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F. L. Cuddihy

Water Current

Gary L. Lewis, Acting Director
Volume 11, Number 6

Karen E. Stork, Editor
November/December 1979

MERRY CHRISTMAS

From The
WATER CURRENT AND NWRC STAFF

The Christmas season is a welcomed time for reflecting on family and friends, peace and love, joy and hope, gifts and giving, and especially on the greatest of all! Givers and the Greatest of all gifts.

This year we've been blessed with a rich and rewarding association with members of Nebraska's water community. Among other things this year, we have been busy with committees and conferences, travel and training, research, reports and requisitions, seminars and state water planning, meetings and memoranda, proceedings, publications and procedures, bookkeeping and brochures, and letters and search committees. Any gains made in encouraging and advancing water research and education at the University of Nebraska were both possible and pleasurable solely because of the encouragement, advice and assistance of all those associated with the Water Center's programs. We're thankful for your many gifts of time and service.

To all of you and to the friends and families of the Water Center everywhere, we sincerely wish that your holiday will be most meaningful and that your new year will be both prosperous and filled with peace.

Staff of the Nebraska Water Center:

Gary L. Lewis
Acting Director

Karen E. Stork
Denis P. Gilbert

Mary Y. Lewis

M. L. Quinn

Mark ...

Maureen V. ...

Jessie Ferguson

Ruth Dickinson

ON THE HOMEFRONT

SEARCH COMMITTEE FOR NWRC DIRECTOR

As reported in the last issue of this newsletter, a search committee has been formed to select a new Director for the Water Resources Center. The committee has now met, and an official job announcement should be available soon.

For additional information, contact Dr. Roger Gold, Chairman, Search Committee, 101-D Vet Science Building, University of Nebraska, Lincoln, Nebraska 68583.

RESEARCH PRIORITIES

The Nebraska Water Resources Center, after consultation with the Advisory and Executive Committees, has developed a list of Nebraska water research priorities for FY 1981. We hope to focus our attention this year on several state-wide problems which require research and development by the faculty and staff of the state colleges.

It is recognized that a water research effort could not be effective if the limited resources are allocated to a spectrum of unassociated activities, nor should the program be so narrow as to discourage innovation and foresight. The following five categories and sub-components are considered to be the present problem priorities in the Nebraska water research program. Because a balanced program emphasizing all five categories is desired, none have priority over the others.

I. WATER QUANTITY MANAGEMENT

- (A) Groundwater-Surface Water Interrelationships
- (B) Instream Flows and Requirements
- (C) Water Planning and Management Technologies
- (D) Transbasin Diversions
- (E) Energy-Water Relationships
- (F) Recharge and Conjunctive Management

II. WATER USE EFFICIENCY AND CONSERVATION (Supply and Demand Management)

- (A) Irrigation Scheduling

- (B) Plant-Water Relationships
- (C) Conservation Practices in Agriculture
- (D) Water Reuse

III. WATER QUALITY

- (A) Groundwater Quality, Especially Nitrates, Pesticides and Other Agricultural Related Pollutants
- (B) Surface Water Quality, Especially Sedimentation and Eutrophication

IV. NATURAL DISASTER PREDICITON AND RESPONSE

- (A) Droughts and Drought Management Strategies
- (B) Flooding and Flood Control

V. LEGAL, INSTITUTIONAL, ECONOMIC AND SOCIAL ASPECTS

- (A) Impacts of Alternative Surface and Groundwater Management Policies
- (B) Project and Program Evaluation and Review
- (C) Decision Making Processes
- (D) Water Policy Implementation (Legal and Institutional Methods)

The above list of research priorities reflects the needs of the state as currently perceived. They are also intended to imply a research program philosophy which treats basic and applied research with equal importance. We believe that the long-term needs of Nebraska demand a research program directed at producing information which may not be useful for a decade or longer, as well as information that can be directly applied.

WATER RESOURCES SEMINAR SERIES

Once again the Water Resources Center will sponsor an Interdisciplinary Water Resources Seminar Series during the 1980 spring semester. The intent of these seminars is to bring together upper classmen, graduate students, professional persons, faculty and others interested in water topics.

This year the series will focus on "Surface and Groundwater Quality in Nebraska." The seminars will be held on Tuesday afternoons beginning on January 15, 1980 from 3:00 to approximately 5:00 p.m. in the East Campus Union Building. The exact room will be listed each week on the activities calendar in the Union.

Students wishing to receive one or two hours credit should register, with their advisor's permission, in their departmental seminar and/or special studies course listings. Attendance and note-taking, along with specific reading assignments, will satisfy the one-hour requirement; a term paper will be an added requirement for anyone wishing to receive two credit hours.

A preliminary schedule of the seminar topics follows. For additional information, contact the Water Resources Center, extension 3305.

1980 WATER RESOURCES SEMINAR

| <u>Dates</u> | <u>Topics</u> |
|--------------|---|
| January 15 | Registration, General Discussion of Class Procedures |
| January 22 | Historical Review of Surface and Groundwater Quality |
| January 29 | Point Source Surface Water Pollution |
| February 5 | Non-Point Source Pollution of Surface Waters |
| February 12 | Groundwater Pollution -- Point & Non-Point Sources |
| February 19 | Guest Speaker: Potential for Weather Modification in the Great Plains |
| February 26 | Water Quality -- Effects on Wildlife and Recreation |
| March 4 | Water Quality Management -- Local Viewpoints |
| March 11 | NEBRASKA WATER CONFERENCE |
| March 18 | EPA Manual -- Agricultural Pollution Management |
| March 25 | EPA Manual -- Economic Aspects of Pollution Management |
| April 1 | SPRING BREAK |
| April | National Water Quality Programs -- Present and Future |
| April 15 | The Future of Water Quality Planning in Nebraska |
| April 22 | TBA |
| April 29 | Student Papers |

SUMMARY REPORT ON WATER-FACTS COMPUTER GAME

The Water Resource Center announces the availability of a new publication entitled "Summary Report on Water-Facts Computer Game" By Dr. M.-L. Quinn. The

report is a compilation of results of a computer game given to over 300 fair-goers during the 1978 State Fair. The purpose of the computer game was mainly to provide fair-goers the opportunity to test their knowledge of facts about Nebraska's water resources.

Each fair-goer who volunteered to take the test answered eight questions randomly selected from a total of 33. Choosing correct answers to five or more of the eight questions was considered a good score. Results were evaluated for the entire group of participants and then in relation to age group as well as residence (urban or rural). The test results were compared between these different groups and are reported in the publication.

The results show that Nebraskans have quite a good command of water-related facts and figures. Questions covered the range from how much rainfall Nebraska receives to definitions of terms such as "aquifer" and "acre-foot." The following are four example questions from the quiz:

- (1) An aquifer is:
 - (a) a unit for measuring the quantity of water
 - (b) a type of well
 - (c) a type of water meter
 - (d) a geologic formation capable of yielding significant quantities of water.

- (2) Under natural conditions, the rate at which groundwater moves through an aquifer is roughly:
 - (a) 1 foot per hour
 - (b) 1 to 3 feet per day
 - (c) 500 feet per day
 - (d) 1 mile per day.

- (3) Of the total number of irrigation wells in Nebraska, how many are equipped with a center-pivot distribution system?
 - (a) approximately 25 percent
 - (b) one-tenth of the total
 - (c) 80 percent
 - (d) one-half

- (4) What happens to most of Nebraska's statewide average annual precipitation?
 - (a) it evaporates
 - (b) it becomes groundwater recharge
 - (c) it passes overland into streams
 - (d) it collects in lakes

Answers to these questions appear at the end of this newsletter.

If you would like to test your own knowledge of facts about Nebraska's water resources and compare your results to those of the fair-goers, a copy of the quiz and the summary publication are available from the Nebraska Water Resources Center, 310 Agricultural Hall, University of Nebraska, Lincoln, NE 68583.

SPEAKERS AT AWRA CONFERENCE

Four members of the Water Resources Center staff presented papers at the September 1979 Annual Conference of the American Water Resources Association in Las Vegas, Nevada. Topics discussed and speakers are listed below:

- Marvin Damm - "Hydrologic Effects From Reduction in Groundwater Pumpage"
- Denis Gilbert - "Implementation of a Screening Model to Evaluate Water Development Plans in the Big Blue River Basin of Nebraska"
- M.-L. Quinn - "Changes in Water Management in the Upper Delaware Basin"
- Donald Wilhite - "Research in Great Plains Drought Management Strategies: A Workshop"

Others attending the conference included Darryll Pederson of the Conservation and Survey Division who served as a session chairman, and Gary L. Lewis who co-authored the paper presented by Denis Gilbert.

For additional information on these papers, it is suggested that you contact the authors directly.

WATER RESOURCES IN NEBRASKA

MRBC APPROVES FY 1982 PRIORITIES

The Missouri River Basin Commission (MRBC) recently designated 45 programs and projects as basinwide priorities for fiscal year 1982. The MRBC priorities process represents an endorsement of proposed federally led or federally funded projects and programs in the Missouri River Basin. The endorsement is considered by federal agencies and the President in budgeting, and by the U.S. Congress in appropriating funds or renewing federal agency programs.

In a departure from past priority-setting activities, all 45 programs and projects endorsed were cited as "equally of highest priority" to the basin. The

"1980 Priorities Report" to be published in January will list priorities alphabetically within six categories: (1) implementation; (2) feasibility studies; (3) River basin planning; (4) special studies; (5) research; and (6) data collection and analysis.

The programs listed under the "Research" category by MRBC are as follows:

- Instream Flow Requirements
- Saline Water Problems with Supplemental Irrigation - Missouri
- Second Stage Groundwater Investigations - North Dakota
- South Platte Basin Water Management Model - Colorado
- Water Use Efficiency and Conservation

FEDERAL HIGHLIGHTS

PROGRESS REPORT ON IMPLEMENTATION OF WATER POLICY INITIATIVES

At a recent meeting of the Missouri River Basin Commission in Omaha, Nebraska, Mr. John Cunningham, Water Policy Coordination Unit, Department of the Interior, reviewed the fourth progress report on the implementation of the President's Water Policy Initiatives.

He noted that the President's water policy message of June 6, 1978, resulted in the development of four legislative proposals, three of which have received extensive congressional discussion. The prospects for passage of two of these--expanded technical and planning assistance to state and local governments, and the initiation of an independent project review--appear good. A third, cost-sharing or joint financing of water resource projects, has spawned a number of similar or competing proposals which will require additional consideration. The fourth is a proposal to encourage water prices which would promote conservation.

The following are excerpts from Mr. Cunningham's report:

Technical and Planning Assistance

To facilitate greater state involvement in water resources development, President Carter recommended the five-fold expansion of a program of planning assistance to the states and the creation of a similar program of technical assistance in water conservation (H.R. 2610). An appropriation of \$25 million was requested for each. This proposal has become entangled in the larger issue of the continued operation of the Water Resources Council and the creation of an independent review

of water project proposals. A compromise bill, S.1639, has been offered by Senator Gravel, and the House also has been considering alternate proposals introduced by Congressman Vento, H.R. 2071. It appears that the final bill will probably provide for some change in the membership of the WRC, the possibility of an independent WRC chairman, a technical and planning assistance program of approximately \$20 million, and an independent review function located in the WRC.

Independent Review Function

The proliferation of water resource development programs has led to confusing and sometimes contradictory sets of guidelines and regulations for the design and financing of individual projects. In order to provide an objective final evaluation of each project, free of the bias of the sponsoring agency, President Carter proposed the establishment of an independent technical review function in the Water Resources Council. This would separate technical review from policy review, a function which would still be carried on in the Office of Management and Budget. The findings of the proposed Technical Review Group of the WRC would not be binding on the construction planning agency, but would be made publicly available. The time limit for technical review is 60 days with a mechanism for a 30-day extension in special cases.

The Secretary of the construction planning agency would retain responsibility for project selection, plan evaluation, and presentation of projects for Congressional and Presidential consideration. To date, the Senate has voted to authorize the activity, but has not yet appropriated funds for its operation. The House has not taken a final position on the issue. In both houses, this issue will be incorporated as part of the bills dealing with technical and planning assistance.

Cost-sharing

The Administration's cost-sharing proposal was introduced on May 16, 1979, by Congressman Udall and later by Senator Gravel. The bill would encourage state involvement in the setting of priorities for water resource development by requiring an up-front contribution to the project's cost. This would range from 5 to 25 percent depending on project purpose. The requirement of a financial commitment is part of the larger water policy goal of increasing state participation in water resource development. This bill (S.1599, H.R. 4127) has generated wide-spread debate and at least two competing proposals, S.1241 introduced by Senators Domenici and Moynihan and S.1856 introduced by Senator Hatfield. It is expected that all three will receive more study before any bill is reported out.

Conservation Pricing

In his water policy message, President Carter proposed the adoption of rate structures which would promote water conservation where water is supplied by federal projects. Legislation to encourage the use of such rates has recently been drafted and was transmitted to Congress on October 17, 1979, by executive communication. No bill number has been assigned as yet.

OWRT ANNOUNCES FINAL DISTRIBUTION OF FY 79 AND FY 80 MATCHING GRANT AWARDS

The Office of Water Research and Technology (OWRT) recently announced that 95 matching grant projects in 46 water institutes have been recommended for funding with remaining FY 1979 monies and in two rounds of FY 1980 funding. Only 79 projects could be funded for FY 1980. (In previous years over 100 projects were initiated.)

Arizona received the greatest number of projects (five) and New Mexico received the greatest total monetary award (\$431,153). Second in the number of awards were Ohio, North Dakota, California and Colorado (four projects each), and in dollars the second-place state was North Carolina (\$290,226). Nine institutes received no matching dollars.

Distribution among the eight OWRT regions was as follows:

| Region | Remaining FY 1979 Funds (May 1979) | First Round FY 1980 Funds (June 1979) | Last Round FY 1980 Funds (October 1979) | Totals |
|----------------------|--|---|---|-----------|
| New England | \$ 46,342 | \$274,509 | \$ 67,444 | \$388,295 |
| Middle Atlantic | 97,441 | 324,001 | 163,842 | 585,284 |
| South Atlantic | 52,381 | 574,160 | 239,075 | 865,616 |
| Ohio-Great Lakes | 114,647 | 651,042 | 147,234 | 912,923 |
| Missouri Basin | 129,165 | 481,392 | 305,208 | 915,765 |
| Southern Plains | 82,705 | 521,692 | 165,027 | 768,424 |
| Colorado-Great Basin | 119,885 | 236,265 | 249,301 | 605,451 |
| Pacific-Northwest | 124,704 | 434,538 | 126,790 | 686,032 |

AMENDING WATER LEGISLATION INTRODUCED

Bills have recently been introduced in both the Senate and the House (S. 1640 and H.R. 5340) to amend portions of the Water Research and Development Act of 1978 (P.L. 95-467) and the desalting Act of August 1977 (P.L. 95-84) and to reauthorize the water research and technology development programs operated by the Office of Water Research and Technology (OWRT) in the Department of Interior.

If approved, some of the amendments proposed in these bills would:

- (1) authorize the Secretary to require state water research and technology institutes to review grant and contract proposals originating within their states for relevance to water resources needs and priorities within the state;
- (2) make state or local government agencies and all academic institutions eligible to participate in the OWRT matching grant program through the state institutes;
- (3) reauthorize all programs under P.L. 95-467 for FY 1981 and 1982, with an authorization for appropriations of "such sums as may be necessary;"

- (4) remove the limitation of five on the number of desalting demonstration plants which could be constructed under the \$50 million existing authorization in P.L. 95-84; and
- (5) provide that desalting demonstration plants demonstrate a technology ready for application, be no larger than necessary to demonstrate the specific application, and should not substitute for conventional water supply projects.

The goal in these proposed changes is to draw local and state governments and water policy decision makers more closely into the research picture, providing a portion of decision making and guidance. For the desalting plants, the "total package" concept allows the local community to be a part of the decision making, and also provides a more clear-cut and understandable demonstration of the economic viability of the new technology or system being demonstrated.

INTERAGENCY TASK FORCE LISTS NATIONAL PRIORITIES

In its first report sent to President Carter, the interagency task force for water research priorities recommends that federal water research concentrate efforts in ten areas:

- (1) conservation
- (2) socio-economic impacts
- (3) basic research
- (4) groundwater/surface water interface
- (5) instream flow; health effects and water quality
- (6) energy/water interface;
- (7) food-fiber/water interface
- (8) natural disasters;
- (9) wetlands
- (10) estuaries

This list was developed by an ad hoc interagency committee which was formed following President Carter's Science and Technology message of March 1979, in which he directed Secretary of the Interior Cecil D. Andrus and Dr. Frank Press of the Office of Science and Technology Policy to establish national water research priorities.

In April 1979 OWRT sponsored a national meeting to ask for recommendations from Institute directors, federal, state and local governmental agencies, the academic community and private industry. Proceedings from that meeting helped identify the pertinent issues analyzed by the task force.

As stated in the report, areas listed "perceive deficiencies or gaps in Federal water research programs and encompass areas where two or more agencies share responsibilities and where we see opportunities for increased efficiency and effectiveness through improved coordination, joint programming, data or facility sharing, a redirection or new initiatives." The group expressed hope that the priorities will assist the President in preparing the 1981 budget and in planning programs for the eighties.

208 PLANNING PHASED OUT

It was recently learned that the Environmental Protection Agency (EPA) has issued a five-year plan which would phase out 208 planning under the Clean Water Act. This program has been under attack by the House of Representatives, and, according to David Ziegler in EPA's Office of Policy and Evaluation, this strategy in reality is an attempt to preserve the program.

EPA's new program will be limited to non-point source pollution problems and high priority problem solving projects. 208 funds will not be available for general planning after fiscal year 1979, and local and state governments will be responsible for assuming costs if they want to continue certain programs.

Details of the proposed EPA planning revisions are contained in the report, "Water Quality Management -- Five-Year Strategy, FY 80 - Baseline and Supplemental Water Quality Management Program, Guidance for FY 80." Copies may be obtained from the Office of Water Planning and Standards, Washington, D.C. 20460.

CONFERENCES

SHORT COURSE

A short course on "Boundary Integral Equation Methods" will be presented March 17-22, 1980, at the University of Arizona in Tucson. The short course is sponsored by the University of Arizona, College of Engineering, and Cornell University, Department of Civil and Environmental Engineering. Hotel accommodations are available at the Plaza International Hotel, 1900 East Speedway, Tucson, Arizona 85719.

The objective of the short course is to introduce the Boundary Integral Equation Method (BIEM) as an efficient numerical tool for the solution of various types of groundwater problems. The course is designed to provide a working knowledge of the BIEM so that the participants will be able to use and modify the existing computer programs and to develop their own programs for their specific problems. Several such programs will be made available to participants.

The short course fee is \$585, and 3 Continuing Education Units will be given for participation.

For additional information, contact Professor James A. Liggett (607 - 256-3556) or Professor Phillip L. F. Liu (607 - 256-5090), School of Civil and Environmental Engineering, Cornell University, Hollister Hall, Ithaca, New York 14853.

INTERNATIONAL SYMPOSIUM ON RAINFALL-RUNOFF MODELING

The International Symposium on Rainfall-Runoff Modeling will be held at Mississippi State University May 18-21, 1981. The purpose of this symposium is to provide a forum to exchange information and discussion on the current state of the art of rainfall-runoff modeling, establish complementary elements of seemingly different approaches, augment interdisciplinary interaction and determine directions for further research.

Original, as well as state-of-the-art type, contributions on both theoretical and practical aspects of rainfall-runoff modeling are invited for presentation at the symposium. A partial list of topics to be discussed includes physically based space-time quantification of rainfall, infiltration, runoff and water quality, geomorphologic interpretation and estimation of model parameters, model comparison and ranking, remote sensing techniques, and applications of the integrated models in agricultural, forest, and urban environments. Integration of stochastic and deterministic approaches will be emphasized. It is hoped that the subject matter will be of interest to Agricultural Engineers, Civil Engineers, Environmentalists, Forest Managers, Geologists, Hydrologists, Water Resources Engineers and those working in interdisciplinary areas related to water resources systems.

Authors are requested to submit summaries in triplicate in English of approximately 500-1000 words highlighting the major thrust and contribution of their papers by May 15, 1980. Information about acceptance of the papers will be sent by July 15, 1980. At that time the authors will be given detailed instructions for preparation of the final manuscripts which will be due at Mississippi State by January 15, 1981.

The Organizing Committee invites all those working in the related areas of rainfall-runoff modeling to participate in this symposium. Send summaries of the papers to be presented to: Dr. Vijay P. Singh, Director, International symposium on Rainfall-Runoff Modeling, Department of Civil Engineering, Mississippi State University, P.O. Drawer CE, Mississippi State, Mississippi 39762. Telephone: (601) 325-4434.

PUBLICATIONS

GROUNDWATER LEAFLET AVAILABLE

A leaflet containing facts about groundwater -- the nation's "hidden" principal reserve source of fresh water -- has been published by the U.S. Geological Survey, Department of the Interior, and is available for public distribution.

Written in nontechnical terms, the leaflet is part of a series of popular publications prepared by the USGS to answer inquiries about a variety of earth

science subjects. It was prepared to help clarify confusing concepts related to the nature, occurrence, and quality of groundwater, and how it is located, developed and used.

Single copies of the 23-page illustrated leaflet, titled "Groundwater," may be obtained free upon request from the U.S. Geological Survey's Branch of Distribution, 1200 South Eads St., Arlington, VA 22202.

PUBLICATION ON IRRIGATION SCHEDULING

A new publication is available from the Water Resources Center at the University of Delaware. Entitled The Use of the Climatic Water Budget in Irrigation Scheduling: Iowa, the report describes a simplified irrigation scheduling procedure using average information on the climatic demand for water (evapotranspiration) and the precipitation as measured at the particular irrigation site. While the approach can be applied anywhere, this primer provides evapotranspiration information only for Iowa. Authors of the report are John R. Mather and Anthony DeNardo.

The publication is available for \$3.00 (prepayment required) from the Water Resources Center, University of Delaware, 42 East Delaware Avenue, Newark, Delaware 1971. (Checks should be made payable to the University of Delaware).

POSITIONS AVAILABLE

ENVIRONMENTAL ENGINEERING/WATER RESOURCES FACULTY POSITION AVAILABLE

The University of Central Florida at Orlando, Department of Civil Engineering and Environmental Sciences, invites applications for a faculty position in the areas of Environmental Engineering/Water Resources. The position is at the Assistant Professor level and may begin in January or March 1980. Responsibilities include undergraduate and graduate teaching with student advising. Also, the successful candidate is expected to develop research and seek funding in an appropriate area of specialization.

The position requires a Ph.D. in Engineering. Competence in both teaching and research are expected. Practical engineering experience is desirable. The candidate is expected to be eligible for registration within the State of Florida.

Interested applicants should send a detailed resume with a list of courses included in the graduate program and the names of five reference to: Dr. Yousef A. Yousef, P.E., Chairman, Search Committee, Civil Engineering and Environmental Sciences, University of Central Florida, Orlando, FL 32816.

FACULTY POSITION IN HYDROLOGY

The Department of Environmental Sciences at the University of Virginia in Charlottesville invites applications for a tenure track faculty position in hydrology. The appointment will most likely be made at the assistant professor level. Applicants must have an earned doctorate and should be specialists in statistical or stochastic hydrology. Evidence of research capabilities including a strong publication record is required.

The responsibilities of the post will include teaching at the undergraduate and graduate level and involvement in a growing interdisciplinary research program in modeling environmental systems.

Applications with names and addresses of three referees should be sent to George Hornberger, Chairman, Department of Environmental Sciences, Clark, Hall, University of Virginia, Charlottesville, Virginia 22903.

The University of Virginia is an Equal Opportunity/Affirmative Action Employer.

CIVIL ENGINEERING OPENING

The Department of Civil Engineering at Virginia Polytechnic Institute and State University invites qualified applicants for a faculty position at the rank of assistant professor on the tenure track. The position is in the hydro-systems and environmental engineering areas.

Duties will include teaching undergraduate and graduate level courses in hydrology, numerical modeling of streamflow and water quality and optimization techniques applied to water resources systems. Candidates will be expected to develop new courses and obtain research in the areas of interest. Salary will be commensurate with the applicant's qualifications and experience.

Interested applicants should send a resume to Dr. Richard D. Walker, Head Department of Civil Engineering, Virginia Polytechnic Institute and State University, Blacksburg, Virginia 24061.

Virginia Polytechnic Institute and State University is an Equal Opportunity/Affirmative Action Employer.

FACULTY POSITION IN SANITARY ENGINEERING

A tenure-track position is available in the area of water supply and water pollution control engineering at the University of Colorado. The candidate should have a doctorate in civil engineering with a specialty in the water quality engineering field.

Responsibilities include undergraduate and graduate teaching of water and wastewater treatment courses. Candidates should be able to generate funded

research, advise undergraduate and graduate students, and be involved in continuing education activities.

Applications should be sent to K. D. Linstedt, Department of Civil, Environmental, and Architectural Engineering, University of Colorado, Boulder, Colorado 80309.

The University of Colorado at Boulder is an Affirmative Action/Equal Opportunity, Section 504 Employer.

FACULTY POSITION

The Department of Environmental Engineering Sciences, University of Florida invites applications for a tenure track faculty position, preferably at the assistant professor level, in water supply and wastewater engineering. Applicants must have an earned doctorate in environmental or civil engineering and must be qualified to become professionally registered. Training in sanitary engineering and professional experience are highly desirable.

Duties include participating in an active research program and teaching undergraduate and graduate courses. Rank and salary are commensurate with qualifications.

Interested applicants should send resume to Dr. John Zolteck, Chairman, Search Committee-F, Department of Environmental Engineering Sciences, University of Florida, Gainesville, Florida 32611. Applications will be accepted until February 29, 1980.

The University of Florida is an Equal Opportunity/Affirmative Action Employer.

POSITION IN ENVIRONMENTAL SCIENCES AND ENGINEERING

The Department of Environmental Sciences and Engineering, University of North Carolina at Chapel Hill, invites applications for a tenure track position at the Assistant Professor level in the Water Resources Engineering Program of the Department. Candidates must have a doctorate in engineering with interests in water quality and water resources engineering.

Duties will include graduate teaching and research. The position is open in the 1979-80 academic year.

Interested applicants should send resume to Professor Charles R. O'Melia, Department of Environmental Sciences and Engineering, University of North Carolina, Chapel Hill, North Carolina 27514.

The University of North Carolina is an Affirmative Action/Equal Opportunity Employer.

GRADUATE RESEARCH ASSISTANTSHIPS IN WATER RESOURCES AND HYDRAULICS

St. Anthony Falls Hydraulic Laboratory, Department of Civil and Mineral Engineering, University of Minnesota, invites applications for graduate study and research, in water resources, hydrology, hydraulic engineering, and fluid mechanic leading to M.S.C.E. and Ph.D degrees. Stipend for academic year approximately \$5400 plus resident tuition rates. Summer work usually available. Attractive fellowships with supplemental support also available through the Department.

For details and application forms write to Director, St. Anthony Falls Hydraulic Laboratory, Mississippi River at 3rd Avenue S.E., Minneapolis, Minnesota 55414.

ENVIRONMENTAL ENGINEERING FACULTY POSITION

The School of Civil Engineering at Purdue University seeks applications for a tenure-track assistant/associate professorship in environmental engineering. Candidates should have a Ph.D. degree and a specialty interest in the area of chemical/physical unit operations. Duties will include academic year teaching of undergraduate courses in water treatment, graduate courses in physical and chemical unit operations, developing a funded research program in the candidate's specialty area, and directing graduate student research. An interest in the area of trace organics removal is desirable. Salary will be commensurate with experience.

Vacancy will remain in effect until filled, with appointment date and salary to be negotiated. Appointment for August 1980 is desired. Send resume and the names of three references to Professor H.L. Michael, Head, School of Civil Engineering, Purdue University, West Lafayette, Indiana 47907.

Purdue University is an Affirmative Action/Equal Opportunity Employer.

RESEARCH REVIEW

PROJECT TITLE: Development of a Manual on Alternative Irrigation Management Practices and their Effects on the Environment in the Great Plains

PROJECT MANAGER: Gary L. Lewis, Nebraska Water Resources Center

PRINCIPAL INVESTIGATORS AND CONTRIBUTING AUTHORS:

James Gilley, Darrell Watts, M.-L. Quinn, Ray Supalla,
Robert Lansford, Fred Roeth, Kenneth Frank and Marvin Twersky

The objective of this project was to produce a manual providing technical guidance on the best available practices for controlling nonpoint pollution associated with irrigation agriculture in the Great Plains. The manual has been drafted and is undergoing final revision. In reaching this objective, the researchers have considered the following:

- (1) the impact which current irrigation practices have on water pollution, with special emphasis on nutrients, pesticides, and sediment;
- (2) the effects which management alternatives to current practices might have on the distribution of these three pollutants; and
- (3) the economic implications of making changes in irrigation management procedures in an effort to control pollutants.

One of the main reasons for the initiation of this project was to provide basic information on management of irrigation agriculture in the Great Plains to reduce nonpoint source pollution. Following the passage of Public Law 92-500 in 1972, state agencies became heavily involved in a wide range of water quality planning activities. Much of this work was related to Section 208 of that law. However, not all agency personnel had the background needed (particularly regarding irrigated agriculture) to perform the many important new tasks associated with 208 water quality planning.

Thus, it is believed that any individual who wishes to become more acquainted with the basics of irrigated agriculture and how it can affect water quality control will find this manual to be helpful. This would be particularly true for those working in the Great Plains states which include North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, Texas, New Mexico, Colorado, Wyoming, and Montana.

The topics covered in each of the five chapters of the manual are listed below:

- (1) An overview of irrigated agriculture in the Great Plains.
- (2) Irrigation return flow and how it is affected by agricultural management practices.
- (3) Available on-farm irrigation alternatives.
- (4) Economic feasibility of farm management alternatives.
- (5) Guidance in the selection of appropriate management systems.

Numerous graphs, maps, drawings, and tables have been included to present information in a clear and expressive fashion. Appendices at the end of the manual will contain a wealth of additional material for the reader's reference.

In the process of writing this manual, the authors have conducted an extensive search of the scientific literature related to the subject of irrigation-related nonpoint source pollution. This fact will assure the users of the manual that the volume includes the findings of available, up-to-date research. In

addition, the authors have had the assistance of agricultural experts throughout the Great Plains states who served on an advisory committee. Those who use the manual will have the benefit of the expertise which these individuals incorporated in the manual.

Parties interested in obtaining a copy of this manual should contact the Nebraska Water Resources Center or:

Mr. Alvin L. Wood
Project Officer
Irrigated Agriculture Section
U.S. Environmental Protection Agency
P.O. Box 1198
Ada, Oklahoma 74280

The report should be available for distribution some time late this spring.

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The Water Current Newsletter will publish, without charge, announcements, programs for upcoming conferences, employment opportunities or other newsworthy items on hydrology, water resources or related topics.

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ANSWERS TO WATER QUIZ ON PAGE 5

- (1) - (d)
- (2) - (b)
- (3) - (a)
- (4) - (a)