

3-1974

Water Current, Volume 6, No. 3, March 1974

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"Water Current, Volume 6, No. 3, March 1974" (1974). *Water Current Newsletter*. 86.
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Water Current

Volume 6 Number 3

March 1974

FROM THE DESK OF THE DIRECTOR . . .

Elementary forms of water resources development probably date back to the time man first appeared on earth. Planning was certainly carried out on an individual level at that point and the objective must have been limited to finding water sources for human consumption. Through the ages, planning and development processes have become more sophisticated and their context has broadened. Water resources development has not always been on a rational basis, however. To be sure, it has been motivated by carefully prepared plans and informed decisions, but it has also resulted from the desires of small pressure groups and unguided political whims. Today, because of extreme population pressures and the complexity of social problems, it is more important than ever to tip the scales of decision making toward rationality.

It is true that we will never know enough about the future to assure that all development is in the best interests of society. It is also true that illogical acts will continue to occur because we are human. Important contemporary issues may even be looked upon as insignificant five to ten years hence. Nevertheless, the consequences of today's decisions are more likely to be carried over into the future than those of the past, and as a result many options may be foreclosed. Because of this, water resources planning as a mechanism for reasoned development assumes great importance. Alternative courses of action must be plotted and the best information available presented to those in a decision-making capacity. The choice will still be made in the political arena, but facts rather than opinions and local pressures must become the primary guiding force. Research will play an important role in this process.

A plan for optimizing the research input to those in planning and policy-making roles in Nebraska has been developed by the Nebraska Water Resources Research Institute. The linkage between producers and users of research is the cornerstone.

ON THE HOMEFRONT

WATER RESOURCES SEMINAR SERIES

Seminar topics and speakers for the coming month are as follows:

Friday, April 5

This is a special session at 11:00 a.m. in the Centennial Room of the Nebraska Union, arranged by the College of Engineering & Technology in connection with E-week 1974. The speaker will be Dr. Jay W. Forrester of M.I.T. and his topic will be "The World in Crisis."

Monday, April 22

This is the final seminar presentation entitled "Regional Water Resources Planning--A Quantitative Approach." Speakers will be Dr. Gary L. Lewis, Assistant Professor of Civil Engineering, UNL, and Dr. Warren Viessman, Jr., Director, Water Resources Research Institute. This seminar will be held in 206 Ag. Engineering Building from 3:00-5:00 p.m.

1974 SUMMER INSTITUTE

The Nebraska Water Resources Research Institute will sponsor a one-week Summer Institute July 21-26, 1974. This year's theme is "Quantitative Planning Techniques in Water Resources." The objective is to provide training in the application of simulation and optimization techniques to the planning and analysis of water resources systems. Primary emphasis will be given to application. Approximately 50 percent of the program will be devoted to workshops providing participants an opportunity to manipulate operational models. A case-study approach will be used to relate lecture materials to workshop activities. Both surface water and groundwater systems will be discussed. The role of quantitative models as practical planning tools will be considered.

Speakers and topics for the Institute program are as follows:

Introduction to Water Resources Systems

Warren Viessman, Jr., Director
Water Resources Research Institute

Simulation Model Structuring -
Surface Water Components

Gary L. Lewis, Assistant Professor
Dept. of Civil Engineering
University of Nebraska-Lincoln

Simulation Model Structuring -
Ground Water Systems

Peter W. Huntoon, Hydrogeologist
Conservation & Survey Division
University of Nebraska-Lincoln

The Big Blue River Basin Model - A Case Study	Peter W. Huntoon
Screening Models for Water Resources Planning	D. Peter Loucks, Chairman Dept. of Environmental Engineering Cornell University
The Elkhorn River Basin - A Case Study	Gary L. Lewis
Simulation and Optimization - Combined Tools for Flood Control Planning	Gary L. Lewis, D. Peter Loucks, Isaac Yomtovian, Research Associate Water Resources Research Institute

For further information contact: Dr. Warren Viessman, Jr., Director, Water Resources Research Institute, 212 Ag. Engineering Building, University of Nebraska, East Campus, Lincoln, Nebraska 68503. Telephone (402) 472-3307 or 3305.

RESEARCH SEMINAR

On March 14, the Institute sponsored a "Research Overview" at the Nebraska Center. The objective of the program was to present a brief review of the current research program of the Institute. Sixteen principal investigators made presentations on studies in progress, accomplishments to date and future research plans. The seminar was very well received, and a similar program is planned for next year.

FEDERAL HIGHLIGHTS

ADMINISTRATION WATER BUDGET - F.Y. 1975

Budgets for various water resource programs proposed by the Administration for fiscal year 1975 include the following:

Bureau of Reclamation

The Administration's budget request for F.Y. 1974 provides for \$1,375,000 for construction of water resources projects by the Bureau and the Corps of Engineers. Priority is placed on funding projects for hydroelectric power, municipal and industrial water supply and urban flood control. High priority is given to maintaining schedules for projects nearing completion.

The F.Y. 1975 total budget of \$435,520,000 for the Bureau includes an increase of \$38.4 million for construction activities, research near the fiscal year 1974 level, a \$12 million increase for operation and maintenance, and \$2.6 million additional for other Bureau activities.

No new starts are scheduled within the Bureau's construction budget of \$293.6 million. The funds provided would continue activities on 75 projects or major units or divisions of projects, including ten under the loan program.

Office of Water Resources Research

The 51 state university water resources research institutes, including Puerto Rico, would each receive \$89,000 in the F.Y. 1975 budget as compared with \$100,000 in 1974. Funds for matching grants to institutes under Title I are proposed at \$3 million, the same as last year. The overall budget for OWRR for F.Y. 1975 is proposed at \$12,700,000 as compared with \$13,229,000 in 1974. Particular emphasis is being given to problems of a regional or river basin nature and to priority water resource research needs generated by the energy crisis and the search for new energy.

Office of Saline Water

The budget request for saline water research and development for F.Y. 1975 is \$3,029,000 compared with \$3,627,000 in 1974. The reduction represents further redirection of the program with emphasis being placed on sea water membrane development carried out at Wrightsville Beach, N.C.

Water Resources Council

Planning grants to states would be reduced to \$2,400,000 in the budget request for F.Y. 1975. For all activities \$6,865,000 is requested. The program includes \$1,350,000 for expenses of river basin commissions and for comprehensive planning; \$2,013,000 million for the 1975 assessment and \$1,170,000 for regional or river basin plans.

Commission on Water Quality

This Commission was established by the Federal Water Pollution Control Act of 1972 to make a full and complete investigation of all aspects of achieving and all aspects of the total economic, social and environmental effects of achieving or not achieving, the effluent limitations and goals set forth in the Act. The budget requested for F.Y. 1975 is \$4,800,000 which, with the unobligated balance available at the start of the year, makes a total program of \$7,550,000.

U.S. Geological Survey

The USGS program of geothermal energy investigations has a total budget of \$10,064,000 for fiscal year 1975, including a supplemental amendment of \$25.3 million to accelerate the energy research and development program submitted to Congress. The revised budget for water resources investigations

is \$53,349,000. The program will include studies of new water problems and environmental questions that will be caused by production of shale oil, and provide water information needed for decisions on siting of mines and conversion plants.

STREAM CHANNELIZATION CRITICIZED

A recent report issued by the House Committee on Government Operations, entitled "Stream Channelization: What Federally Financed Draglines and Bulldozers Do to Our Nation's Streams," charges that stream channelization has been over-used without sufficient consideration for the adverse environmental effects. These adverse effects include draining of wetlands, destruction of hardwood forests, increase in erosion and sedimentation, elimination of habitat needed by fish and wildlife, lowered water tables and poor water quality.

The report listed ten major recommendations for improving channelization projects:

1. The Soil Conservation Service (SCS) should comply with two Executive Orders and promptly adopt new regulations designed to promote public participation in the formulation of this project.
2. In accordance with the Administrative Procedure Act concerning rulemaking and public information, the SCS should publish all documents that are in fact regulations, although not so designated, and all other statements of general policy and interpretations of general applicability.
3. The SCS, Corps of Engineers, and the Bureau of Land Reclamation should adopt a policy of fully identifying all known project beneficiaries in pertinent project documents.
4. The SCS should include on its questionnaire forms concerning irrigation, draining, and flood damages a statement which specifies, with respect to commercial and financial data supplied by a respondent, that the respondent shall indicate whether he desires the data to be kept confidential and exempt from disclosure.
5. The Bureau of Outdoor Recreation should begin to review small watershed projects of the SCS to ascertain their probable effects on recreational and aesthetic values.
6. An appropriate House committee should consider amending the Fish and Wildlife Coordination Act to extend it to all water resource projects constructed or financed by a federal agency, to insure that fish and wildlife agencies are notified at an early stage in project development, to require that federal water resource agency to set forth its reasons for not including fish and wildlife mitigation and enhancement features recommended in the project, and to require that estimates of fish and wildlife losses not be evaluated solely in monetary terms.

7. The SCS should be required to obtain from the state water pollution control agency, or from EPA, a certification that a proposed project will, as a minimum, maintain the chemical, physical, and biological integrity of the effect of water.
8. The SCS should adopt a policy of full compliance with the requirements of section 102(2)(C) of the National Environmental Policy Act.
9. The Council on Environmental Quality should develop and, after providing opportunity for public comment, recommend that the President promulgate comprehensive guidelines for federal agencies in planning and carrying out projects involving channelization.
10. An appropriate House committee should consider clarifying the Fish and Wildlife Coordination Act to insure that water resource development agencies can acquire mitigation lands without further authorization by Congress, but subject to obtaining an appropriation for such acquisition.

INVESTMENTS IN TRANSPORTATION

In a recent speech, William J. Hull, President, National Waterways Conference, Inc., and Vice-President, Ashland Oil, Inc., quoted estimates from the Department of Transportation that a capital investment of \$8.9 billion for rail growth would be needed to expand rail traffic by 221 billion ton-miles between 1970 and 1980, while an equal expansion of 215 billion ton-miles could be realized in river, Great Lakes and coastal traffic with an investment of \$1.6 million. These estimates signify that capital costs of expanding rail facilities per 1,000 ton-miles of increased capacity is more than five times as great as that required per 1,000 ton-miles by water.

During his talk, Hull stated, "In a period of unprecedented demands on our capital resources to achieve necessary increases in energy supply, the inherent low capital cost of capacity expansion by water becomes a matter of critical importance in planning resources allocations for governmental programs."

CLOUD SEEDING IMPACTS RESEARCHED

Gilbert G. Stamm, Commissioner of Reclamation, announced that the Natural Resource Ecology Laboratory at Colorado State University has received a contract for \$74,758 to be used to study potential effects of cloud seeding on the ecology and agriculture in the High Plains.

Duration of the study is six months and is designed to resolve several questions about the technology of summer cloud seeding over this area. The main objective is to learn more about precipitation processes in the High Plains. Identification of possible impacts on the grassland ecology and agricultural systems will be a major part of the project.

\$7 BILLION PROPOSED FOR ENVIRONMENTAL PROGRAMS

Pollution control and abatement activities will share in an increase of \$1.7 billion in the F.Y. 75 budget for environmental programs. This reflects expansion of the construction grants program for sewage treatment facilities under the Water Pollution Control Act of 1972. The outlays for such grants will be \$3.25 billion--70 percent of all pollution control and abatement activities. The construction grant program plays a large part of this category but is only one of numerous programs to fight pollution conducted by several federal agencies.

WRC ISSUES NEW GUIDELINES

The Water Resources Council has released new guidelines to provide a price base for evaluating agricultural effects of alternative plans for the development and management of water and related land resources. "Agricultural Price Standards for Water and Related Land Resources Planning" was developed as a final result of and supplement to the WRC's "Principles and Standards for Planning Water and Related Land Resources." The new guidelines represent current agricultural prices made standard for short-term changes and were prepared for WRC by the Economic Research Service.

Warren D. Fairchild, Director of the WRC said, "If water planning is to be fully credible, not only should cost factors be relevant, but also benefit factors. Based on the price of agricultural commodities in the market place, the current normalized prices to be used in evaluating projects will be over 30 percent higher than those previously approved."

Copies of the Council's Guideline #1, "Review and Comment of the Water Resources Council on Wild and Scenic Rivers Proposals of the Department of Agriculture and the Department of the Interior;" and Guideline #2, "Agricultural Price Standards for Water and Related Land Resources Planning," are available upon request. Contact the Water Resources Council, Washington, D.C. 20037.

CONFERENCES

SUMMER COURSES AT PRINCETON

- June 17-21 Removal Processes for Water Purification
- June 17-21 Digital Signal Processing
- June 17-21 Polymer Production, Structure, and Processing
- June 17-21 Interactive Computing and Computer Graphics
- June 17-21 Chemical Reaction Engineering

- June 17-21 Introduction to Water Pollution Science and Technology
- June 24-28 Introduction to Groundwater Hydrology and Pollution
- June 24-28 Modern Process Control
- June 24-28 Operating Systems Design Concepts
- June 24-28 Modern Methods in Design Against Wind Loadings on Structures
- June 24-28 Current Methods in Transportation
- July 8-12 Energy Transport Phenomena in Gas Core (Fissioning and Fusioning) Reactors
- July 8-12 Polymer Processing from the Materials Point of View
- July 15-19 Numerical Techniques for Engineers
- July 15-19 Introduction to Solid State and Materials Science
- July 15-19 Mechanics of Composite Materials
- July 22-26 Acoustic Waves and Vibrations in Solids
- July 29-
August 2 Code Optimization
- July 29-
August 2 The Statistical Design of Engineering Experiments
- August 19-23 The Finite Element Method in Surface and Subsurface Hydrology

The courses in this series have been developed in response to the expressed needs of engineering professionals for continuing education. The level of instruction is based on the assumption that participants have basic engineering degrees and industrial experience related to the subject matter being taught.

Brochures are available by writing or calling: George J. Mueller, Assistant Dean, Princeton University, School of Engineering/Applied Science, Room C-230, The Engineering Quadrangle, Princeton, New Jersey, 08540, (609) 452-5556.

SHORT COURSE ON IMPACT STATEMENTS OFFERED

The Water Resources Research Institute at the University of North Carolina and Appalachian State University are co-sponsoring a course entitled "Environmental Assessment and Impact of Water Resources Development." The objective of the course is to help persons interested in the formulation of impact statements.

The course will be held at the Continuing Education Center, Appalachian State University. Housing facilities and recreation programs for students and their families are available at the Center.

For further information contact: Professor F. Eugene McJunkin, Associate Director of WRII, 124 Riddick Building, North Carolina State University, Raleigh, North Carolina 27607.

PUBLICATIONS

REPORT ON WATER IN AN OIL SHALE AREA

U.S.G.S. hydrologists have summarized data on the relation between oil shale development and the quantity and quality of surface and groundwater in the Piceance Basin of northwest Colorado which contains the largest known deposits of high-grade oil shale in the United States.

The information is available in a 246-page report which includes 80 illustrations and 91 tables. The report presents fundamental hydrologic data needed by those who must plan for water supplies to support development of oil shale, for those who must devise plans for dewatering oil shale so that it can be safely mined and for those who must protect the Colorado River system from discharges of saline water.

Copies of the publication may be obtained for \$2 from the Colorado Geological Survey or the Colorado Water Conservation Board, 1845 Sherman Street, Denver, Colorado.

CLEAN WATER COSTS RISING

The Environmental Protection Agency, in its sixth report to Congress on the Economics of Clean Water, indicates that industry will be required to invest about \$12 billion for treatment facilities in the next few years to meet the 1977 standards of P.L. 92-500. This is in addition to the \$2 to \$9 billion cost of meeting thermal discharge standards that some electric utilities will have to pay.

In a review of 23 industries discharging to the nation's waters, the EPA report notes that most will be able to recover the cost of wastewater treatment facilities through increases in prices. This new report also assesses water pollution control programs and policies with particular emphasis on the constraints to implementation. Two nonpoint sources of pollution (agricultural soil loss and nitrogen fertilizers) are discussed for the first time.

Copies of the EPA report will be available through the Government Printing Office within two months.

RESEARCH REVIEW

Project Title: Biological Control of Blue-Green Algae

Principal Investigator: Dr. E. L. Martin
Assistant Professor of Microbiology

The objective of this study is to find biological control methods for blue-green algal growth. The immediate objectives are first the isolation of the specific blue-green algae strains that are responsible for the algal blooms observed in the surface waters of eastern Nebraska, and second, the search for naturally occurring viruses and bacteria that are capable of selectively attacking these strains of blue-green algae. The ultimate objective is the use of these viruses and bacteria to control the level of the blue-green algae population, thereby allowing the widest use of eastern Nebraskan surface waters.

The following types of blue-green algae are considered to be responsible for algal blooms in eastern Nebraska: Anabaena flos-aquae; Microcystis aeruginosa; and Aphanizomenon flos-aquae. Strains of these algal types have been observed in the flood control lakes of the Salt Valley Watershed. Additionally, isolation in pure culture of these various algal types is currently in progress. Because these algal types often change their morphology when cultured under laboratory conditions, further identification must be carried out before it is definitely ascertained that pure cultures of the above three blue-green algal types have been produced.

Rather than wait until pure cultures of the three types of blue-green algae had been isolated, it was decided to test concentrated water samples from the various flood control lakes and sewage to determine if they contained any viruses or bacteria which would attack four related blue-green algal strains in the culture collection. Hopefully, any viruses or bacteria which will attack the culture collection strains will also attack the related blue-green algal strains which are currently in the process of being isolated.

In the immediate future, further characterization of the isolated viral agents will be continued. At present the viral nature of these agents is based upon their filterability. Definitive verification of these agents as viruses also rests on their morphology and size, both of which can be determined with the electron microscope. Similar characterization of active bacterial isolates will also be conducted. Growth, concentration and purification procedures will be developed. With the bacterial isolates, host range and safety testing will be rigorously evaluated since bacteria in general have a wider range of biological activity than do viruses. As with the viral agents, desirable bacterial agents will be tested under simulated natural conditions in the laboratory.

In the coming spring and summer, a vigorous effort will be continued to isolate and identify Nebraska strains of nuisance blue-green algae. These blue-green algae strains will be used to test the viral and bacterial agents for their ability to be used as biological control agents.

PUBLICATIONS RECEIVED BY THE INSTITUTE

1. Illinois Storm Sewer System Simulation Model: User's Manual, A. Suha Sevuk and Ben Chie Yen, Department of Civil Engineering, Gordon E. Peterson, Department of Computer Sciences, University of Illinois at Urbana-Champaign, Water Resources Center, University of Illinois, Urbana, Illinois, October 1973.
2. Approaches to Stormwater Management, Burton C. Becker, Michael L. Clar, and Robert R. Kautzman, Hittman Associates, Inc., November 1973.
3. Nitrogen Uptake Efficiency by Four Plant Species in the Field and Growth Chamber, J. H. Edwards, D. D. Warncke, S. A. Barber, D. W. Nelson, Water Resources Research Center, Purdue University, West Lafayette, Indiana, December 1973.
4. Water Quality Requirements of Aquatic Insects, Arden R. Gaufin, University of Utah, and Dr. Alan V. Nebeker, Environmental Protection Agency, September 1973.
5. Studies on the Validity of Darcy's Law for Flow in Natural Sands, Robert E. Carver, Department of Geology, University of Georgia, Athens, Georgia, November 1973.
6. The Identification and Quantification of the Net Effects of Multiple-Purpose River Basin Development, Ronald M. North and Jackie Sellers, Institute of Natural Resources, The University of Georgia, Athens, Georgia, June 1973.
7. Water Pollution Control in the Primary Nonferrous - Metals Industry - Vol. I, Copper, Zinc, and Lead Industries, J. B. Hallowell, J. F. Shea, G. R. Smithson, Jr., A. B. Tripler, B. W. Gonser, and John Ciancia, Edison Water Quality Research Laboratory, Edison, New Jersey, September 1973.
8. Engineer's Report on Groundwater Conditions Water Supply and Basin Utilization in the Orange County Water District, Orange County Water District, 10500 Ellis Avenue, Fountain Valley, California, February 1973.
9. Air Flotation - Biological Oxidation of Synthetic Rubber and Latex Wastewater, A. H. King, J. Ogea, J. W. Sutton, and Joseph W. Field, III, U.S. Environmental Protection Agency, November 1973.
10. Combined Sewer Overflow Seminar Papers, National Environmental Research Center, Office of Research and Development, U.S. Environmental Protection Agency, Cincinnati, Ohio, November 1973.
11. Reviewing Environmental Impact Statements - Power Plant Cooling Systems, Engineering Aspects, National Thermal Pollution Research Program, Pacific Northwest Environmental Research Laboratory, National Environmental Research Center, Corvallis, Oregon, October 1973.

12. Abatement of Mine Drainage Pollution by Underground Precipitation, C. K. Stoddard and Harold J. Snyder, Jr., Office of Research and Development, Washington, D. C., October 1973.
13. A Streamflow Model for Metropolitan Planning and Design, ASCE Urban Water Resources Research Program, Technical Memorandum No. 20, Richard F. Lanyon and James P. Jackson, The Metropolitan Sanitary District of Greater Chicago, January 1974.
14. Report, International Workshop on the Hydrological Effects of Urbanization, Warsaw, 1973, American Society of Civil Engineers, New York, New York, January 1974.
15. Water Pollution Control in the Primary Nonferrous - Metals Industry - Vol. II, Aluminum, Mercury, Gold, Silver, Molybdenum, and Tungsten, J. B. Hallowell, J. F. Shea, G. R. Smithson, Jr., A. B. Tripler, B. W. Gonser, and John Ciancia, Edison Water Quality Research Laboratory, NERC, Edison, New Jersey, September 1973.
16. Evaporation Suppression, A Bibliography, U.S. Department of the Interior, Office of Water Resources Research, Water Resources Scientific Information Center, Washington, D. C., December 1973.
17. Electrofishing Boats, Improved Designs and Operational Guidelines to Increase the Effectiveness of Boom Shockers, Donald W. Novotny and Gordon R. Priegel, Department of Natural Resources, Madison, Wisconsin, 1974.
18. Minutes, Iowa State Water Resources Research Institute Advisory Board and Council, Eighth Annual Meeting, Iowa State Water Resources Research Institute, Iowa State University, Ames, Iowa, September 1973.
19. New Directions in U.S. Water Policy, Summary, Conclusions, and Recommendations, from the Final Report of the National Water Commission, National Water Commission, Arlington, Virginia, June 1973.
20. National Weather Service River Forecast System - Snow Accumulation and Ablation Model, Eric A. Anderson, U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Weather Service, Washington, D.C., November 1973.
21. Effects of Urbanization on Stream Channels and Stream Flow, Thomas R. Hammer, Regional Science Research Institute, Philadelphia, Pennsylvania, November 1973.
22. Nebraska Conference on Sedimentation and Erosion Control, Nebraska Association of Resources Districts, Nebraska Natural Resources Commission, National Association of Conservation Districts, Lincoln, Nebraska, December 12-13, 1973.

23. Probabilistic Models in the Design and Operation of a Multi-Purpose Reservoir System, Subramani Arunkumar and William W-G Yeh, California Water Resources Center, University of California, Davis, California, December 1973.
24. A Guide to Important Characteristics and Values of Freshwater Wetlands in the Northeast, Joseph S. Larson, Water Resources Research Center, University of Massachusetts at Amherst, July 1973.
25. Extended Period Simulation of Water Distribution Networks, H. S. Rao, D. W. Bree, Jr., and R. Benzvi, Systems Control Inc., Palo Alto, California, February 1974.
26. Conservation of Water and Reduction of Pollution by Use of Solvent Systems for Coloring Textile Materials: An Economic Outlook, David M. Hall, Warren S. Perkins, Water Resources Research Institute, Auburn University, Auburn, Alabama, January 1974.
27. Effect of Detergent-Laden Water on the Growth of Corn, Bulletin 62, Wybe Kroontje, Jesse N. Judy, and Hermann C. H. Hahne, Virginia Water Resources Research Center, Virginia Polytechnic Institute and State University, Blacksburg, Virginia, August 1973.
28. Aesthetics in Environmental Planning, Martin J. Redding, Environmental Studies Division, Washington Environmental Research Center, Washington, D.C., November 1973.
29. Evaporation, Infiltration and Rainfall-Runoff Processes in Urban Watersheds, Aolad Hossain, Jacques W. Delleur, and Ramachandra A. Rao, Water Resources Research Center, Purdue University, West Lafayette, Indiana, January 1974.
30. Simulation of the Hydrology of Ungaged Watersheds, L. F. Huggins, J. R. Burney, P. S. Kundu, E. J. Monke, Water Resources Research Center, Purdue University, West Lafayette, Indiana, June 1973.
31. Oil Recovery System Using Sorbent Material, Garth D. Buntz, Thomas P. Meloy, and Kurt Jacobson, Agricultural and Spills Branch, Environmental Protection Agency, Washington, D. C., September 1973.
32. Mobile Oxygen Dispersion Craft, William Whipple, Jr., Water Resources Bulletin, American Water Resources Association, Urbana, Illinois, August 1973.
33. Coal-Energy Development in the Northern Great Plains, Jack R. Davidson, Paul Rechar, Water Resources Research Institute, University of Wyoming, Dale Anderson, Water Resources Research Institute, North Dakota State University, Ted Williams, Water Resources Research Institute, Montana State University, and Clynn Phillips, Water Resources Research Institute, University of Wyoming, 1974.

34. Evaluation of the Use of Pricing as a Tool for Conserving Water, M. H. Chiogioji, E. N. Chiogioji, Water Resources Research Center, Washington Technical Institute, Washington, D. C., November 1973.
35. 1973 Annual Report, Office of Water Resources Research, Cooperative Water Resources Research and Training, U.S. Department of the Interior, Washington, D.C., January 1974.
36. Water Allocation Models Based on an Analysis for the Kissimmee River Basin, John E. Reynolds, J. Richard Conner, Kenneth C. Gibbs, and Clyde F. Kiker, Water Resources Research Center, Food and Resources Economics, University of Florida, Gainesville, Florida, December 1973.
37. Publications List, Water Resources Research Center, University of Hawaii, Honolulu, Hawaii, Fall 1973.
38. Annual Report, Water Resources Research Institute, University of North Carolina, Raleigh, North Carolina, July 1, 1972-June 30, 1973.
39. Determination of the Complexing Capacity of Natural Water, Kenneth W. Hanck and James W. Dillard, Department of Chemistry, School of Physical and Mathematical Sciences, North Carolina State University, Raleigh, North Carolina, December 1973.
40. Research and Demonstration Programs to Achieve Water Quality Goals: What the Federal Government Needs to Do, Comptroller General of the United States, Washington, D.C., February 1974.
41. Adsorption Characteristics of Silver, Lead, Cadmium, Zinc, and Nickel on Borosilicate Glass, Polyethylene, and Polypropylene Container Surfaces, Arthur W. Struempler, Chadron State College, Chadron, Nebraska, November 1973.
42. Lime Disinfection of Sewage Bacteria at Low Temperature, S.M. Morrison, K. L. Martin, and D. E. Humble, Colorado State University, Fort Collins, Colorado, and Dr. Ronald C. Gordon, Arctic Environmental Research Laboratory College, Alaska, September 1973.
43. This Land is Your Land, Water Resources Management Alternatives for the Omaha-Council Bluffs Area, Regional Planning Branch, U.S. Army Corps of Engineers, Omaha, Nebraska, 1974.
44. Assessing the Social Effects of Public Works Projects, E. Jackson Baur, Department of the Army, Corps of Engineers, Board of Engineers for Rivers and Harbors, Fort Belvoir, Virginia, June 1973.
45. Phase One: Summary, Phase Two: Program, Metropolitan Omaha, Nebraska - Council Bluffs, Iowa, Omaha District Corps of Engineers, 1974.
46. Water Resources Publications Related to the State of Delaware, R. W. Sundstrom, Water Resources Center, University of Delaware, October 1972.

47. Processing, Chemical Composition and Nutritive Value of Aquatic Weeds, L. O. Bagnall, R. L. Shirley, and J. F. Hentges, Water Resources Research Center, University of Florida, Gainesville, Florida, November 1973.
48. In Touch With People, United States Department of the Interior Conservation Yearbook Series No. 9, Washington, D. C., 1973.
49. Eighth Annual Conference on Water Resources Research, Office of Water Resources Research, U.S. Department of the Interior, Washington, D. C., April 11-12, 1973.
50. Annual Report, Fiscal Year 1973, Delaware Water Resources Center, University of Delaware, Newark, Delaware, September 1973.
51. Ninth Annual Report, Rhode Island Water Resources Center, University of Rhode Island, Kingston, Rhode Island, October 1973.
52. Desanding Works and High Head Line, Hydraulic Studies for Liddell Power Station, Vol. IV, D. N. Foster, K. K. Lai, and K. C. Yong, University of New South Wales, Manly Vale, N.S.W., Australia, December 1969.
53. Hunter River Measuring Weir, Hydraulic Studies for Liddell Power Station, Vol. III, A. J. Bonham and P. B. Stone, University of New South Wales, Manly Vale, N.S.W., Australia, August 1969.
54. Mercury in the Environment, David H. Klein, William T. Donaldson, Southeast Environmental Research Laboratory, Athens, Georgia, December 1973.
55. Investigation of Treating Electroplaters Cyanide Waste by Electrodialysis, Sidney B. Tuwiner, Lloyd Kahn, Edison Water Quality Research Laboratory, Edison, New Jersey, December 1973.
56. Color Removal from Kraft Mill Effluents by Ultrafiltration, H. A. Fremont, D. C. Tate, R. L. Goldsmith, Mr. Edmond P. Lomasney, Environmental Protection Agency, Atlanta, Georgia, December 1973.
57. Recurrence Frequency of Flood Levels in the Tuggerah Lake System, K.D. Yong, P. B. Stone, Water Research Laboratory, University of New South Wales, Manly Vale, N.S.W., Australia, February 1971.
58. Utilization of Phosphorus by Phytoplankton in Phosphorus-Rich Environments, John R. Strange, School of Biology in cooperation with Environmental Resources Center, Georgia Institute of Technology, Atlanta, Georgia, January 1974.
59. Information Resource: Final Report Water Pollution Control in Water Utilities, H. A. Faber, A. D. Nardozi, M. J. Taras, Harry F. Smith, Jr., EPA, Region II, 26 Federal Plaza, New York, New York, December 1973.

60. Nitrogen Budget of a North Carolina Estuary, William G. Harrison, John E. Hobbie, Department of Zoology, Agricultural Experiment Station, School of Agriculture & Life Sciences, North Carolina State University, Raleigh, North Carolina, January 1974.
61. An Urban Study, Metropolitan Region of Kansas City, Missouri and Kansas, Urban Studies Program of the Corps of Engineers, April 9, 1973.
62. Nitrogen and Phosphorus in Water, An Annotated Selected Bibliography of Their Biological Effects, Kenneth M. Mackenthun, U. S. Department of Health, Education and Welfare, Division of Water Supply and Pollution Control, Washington, D. C. May 1, 1965.
63. Water Pollution in the United States, Third Report of the Special Advisory Committee on Water Pollution, Natural Resources Committee, Washington, D. C., February 16, 1939.
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QUESTIONS AND INQUIRIES

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