

5-1971

## Water Resources News, Volume 3, No. 5, May 1971

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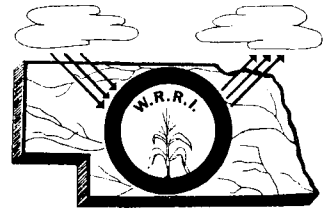
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# WATER RESOURCES NEWS

NEBRASKA WATER RESOURCES RESEARCH INSTITUTE  
212 AGRICULTURAL ENGINEERING BUILDING

THE UNIVERSITY OF NEBRASKA  
LINCOLN, NEBRASKA 68503



Volume 3 Number 5

May 1971

## CONGRATULATIONS DOANE COLLEGE

Doane College has just received notification that it has been successful in competition for Title II funds provided by the Water Resources Research Act of 1964. The grant totaling \$51,935 is to fund a research project entitled, "Measuring and Developing Methods of Attitude and Motivational Change in Implementing the Big Blue River Basin Water Plan." The effectiveness of communicating a river basin plan to the public via methods such as news media, speakers bureau, filmstrips, brochures, and surveys is to be determined. The results of this research are expected to be useful in developing greater public participation in water resources planning activities. Project director is Dr. Edward J. McPartland, and is assisted by Dr. Anthony Catana, Dr. Robert Conner, Richard B. Gartrell, Charles R. Hein and Dr. Delbert King. The project will run from July, 1971 to January 1973.

## OWRR ANNOUNCES FISCAL YEAR 1972 TITLE II WATER RESOURCES RESEARCH PROGRAM

Secretary of the Interior, Rogers C. B. Morton, recently announced the selection of 54 research projects for the fiscal year 1972 water research program authorized under Title II of the Water Resources Research Act of 1964.

The Title II program -- administered by the Office of Water Resources Research -- provides for research grants, contracts, or other arrangements with educational institutions, private foundations or other institutions, and with private firms and individuals for the conduct of research that seeks solutions to urgent water problems throughout the Nation.

## WATER RESOURCES RESEARCH ACT TITLE II PROPOSED FISCAL YEAR 1972 AWARDS

Utah State University, Logan, Utah -- A Study of the Effectiveness of Water Resource Planning Groups - (In this research, the experience of interagency groups responsible for formulating river basin plans is to be studied and evaluated. The results will be

used to suggest ways to improve future planning studies.) - \$45,149

Desert Research Institute, Reno, Nevada -- Development and Management of Ground-Water Factors in Arid Alluvial and Carbonate Basins in Southern Nevada - (In this research, a management approach is to be developed which will allow the use of ground-water for irrigation and at the same time preserve environmental features in the desert basin.) - \$50,000

Kansas State University, Manhattan, Kansas -- Modeling and Optimization of Water Resources Systems - (This research is to develop mathematical equations and equation solving procedures which can be used to study and simulate water resource systems on high speed computer.) - \$37,250

Cornell University, Ithaca, New York -- Metropolitan Water Resources Systems Analysis - (This research is to be a study of methods for selecting the best alternative from among the range of alternatives which may be available to the decision-maker responsible for meeting current and foreseeable metropolitan water and related needs.) - \$92,784

Colorado State University, Fort Collins, Colorado -- Metropolitan Water Intelligence Systems - The Development of Criteria and Rationale for the Establishment of Centralized Metropolitan Water Intelligence Systems in Urbanized and Urbanizing Areas - (This research is to determine the feasibility and assist in the design of automation and control systems to improve the efficiency of sanitary sewer systems, sewage treatment plants,

storm sewer systems, water supply and transmission systems, water treatment plants and water distribution systems.) - \$100,000

Colorado State University, Fort Collins, Colorado -- Water Law in Relation to Environmental Quality with Particular Reference to Recreational and Esthetic Values - (This research involves an analysis of water law as it affects environmental quality. The effects of legal or administrative efforts to protect or enhance recreational and esthetic values of aquatic environments will be studied. Desirable features of effective laws will be used to suggest improved laws.) - \$71,347

Pennsylvania State University, University Park, Pennsylvania -- Economics of Water Supply Planning and Management - (This research is to determine how water pricing policies affect water demands and the planning and development of water supply systems.) - \$77,276

University of Wyoming, Laramie, Wyoming -- Reliability of Snowmelt Runoff Predictions Based on Mass Balance Procedures Versus Index Methods - (Eighty to ninety percent of runoff in the streams in the West result from melting of snow. This research is to explore a new technique to enable the accurate prediction of stream runoff.) - \$26,820

Desert Research Institute, Reno, Nevada -- Research and Analysis to Plan, Develop and Manage a Ground and Surface Water Supply, Phase IV - (This research is to examine the physical, legal, and institutional framework which determine how surface and ground-

water use must be planned, developed and managed.) - \$100,000

University of Arizona, Tucson, Arizona -- Decision-Theoretic Aspects of Model Building, Use and Validation in Hydrology and Water Resources - (This research is to evaluate the reliability of results obtained by mathematical analyses of hydrologic phenomena.) - \$75,000

Utah State University, Logan, Utah -- Analysis of the Hydrologic and Sociologic Impact of Urban Flooding and Modeling the Total Hydrologic-Sociologic Flow System of Urban Areas - (This research will deal with how consideration of such values as recreation, aesthetics, land values, etc., affect decisions concerning the minimization of flood damage to urban areas.) - \$44,000

Purdue University, Lafayette, Indiana -- Systematic Development of Methodologies in Planning Urban Water Resources for Medium Size Communities, Phase I - (This research is to evaluate and develop techniques to be used by communities of 100,000 to 200,000 inhabitants in planning for their future water needs.) - \$147,233

University of California, Los Angeles, California -- Economics and Politics of Water Development and Management by Local Agencies - (This research will examine the policies and procedures of selected local water agencies in California in an attempt to determine how local government structure, operation of local districts, legal constraints, political considerations, and efficiency criteria affect water decisions. The results could be used to develop improved management procedures.) - \$90,000

Auburn University, Auburn, Alabama -- Impact of Industrial Water Pollution Abatement in Alabama on Consumer Prices and the Balance of Competition - (The purpose of this research is to measure the impact of action to eliminate industrial pollution of water on consumer prices and the competitive position of firms required to install pollution abatement processes.) - \$95,350

University of Idaho, Moscow, Idaho -- Socio-Economic Aspects of Wild and Scenic Rivers - (This research will be concerned with the development of methods to measure the benefits of wild rivers associated with their recreational, scenic, historical and cultural use.) - \$69,950

Utah State University, Logan, Utah -- Development of Techniques for Estimating the Potential of Water Resource Development for the Achievement of National and Regional Social Goals, Phase II - (This research deals with the development of methods to determine the effectiveness of water resource investments jointly with other investments in achieving regional and social goals.) - \$130,000

Michigan State University, East Lansing, Michigan -- An Ecological Evaluation of Stream Eutrophication - (This research will be concerned with the development of methods for measuring eutrophication and an analysis of the effect of man's activity, such as urbanization, on the eutrophication process.) - \$69,754

University of Texas, Austin, Texas -- An Investigation of the Optimal Expansion of a Water Resources System - (The objective of this research is to develop

and test computer programs to be applied to water resource planning, design and management problems.) - \$16,830

Worcester Polytechnic Institute, Worcester, Massachusetts -- Combined Effect of Thermal and Organic Pollution on Oxygen Sag Curve - (This research is to develop methods for predicting the effects of combined thermal and organic pollution on dissolved oxygen. The results will be useful in setting stream standards and in locating thermal and organic waste bearing outlets.) - \$33,326

Stanford University, Stanford, California -- Numerical Modelling of Thermal Loading in Bodies of Water - (The objective of this research is to develop ways to predict accurately the temperature variations in bodies of water being used as heat dissipation sinks.) - \$74,950

University of Toledo, Toledo, Ohio -- Stage, Discharge, and Quality Changes in a Water Table Aquifer Related to Urbanization - (This research will be concerned with documenting the nature, degree and direction of subsurface water changes caused by urbanization. The results will aid in planning urban land use to minimize effects on the subsurface water resource.) - \$41,474

University of California, Irvine, California -- Hydrodynamics of Artificial Ground-Water Recharge - (The objective of this research is to develop reliable methods for predicting the water flows which occur under various artificial recharge conditions. The results of the research will have value in the design of water recycle, underground storage, and water

conservation systems.) - \$40,624

Indiana University, Bloomington, Indiana -- Systems Analysis of the Geomorphology, Hydrology and Soils in the Karst Terrain of South Central Indiana Applied to Water Use and Environment - (This research will be concerned with defining the properties of water in watersheds having prominent limestone features. The results will be used to improve water management practices in those areas.) - \$83,496

University of Iowa, Iowa City, Iowa -- Mixing and Transfer of Heat in Open Channel Flow - (The principal aim of this research is to better understand the processes in streams and rivers by which discharged heated water mixes with the flowing stream-water. The results will be used in the design of systems for disposing of waste heat from industrial and utility operations.) - \$99,400

Doane College, Crete, Nebraska -- Measuring and Developing Methods of Attitude and Motivational Change in Implementing the Big Blue River Basin Water Plan - (The effectiveness of communicating a river basin plan to the public via methods such as news media, speakers bureau, filmstrips, brochures, and surveys is to be determined. The results of this research may be useful in developing greater public participation in water resources planning activities.) - \$51,935

Texas Tech University, Lubbock, Texas -- Effect of Prescribed Burning on Water Yield and Quality from Brush Infested Lands - (This research is designed to measure the magnitude of water yield,

sedimentation, and water quality following a burn in relation to various degrees of cover and slope. The results will aid in prescribing water management strategies for brush covered watersheds.) - \$45,961

University of Iowa, Iowa City, Iowa -- Engineering and Legal Aspects of Storm Assessments - This research will be concerned with the development of methods or procedures for the equitable apportionment of the costs of storm sewer improvements among benefiting properties.) - \$42,205

University of Notre Dame, Notre Dame, Indiana -- Hydrogeologic Factors Involved in Predicting the Effects of Sanitary Landfill Operations on Ground Water Quality - (The purpose of this research is to determine the effects of solid waste disposal by sanitary landfill methods upon ground water quality. The results will be used to improve procedures for locating sanitary landfills to protect ground water quality.) - \$94,580

University of Oklahoma, Norman, Oklahoma -- Systems Approach to Metropolitan Regional Area Water and Sewer Planning - (The purpose of this research is to develop and validate a mathematical model as a planning tool for water and sewer systems for metropolitan regional areas.) - \$44,219

Florida State University, Tallahassee, Florida -- Analysis of Ground Water Regimes by Use of Natural Uranium Isotopic Variations - (A method to determine source, movement, quantities, and mixing of ground water resources.) - \$69,400

Massachusetts Institute of Technology, Cambridge, Massachusetts

-- Project Evaluation in Water Resources: Budget Constraints and Risk and Uncertainty - (New investment principles and criteria require inclusion of budget considerations and risk and uncertainty questions in the project design.) - \$50,000

Water Resources Engineers, Walnut Creek, California -- A Finite Element Solution for Two-Dimensional Density Stratified Flow - (A model which will describe fluid properties where temperature, salinity or suspended sediment cause separate strata of layers to occur within the water.) - \$70,380

Environments for Tomorrow, Washington, D.C. -- Management of Water and Related Land Resources to Enhance the Urban Environment - (This research will investigate how water and land resources in urban areas can and should be managed to help make the cities better places for people to live.) - \$150,000

Ichthyological Associates, Ithaca, New York -- The Effect of Temperature and Chemical Pollutants on the Behavior of Several Estuarine Organisms - (Laboratory research of estuarine fish and other aquatic life to determine limits of habitable conditions in thermal effluents.) - \$44,235

General Electric TEMPO, Santa Barbara, California -- Mathematical Modeling of Fresh Aquifers Having Salt-Water Bottoms: A Continuation - (Research will develop mathematical methods for modeling subsurface sources in which fresh water floats upon and mixes with salt water.) - \$48,300

Anacapa Sciences, Inc., Santa Barbara, California -- Psychophysical Criteria for Water Quality - (This research will relate controllable dimensions of water quality to acceptance of the water by the public.) - \$27,900

M. W. Bittinger & Associates, Fort Collins, Colorado -- Management and Administration of Ground Water in Interstate and International Aquifers, Phase II - (Recommended courses of action will be developed for State agencies concerned with physical problems and legal doctrines involving interstate ground water supplies.) - \$60,000

H. Peter Odegard, Hudson, Wisconsin -- River Basin Planning Audit: Procedure, Organization, Implementation - (Selected current and completed basin planning programs will be reviewed to test the usefulness of a method for measuring planning effectiveness.) - \$39,000

International Business Machines Corp., Yorktown Heights, New York -- Seasonal and Spatial Longterm Persistence in U.S. Hydrologic Records - (This research will involve the analysis and measurement of long term statistical properties of monthly streamflow and meteorological records for the continental United States.) - \$38,204

International Business Machines Corp., Yorktown Heights, New York -- A Physics-Based Approach to Hydrologic Response Modeling - (The model to be developed will permit simultaneous predictions of rates of streamflow and infiltration, and moisture contents, water table fluctuations and ground water flow patterns.) - \$27,741

Nielsen Engineering & Research Inc., Mountain View, California -- Application of Turbulent Boundary-Layer Theory to Dispersion in Estuaries - (Water management in estuaries requires sound prediction of velocity variations with depth.) - \$99,941

Engineering Sciences, Inc., Arcadia, California -- Encouragement of Public Funding, Support, and Involvement in Urban Water Resource Management - (This research will devise measures of community involvement and support in decision making on urban water management proposals.) - \$85,000

Urban Systems Research and Engineering, Cambridge, Massachusetts -- A Proposal for Urban Water Resource Management: Local, State, and Federal Impact - (This research will identify methods to decrease inefficiencies in the application of public funds to metropolitan water resources projects.) - \$80,000

Hydrocomp International, Palo Alto, California -- Computer Simulation of Design Criteria for Urban Flow-Storage Systems - (Methods will be developed to improve current storm drainage design procedures which do not establish the risk of failure.) - \$56,453

Intasa, Inc., Menlo Park, California -- Development of Procedures for the Identification and Measurement of Benefits from Multiple Purpose Water Resource Projects - (This research will attempt to establish an economic basis to measure the full range of benefits in terms of people's willingness to pay.) - \$73,066

Environmental Dynamics, Los Angeles, California -- Optimal Pricing Policies for Conjunctive Urban Water Supply and Waste Water Treatment Systems - (Optimal prices will recover operating and expansion costs of the system and will lead to optimal control of water pollutants.) - \$49,200

General Dynamics Corp., Groton, Connecticut -- Free Surface Effects on a Buoyant Jet - (This research will attempt to develop methods to predict the thermal field resulting from the discharge of powerplant cooling water.) - \$31,095

Arthur D. Little, Inc., Cambridge, Massachusetts -- A River Basin Management Post-Audit and Analysis - (This research will develop water management guidelines for policy in the future by analysis of past experience.) - \$115,000

Herbert G. Poertner, Hinsdale, Illinois -- Investigation of On-Site Stormwater Storage Concepts and Techniques for Pollution and Flood Control - (This research will attempt to develop methods for temporary storage of stormwater at or near points of precipitation as a practical means to reduce pollution and flooding at reasonable costs.) - \$45,880

American Society of Civil Engineers, New York, New York -- Systematic Study and Development of Long-Range Programs of Urban Water Resources Research - (This research will provide guidelines for designing a program of long-range studies on urban water problems.) - \$69,700

Harbridge House, Inc., Boston, Massachusetts -- Analysis of Regulations, Organization, and Operations of a Regional Water Management Institution - (This

research will examine the legal, organizational, and decision-making components of a State water agency which is responsible to 42 communities.) - \$50,000

New York State Environmental Conservation Department, Albany, New York -- Development of Procedures for Cost-Sharing and Repayment Analysis - (This research will develop a basis for State, local cost sharing and repayment methods and also give a non-Federal view of existing Federal-State cost sharing mechanisms.) - \$24,750

Department of Public Works, San Juan, Puerto Rico -- An Analysis of the Impact of Urbanization of the Natural Water Systems of Puerto Rico - (This research will result in a manual of procedures for land use management and policy for the Bayamon and other river basins.) - \$100,000

General Electric Co., Philadelphia, Pennsylvania -- The Impact of Municipal Water Pricing Policy of Industrial Reuse - (This research will examine the role of rising water cost in encouraging the recycling and reuse of water by industry.) - \$33,502

### ECONOMIC ANALYSIS OF WATER PROJECTS

The Department of the Interior recently announced publication of a Bureau of Reclamation technical manual outlining the use of interest factors in economic analysis of water projects. The publication will contain both new and updated material and it will be a valuable reference for engineers and economists. Copies of the manual may be obtained at a cost of \$1.50 from the Government Printing Office, Washington, D.C. 20402.



NEW FEDERAL DEPARTMENT  
OF NATURAL RESOURCES

H.R. 6959 has been introduced in the House to implement the President's proposal to establish a new Department of Natural Resources. The bill was referred to the Committee on Government Operations. H.R. 6959, introduced by Mr. Chet Holifield, California, Chairman of the Government Operations Committee, occupies 35 printed pages beginning with Title I, A Declaration of Purpose.

Title II would establish the Department and its organization of a Secretary, Deputy Secretary, two Under Secretaries, and these functions, each headed by an Administrator: Land and Water Resources, Energy and Resources Administration, Water Resources Administration, Oceanic, Atmospheric and Earth Sciences Administration, an Indian and Territorial Administration. The Department would also include one Assistant Secretary and General Counsel. Title III would transfer to the Department functions of the Interior Department, functions of the Department of Commerce relating to the National Oceanic and Atmospheric Administration, functions of the Corps of Engineers relating to Civil Works, functions of the Water Resources Council and certain functions of the Civilian Power Program of the Atomic Energy Commission, functions of the Agriculture Department relating to Forest Service and the Soil Conservation Service as well as some other special activities. From the Department of Transportation, also would come the activity related to pipeline safety.

REGIONAL ENVIRONMENTAL TRAINING  
AND RESEARCH ORGANIZATION

RETRO, organized by Congressman Louis Frey, Jr., Florida, is currently coming into being and carries an important assist to displaced aerospace personnel in its retraining program. RETRO stands for Regional Environmental Training and Research Organization. It represents a joint effort by Florida Institute of Technology, Melbourne; Florida Technological University, Orlando; and Brevard Junior College, Cocoa; to present a structured program for retraining about 3,300 aerospace personnel for work in environmental quality control. This program represents a mix of environmental engineering and management systems courses to fit engineers for a variety of positions in the environmental quality control field. RETRO programs are receiving initial funding of about \$150,000. The entire effort is projected to cost about \$15 million.

RESEARCH AND DEVELOPMENT  
SOURCES SOUGHT

Detailed producers for evaluating plans, and specifications for projects, and procedures for evaluating existing waste treatment facilities to determine features which should be upgraded to meet standards on reliability and maintainability.

For details contact Nebraska Water Resources Research Institute, University of Nebraska, 212 Agricultural Engineering, Lincoln, Nebraska 68503. Telephone 472-3307.

## WATER QUALITY GUIDELINES

The Environmental Protection Agency and the Department of Housing and Urban Development have drawn up preliminary planning guidelines to set forth the basic unified requirements for participating in the Waste Water Treatment Works Construction Grant Program and the Water and Sewer Facilities Grant Program. The guidelines are now available under the title "Guidelines-Water Quality Management Planning." They may be used as a point of reference pending completion of the unified planning requirements now being prepared by both organizations.

The guidelines are divided into five chapters, as follows:

1. Approach to water quality management and planning
2. Basin plans
3. Metropolitan/regional plans
4. EPA plan evaluation procedures
5. Evaluation of construction grant applications for conformance to plans

To obtain a copy of the guidelines, contact EPA, Water Quality Office, Washington, D.C. 20460.

## RESEARCH REVIEW

Project Title: Eutrophication of Small Reservoirs in the Great Plains

Principal Investigators: Dr. Mark J. Hammer, Dr. Gary L. Hergenrader

Dates: June, 1969 to June, 1972

Recently constructed reservoirs in the Great Plains are experiencing

symptoms of advanced eutrophication, i.e., profuse aquatic weed growth, bluegreen algae blooms, and shifting fish populations. Thus the recreational benefits of these waters are being seriously impaired. The objectives of this research project are to:

- (1) determine their present trophic condition
- (2) estimate their rate of eutrophication
- (3) identify sources of nutrients, and
- (4) evaluate preventive and remedial measures.

The five reservoirs under study near Lincoln, Nebraska are very eutrophic with the larger clear-water impoundments showing the worst conditions. Rooted aquatics (Potamogeton, Polygonum) grow to depths of 4 to 5 meters, and bluegreen algae blooms (Anabeana, Aphanizomenon, Microcystis) occur from June through September. Water-based recreation is severely hindered from mid-summer through fall. The majority of nutrients appear to come from land runoff and other difficult-to-control sources, and thus fertilization is not easily controlled.

Although the eutrophication rate of these small man-made lakes has not been firmly established, trends indicate that the usable life span for recreation will be limited to about 10 years. Eutrophication control in these reservoirs depends upon developing techniques to inhibit photosynthesis. The feasibility of methods for reducing light penetration are currently being evaluated on a laboratory scale.

NEW PUBLICATIONS RECEIVED  
BY INSTITUTE - MAY

1. "Horizontal Entry and Redistribution of Soil Water," D.L. Nofziger, D. Swartzendruber, M. L. Sharma, Purdue University, March 1971.
2. "Soils of Nebraska," J. A. Elder, University of Nebraska, Conservation and Survey Division, Resource Report No. 2, May 1969.
3. "Water and Oregon's Ecology," Water Resources Research Institute, Oregon State University, Fall Quarter 1970, January 1971.
4. "Pyrite Depression by Reduction of Solution Oxidation Potential," University of Utah, for Environmental Protection Agency, Water Quality Office, December 1970.
5. "Silicate Treatment for Acid Mine Drainage Prevention," Environmental Protection Agency, Water Quality Office, February 1971.
6. "Renovation of Municipal Wastewater by Reverse Osmosis," Environmental Protection Agency, Water Quality Office, May 1970.
7. "Toxic Action of Water Soluble Pollutants on Freshwater Fish," Dr. P. O. Fromm, Michigan State University, for the Water Quality Office, Environmental Protection Agency, December 1970.
8. "Treatment Techniques for Removing Phosphorus From Municipal Wastewaters," J. J. Convery, Environmental Protection Agency, Water Quality Office, January 1970.
9. "Oxygen Regeneration of Polluted Rivers: The Delaware River," W. Whipple, Jr., J. V. Hunter, F. W. Dittman, S. L. Yu, Rutgers University, G. E. Mattingly, Princeton University, for the Environmental Protection Agency, Water Quality Office, December 1970.
10. "Annual Report Fiscal 1970," Kansas Water Resources Research Institute, Kansas State University, University of Kansas, July 1970.
11. "Evaluating Urban Core Usage of Waterways and Shorelines," Battelle Memorial Institute, to Office of Water Resources Research, April 1971.
12. "Dispersion in Heterogeneous Nonuniform Anisotropic Porous Media," R. A. Greenkorn, Purdue University, September 1970.
13. "Analysis of Flow Separation in a Confined Two-Dimensional Channel," A. C. Hurd, E. I. du Pont de Nemours & Co., A. R. Peters, University of Nebraska, December 1970.
14. "Pedologic Features of Reservoir Sedimentation," H. Kohnke, M. Paulet, L. J. Lund, Purdue University, April 1971.
15. "Programs of Graduate Study in Environmental Systems Engineering," at Clemson University, 1971.
16. "Centers and Institutes at the Pennsylvania State University," A Case Study, M. M. Norman, Pennsylvania State University, March 1971.
17. "Sea Ice Surveillance From Earth Satellites," E. P. McClain, M. D. Baliles, National Environmental Satellite Service, Reprinted from the MARINERS WEATHER LOG, January 1971.
18. "Dunes on The Plains - The Sand Hills Region of Nebraska," C. F. Keech, R. Bentall, U.S. Geological Survey, University of Nebraska, Conservation and Survey Division, February 1971.
19. "An Annotated Bibliography On The Design of Water Resources Systems," Hani Asfur, W. W-G. Yeh, University of California, March 1971.

20. "Hydrology of A Small Rural Watershed Under Suburban Development," K. Nathan, G. H. Niewsand, A. J. Esser, Rutgers University, October 1970.

21. "Recovery, Separation, and Identification of Phenolic Compounds From Polluted Waters," by S. D. Faust, Hansjakob Stutz, O. M. Aly, Rutgers University, P. W. Anderson, U.S. Geological Survey, January 1971.

22. "Hydrodynamics and Discharge Measurements of Storm Sewers," E. L. Bourodimos, A. Oguntuase, Rutgers University, March 1971.

23. "The Disutility of Uncertain Losses," W. Whipple, Jr., Rutgers University, 1970.

24. "An Analysis of New Jersey's Water Pollution Control Programs," P. H. Burch, Jr., Rutgers University, Part I, November 1970.

#### NEWSLETTER ITEMS

Newsletter items and inquiries should be sent to: Dr. Warren Viessman, Jr., Director, N.W.R.R.I., 212 Agricultural Engineering Building, East Campus, Lincoln, Nebraska 68503