 583 (S 244) is the product of two years of negotiations between state officials and the Federal Environmental Protection Agency (EPA) over refinements to the state water pollution control law. Top EPA officials have given assurances that the changes contained in this act will qualify North Carolina to administer the NPDES, thereby merging the current dual federal and state permits for waste discharges into a single permit system. Ch. 583 makes three principal changes in present law. First, it tightens the variance provisions by restricting the granting of variances to situations in which (1) compliance cannot be had by use of best available technology economically achievable, and (2) compliance would produce serious hardship (previous law allowed a variance upon either of these two findings). It also requires that air and water variances be consistent with federal law. Second, it revises confidentiality provisions by replacing a statutory prohibition against disclosing secret processes or formulas with a provision that all information shall be available for the public unless a need to protect trade secrets can be shown. Third, it authorizes the imposition of a daily civil penalty upon proof of "continuous" water pollution violations (formerly, "willful" violations).

Ch. 512 (S 245) complements Ch. 583 by giving the state a continuing basis for eliminating dual federal-state permit requirements. It empowers the Environmental Management Commission to accept evidence of compliance with federal law in lieu of requiring any state permit that it administers, upon finding that the federal requirements are at least as restrictive as the state requirements and that the duplication of effort by the applicant would cause an unreasonable burden.

Ch. 251 (S 247) seeks to ensure better coordination of the state's regional sewage disposal planning act with the federal and state sewage treatment grants program by providing that the planning contemplated under the state act is planning that (1) will qualify for receipt of federal and state construction-grant funds, and (2) involves areas suitable for regional systems that meet federal and state grant requirements. It also limits planning advances to applicants that can show need for the grants in order to finance their plans and requires repayment of the advances from any applicable planning grants that may be received.

Ch. 655 (S 249) made several miscellaneous changes in existing pollution control laws designed primarily to clarify and simplify program authority and procedures. In the interest of simplifying the law for the benefit of permit holders, it replaces a requirement for monthly water and air pollution reports with an authorization for the Commission to set the frequency of reports (at least quarterly), and it eliminates notice requirements as to permits for waste discharge of 1,000 gpd or less for single-family

homes. In keeping with the trend toward decentralization, it delegates administration of the single-family 1,000 gpd permits to local health departments, under Environmental Management Commission guidelines. It extends from 45 days to 60 days the period within which the Commission must act on applications for discharge permits. It fills a long-standing gap in the water pollution control law with respect to groundwater by spelling out criteria for classifying groundwater in the initial phase of a water quality program (natural quality, recharge, movement and discharge, vulnerability to pollution, and potential for improvement). Finally, anticipating a reduction of federal program grant funds within the next year or two, it authorizes the Commission to develop a fee system for processing permit applications and construction-grant applications under the water pollution, air pollution, and oil pollution laws. A limit of \$100 is placed on the fee for any single permit application.

Ch. 842 (S 250) is part of a continuing departmental effort to standardize environmental enforcement procedures. As originally introduced, the bill would have added civil penalties administered by the Commission as a sanction for violations of the Well Construction Act, the Capacity Use Areas Act, the Dam Safety Act, and the Water and Air Quality Reporting Act. Various maximum total or daily amounts were set, in most cases with a range of \$100 to \$1,000. Standards were spelled out to help the Commission determine the penalty to be assessed against a particular violator. The bill ran into heavy sledding in the Senate, where it hung on the Senate calendar for more than a month and was amended on four separate occasions. Before the bill was enacted the well construction authority had been deleted, the maximum civil penalty level had been reduced to \$250, provisions authorizing Wake County as an alternate venue for enforcement actions had been deleted, and a new set of reduced maximum levels for penalties in criminal prosecutions for water and air pollution control cases had been added. The effect of the latter provisions was to lower the ceiling for daily criminal fines for continuing flagrant violations from \$25,000 to \$15,000 and to set a new maximum cumulative total fine of \$200,000 for each 30 days of continued violations.

Two departmental bills were allowed to die in the Senate with departmental acquiescence. S 246 would have required Environmental Management Commission approval for construction of industrial, commercial, irrigation, institutional, or public water supply wells. S 248 would have conformed reporting provisions of the air pollution law to similar provisions respecting water pollution in order to correct a codifying omission.

Other Water and Air Pollution Bills. The General Assembly this year enacted an air pollution equivalent of the "Hardison Amendment" of 1973-74 that limited North Carolina's water pollution standards to standards that are no more stringent than federal law. Ch. 784 (S 876, by Sen. Hardison) states the General Assembly's intent that North Carolina's air quality rules, regulations, and procedures (of state and local agencies) shall be no more restrictive than those adopted by the U.S. Environmental Protection Agency. At various times during the history of this bill, amendments were proposed or adopted that would have very substantially increased its impact by adding source categories and policies to the list of covered subjects and by tying North Carolina's requirements to the lowest common denominator of all the other 49 states, but these provisions were all eliminated before the act was passed.

In the waning days of the 1975 session a flurry of bills and proposals reached the floor of the House that, in the judgment of environmental management officials, might have seriously impaired the administration of several pollution control laws, if enacted. These proposals, all of which were defeated, were:

S 84: A bill to empower the State Board of Health to regulate the location and construction of water supply wells. This bill, which would have confused the legal status of the existing well construction act, was defeated in the House for the third successive year, this time by a narrow margin on second reading.

H 1108: A bill to allow the use of a sand filter system, as a matter of law, under the Ground Absorption Sewage Disposal Act, in order to permit property to be used. Public Health officials expressed concern about the impact of this bill, which died on the House floor.

S 876: The proposed amendments to this bill, as noted earlier, were defeated. The House had to recall the bill from the Senate to eliminate an amendment that would have tied North Carolina's air-pollution standards to those of the most lenient state in the nation.

Earlier in the session, the House Committee on Water and Air Resources reported unfavorably a bill that would have authorized postponement for five years of any EPA requirement if it were likely that a cheaper method could be developed to achieve the same result. Also defeated for the second year running, this time on the Senate floor, was the bill to authorize creation of local environmental quality boards (S 782 - H 1197).

WATER RESOURCES LEGISLATION IN THE CONGRESS

Bills Introduced

House

- H.R. 9487 To modify section 204 of the Flood Control Act of 1965.
- H.R. 9782 To amend section 206 of the Federal Water Pollution Control Act relating to reimbursement and advance construction.
- H.R. 9789 To amend the Wild & Scenic Rivers Act by designating a segment of the New River in North Carolina as a component of the National Wild & Scenic Rivers System.
- H.R. 9819 To abolish the Environmental Protection Agency and transfer its administrative authority over various environmental programs to other appropriate agencies.

NEW PUBLICATIONS RECEIVED BY THE INSTITUTE

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

Abbreviations used throughout as follows:

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|--------|---|------------------------------------|-------|---|------------------------------------|
| ARS | - | Agric. Res. Service | OWP | - | Office of Water Programs |
| ASCE | - | American Society of Civil Engrs. | *OWRR | - | Office of Water Res. Research |
| EPA | - | Env. Protection Agency | SCS | - | Soil Conservation Service |
| ERC | - | Engr. Res. Center | TVA | - | Tennessee Valley Authority |
| GAO | - | General Accounting Office | USDA | - | U.S. Dept. of Agriculture |
| IWR | - | Inst. for Water Resources | USDC | - | U.S. Dept. of Commerce |
| NAS | - | Nat'l. Academy of Sciences | USDI | - | U.S. Dept. of the Interior |
| NCDNER | - | N.C. Dept. of Natural & Econ. Res. | USGPO | - | U.S. Gov. Printing Office |
| NERC | - | Nat'l. Env. Res. Center | USGS | - | U.S. Geological Survey |
| NOAA | - | Nat'l. Oceanic & Atmospheric Adm. | WPC | - | Water Pollution Control |
| NPS | - | Nat'l. Park Service | WQS | - | Water Quality Standards |
| NTIS | - | Nat'l. Technical Information Serv. | WRC | - | Water Resources Council |
| NWC | - | Nat'l. Water Commission | WRI | - | Water Resources Res. Institute |
| *OWAR | - | N.C. Off. of Water & Air Resources | WRSIC | - | Water Res. Sci. Information Center |

Water Resources Planning

"Civil Works Water Resources Development Program," 1974-75, NCDNER, Div. of Res. Planning & Evaluation, PO Box 27687, Raleigh, NC 27611.

*Agency name changed to N.C. Division of Environmental Management (NCDNER).
**Agency name changed to Office of Water Research & Technology (OWRT) as of July 29, 1974.

- "Studies on Operations Planning and Control of Water Distribution Systems," 8/75, by D. W. Bree, Jr., *et al*, for OWRT, avail. from Systems Control, Inc., 1801 Page Mill Rd., Palo Alto, CA 94304.
- "Environmental Impact Assessment of Alternatives for the Maintenance of Wilmington Harbor North Carolina," by C. A. Carlotzi, TEG Int., Ltd., avail. from US Army Corps of Engineers, PO Box 1890, Wilmington, NC 28401.
- Appendix A, Aquatic Ecology Studies, Cape Fear River Estuary, North Carolina, Sept. 1972 to Aug. 1973, by Lawlet, Mutusky & Shelly, Eng.
- Appendix B, Terrestrial Ecological Analysis of the Cape Fear Study Area, Wilmington, North Carolina, 8/73, by J. R. Vilkitis, *et al*, Carlotzi, Sinton, Vilkitis, Inc.
- Appendix C, Dredged Material Engineering, 1/75, by Joseph S. Ward & Assoc.
- Appendix D, Cape Fear Project, Ground Water Resources and Land Disposal of Dredge Spoil, 6/75, by Geraghty & Miller, Inc.
- Appendix E, Wilmington Harbor and Northeast Cape Fear Study Economic and Social Analysis, by John Delaplaine.
- Appendix F, Landscape Analysis - Cape Fear River Study area, Jon Rodiek, M.L.A.
- "Urban Drainage and Flood Control Projects Economic, Legal and Financial Aspects," (#65), 7/75, by N. S. Grigg, *et al*, ERC, CO St. U., Ft. Collins, CO 80521.
- "Southern United States Land Use Legislation: A Legal Inventory," (#104), 7/75, by S. S. Batie, *et al*, VPI & St. U., Blacksburg, VA 24061.
- "Water Quality Management Plan, Yadkin River Basin," (Sub-Basins 56 & 59), (DRAFT), 10/75, by Env. Mgt. Comm., NCDNER, PO Box 27687, Raleigh, NC 27611.
- "Water Management Study for Hyde County," 6/75, USDA, SCS, PO Box 27307, Raleigh, NC 27611.
- "Water Resources Policy Issues - 1975," 7/75, Seminar conducted by WRRI, OR St. U., Corvallis, OR 97331.
- "Planning for Coastal Recreation Opportunities Near Large Urban Areas: A Study Relating Transportation and Recreation," (Final Report), 7/75, Ed. by A. S. Davenport, for OWRT, avail. from INTASA, 1120 Crane St., Menlo Pk., CA 94025.
- "Roanoke River Framework Alternatives," (REVIEW DRAFT), 8/75, NCDNER, PO Box 27687, Raleigh, NC 27611.
- "Yadkin River Framework Alternatives," (REVIEW DRAFT), 8/75, NCDNER, PO Box 27687, Raleigh, NC 27611.
- "The Yakima Basin and Its Water: At the End, There Is Little to Mark," by D. C. Flaherty, WRC, WA St. U., Pullman, WA 88163.

Water Quality Management

- "Aquaculture in Idaho and Nationwide," 3/75, by G. W. Klontz, *et al*, WRRI, U. of ID, Moscow, ID 83843.
- "Development of a Biological Monitoring Network - A Test Case," (EPA-680/4-75-003), 6/75, by W. W. Sutton, *et al*, NERC, for EPA, avail. from NTIS, USDC, Springfield, VA 22151.
- "Reduction of Aqueous Free Chlorine with Granular Activated Carbon," (#103), 8/75, by M. T. Suidan, *et al*, WRC, U. of IL, Urbana, IL 61801.
- "Turbulent Bed Cooling Tower," (EPA-660/2-75-027), 6/75, by R. G. Barile, Purdue U., for EPA, avail. from NTIS, USDC, Springfield, VA 22151.
- "User's Manual for the IIHR Model of Dry-Wet Cooling Tower Economics," (IIHR #181), 8/75, by T. E. Croley, II, *et al*, IA Inst. of Hydraulic Res., U. of IA, IA City, IA 52240.
- "Analysis of Multiple Cell Mechanical Draft Cooling Towers," (EPA-660/3-75-039), 6/75, by L. R. Davis, NERC, EPA, avail. from NTIS, USDC, Springfield, VA 22151.
- "Egg Breaking and (Food) Processing Waste Control and Treatment," (EPA-660/2-75-019), 6/75, by W. J. Jewell, *et al*, Cornell U., for EPA, avail. from USGPO, Wash., DC 20402.
- "Toxic Heavy Metals in Groundwater of a Portion of the Front Range Mineral Belt," Partial Completion Report," (#67), 6/75, by K. W. Edwards, *et al*, ERC, CO St. U., Ft. Collins, CO 80521.
- "A Study of the Treatment of Lake Michigan Water Using Direct Filtration," (#102), 6/75, by R. D. Letterman, WRC, U. of IL, Urbana, IL 61801.
- "Isolating Organic Water Pollutants: XAD Resins, Urethane Foams, Solvent Extraction," (EPA-660/4-75-003), 6/75, by R. G. Webb, NERC, for EPA, avail. from USGPO, Wash., DC 20402.
- "Effects of Original Vegetation on Reservoir Water Quality," (TR-64), 4/75, by J. Ball, *et al*, WRI, TX A&M U., College Station, TX 77843.
- "Microbial-Malathion Interaction in Artificial Salt-Marsh Ecosystems, Effect and Degradation," (EPA-660/3-75-035), 6/75, by A. W. Bourquin, NERC, for EPA, avail. from USGPO, Wash., DC 20402.
- "Evaluation of Mathematical Models for Temperature Prediction in Deep Reservoirs," (EPA-660/3-75-038), 6/75, by F. L. Parker, *et al*, Vanderbilt U., for EPA, avail. from USGPO, Wash., DC 20402.
- "Tritium Fractionation in Plants," (EPA-680/4-75-006), 6/75, by J. C. McFarlane, NERC, for EPA, avail. from NTIS, USDC, Springfield, VA 22151.

- "Water Quality Management Planning for Urban Runoff," (EPA-440/9-75-004), 12/74, by G. Amy, *et al*, URS Res. Co., for EPA, Off. of Plan. & Standards, Wash., DC 20460.
- "Evaluation of the Effects of Urbanization on Aquatic Ecology and Hydrologic Regimes," 7/75, for OWRT, by Hydrocomp Inc., Palo Alto, CA 94302.
- "Optimizing Petrochemical Waste Bio-Oxidation System Through Automation," (EPA-660/2-75-021), 6/75, by M. A. Zeitoun, *et al*, The Dow Chemical Co., for EPA, avail. from USGPO, Wash., DC 20402.
- "Modeling the Effect of Waste Discharges in a Small Mountain Stream," (#76), 9/75, by R. C. Hoehn, *et al*, WRRRC, VPI & St. U., Blacksburg, VA 24061.
- "Individual Home Wastewater Characterization and Treatment," (#66), 7/75, by E. R. Bennett, *et al*, ERC, CO St. U., Ft. Collins, CO 80521.

Water Quantity Management

- "A Preliminary Report on Anomalous Pressures in Deep Artesian Aquifers in Southeastern North Carolina," (#10), 8/75, by H. M. Peek, *et al*, Div. of Res. Plan. & Eval., NCDNER, PO Box 27687, Raleigh, NC 27611.
- "Field Observations of Transient Ground Water Mounds Produced by Artificial Recharge into an Unconfined Aquifer," (ARS W-27), 8/75, by W. C. Bianchi, *et al*, ARS, USDA, 2650 Telegraph Ave., Berkeley, CA 94705.
- "Hydraulics of Closed Conduit Spillways Part XIII: The Hood Drop Inlet," (ARS-NC-23), 8/75, by ARS, USDA, 2000 W. Pioneer Parkway, Peoria, IL 61614.
- "Groundwater Resources of the Cape Hatteras National Seashore, North Carolina," (ATLAS HA-540), 1975, by M. D. Winner, Jr., USGS, Reston, VA 22092.
- "Hydroelectric Power Potential at Corps of Engineers Projects," (75 R1), 7/75, by R. L. Trisko, for US Army Corps of Eng., avail. from NTIS, USDC, Springfield, VA 22151.
- "Hydrology and Circulation Patterns in the Vicinity of Oregon Inlet and Roanoke Island, North Carolina," (UNC-SG-75-15), 6/75, by J. J. Singer, *et al*, Sea Grant Prog., 1235 Burlington Lab., NCSU, Raleigh, NC 27607.
- "Relationship of Crop Metabolism and Water Status to Irrigation Need," (#101), 7/75, by S. Jurgens, *et al*, WRC, U. of IL, Urbana, IL 61801.
- "Utilization of Water in a Semi-Arid Region," (#059), 9/75, by H. D. Fuehring, WRRRI, NM St. U., Box 3167, Las Cruces, NM 88003.
- "Soil and Hydrologic Factors Affecting the Stability of Natural Slopes in the Oregon Coast Range," (WRRRI-33), 7/75, by R. D. Harr, *et al*, WRRRI, OR St. U., Corvallis, OR 97331.
- "Generalized Criteria for Verification of Water Developed Through Weather Modification," 8/75, by E. B. Jones, *et al*, for OWRT, avail. from M. W. Bittinger & Assoc., Inc., PO Box Q, Ft. Collins, CO 80522.

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- "Oil Shale Air Pollution Control," (EPA-660/2-75-009), 5/75, by E. E. Hughes, *et al*, Stanford Res. Center, for EPA, avail. from NTIS, USDC, Springfield, VA 22151.

The following publications are avail. from the Inst. of Behavioral Sciences, U. of CO, Boulder, CO 80302, 1975.

- "Earthquake and Tsunami Hazards in the United States: A Research Assessment," by R. S. Ayre, (NSF-RA-E75-005).
- "Natural Hazard Warning Systems in the United States: A Research Assessment," (NSF-RA-E-75-013), by D. S. Mileti.
- "Computer Simulation in Natural Hazard Assessment," (NSF-RA-E-75-002), by D. G. Friedman.
- "Some Legal Aspects of the Atlantic Lobster Industry," (UNC-SG-75-07), 7/75, by E. L. Winn, III, Sea Grant Prog., 1235 Burlington Lab., NCSU, Raleigh, NC 27607.
- "Nimbus-5 Sounder Data Processing System, Part II. Results," (NESS 71), 7/75, by W. L. Smith, *et al*, NOAA, avail. from NTIS, USDC, Springfield, VA 22151.
- "Ocean Flight Test Final Report," 6/75, by NOAA, avail. from TRW Systems Group, One Space Pk., Redondo Beach, CA 90278.
- "A Summary of Missions, Needs, Resources, Accomplishments, and Trends," 8/75, Corvallis Env. Res. Lab., 200 SW 35th St., Corvallis, OR 97330.

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