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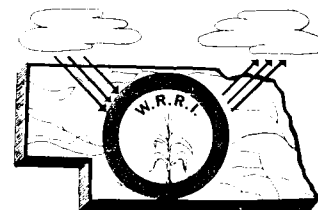
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WATER RESOURCES NEWS

NEBRASKA WATER RESOURCES RESEARCH INSTITUTE
212 AGRICULTURAL ENGINEERING BUILDING

THE UNIVERSITY OF NEBRASKA
LINCOLN, NEBRASKA 68503



Volume 5 Number 2

February 1973

FROM THE DESK OF THE DIRECTOR . . .

The volume of groundwater in the United States greatly exceeds that stored in all the nation's streams, rivers, reservoirs and lakes, including the Great Lakes. This vast reservoir sustains stream flow during precipitation-free periods and constitutes the principal source of fresh water for many arid localities. About 70-80 percent of the water used in Nebraska is from groundwater sources, while the national average is about 22 percent.

Of special interest is that quantity of groundwater which can be withdrawn by wells and related devices or which forms the base flow of surface streams. Unfortunately, there has been a great deal of misinformation and misconception about the origin and movement of groundwater. Much of the misunderstanding about this resource relates to the fact that it is not visible and thus difficult to measure in the ordinary sense. This obstacle is being eliminated, though, and we now understand the physics of groundwater systems and in many cases know the extent and quality of local groundwater resources.

The amount of recoverable high-quality water stored in permeable materials in Nebraska is estimated to exceed 1,678,800,000 acre-feet. This is enough water to cover the state to a depth of about 39 feet and equals approximately 20 years of annual precipitation. An average specific yield of two-tenths of the thickness of permeable materials is assumed.

A large amount of Nebraska's good quality water can be recovered by wells of moderate depth, and in this respect, the state fares better than many other neighboring regions. The groundwater reserve has potential for many practical uses but it should be understood that this is water in storage and withdrawals may be greater or less than levels of replenishment. Natural recharge is derived from precipitation and surface sources, but artificial recharge can also supplement underground supplies.

In Nebraska the average annual recharge from precipitation is about 8 million acre-feet. Contrast this with about 6 million acre-feet of groundwater consumptively used during the irrigation season (1972) and it is easy to see that statewide withdrawals might exceed natural recharge in the not-too-distant future. This fact should serve notice that increased attention to prudent groundwater development and management is in order.

INTERDISCIPLINARY WATER RESOURCES SEMINAR

This year's Water Resources Seminar theme is "Regional Planning for Natural Resources with Special Emphasis on the Missouri River Basin." The seminar is held every Monday afternoon at 4:00 p.m. in Room 206 Ag. Engineering on the East Campus. All interested persons are welcome to attend.

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

<u>Date</u>	<u>Topic</u>	<u>Speaker</u>
March 5	Energy Requirements and Potential	John E. Lagerstrom, Chairman Dept. of Electrical Engr. University of Nebraska
March 12	Environmental Considerations in Planning	Steve H. Hanke, Dept. of Geography & Environmental Engineering Johns Hopkins University
March 19	Special Problems of Nebraska - An Overview	Dayle E. Williamson Executive Secretary Nebraska Natural Resources Commission

REGIONAL NEWS

SUMMER INSTITUTES ANNOUNCED AT THE UNIVERSITY OF NEBRASKA

Two one-week Summer Institutes for practicing professionals and academicians have been announced for the summer of 1973 at the University of Nebraska. The first Institute will be held from July 16-20 and will be entitled "Planning and Management of Urban-Metropolitan Water Systems." Topics to be discussed include urban hydrology, quantity and quality modeling, water supply, waste disposal, regional management of urban and industrial wastes, recycling and reuse and land disposal techniques. In addition, discussions on use of optimization techniques as tools for urban water planning and management will be included.

The second Institute will be held from July 23-27 and is entitled "Multiple Objective Water Resources Planning Techniques." Included in this Institute will be discussions of topics such as social goals related to water resources, impact of water resources activities on quality of life aspects, the nature of ecologic systems, dynamic considerations in environmental impact, and the multiple objective planning process.

Further information on these Institutes may be obtained by writing Dr. Warren Viessman, Jr., Director, Nebraska Water Resources Research Institute, 212 Ag. Engineering Building, University of Nebraska, Lincoln, Nebraska 68503. Complete announcements are available including course outlines and fees.

RESEARCH PROJECT INITIATED ON WHITE RIVER BASIN

Chadron State College Research Institute has announced the funding of an initial data gathering project on the White River Basin--surface and groundwater. Anyone having information on this subject is requested to contact the principal investigator, Larry D. Agenbroad, Professor of Earth Science, School of Science and Technology, Chadron State College, Chadron, Nebraska 69337 (308) 432-5571.

UNIVERSITY OF NEBRASKA IRRIGATION SHORT COURSE

University of Nebraska extension water resources specialist, Deon Axthelm, addressed the annual Irrigation Short Course in Lincoln on January 29, 1973.

Axthelm stated that the decision to permit local governmental subdivisions, rather than the state to regulate groundwater use is an historic step. Local Ground Water Conservation Districts (GWCD) and Natural Resource Districts have been empowered by law to place restrictions on the irrigator's use of groundwater.

Because of declining groundwater supplies, four Ground Water Conservation Districts have set up regulations to curtail the loss of groundwater through irrigation water runoff.

By January 1, 1975, groundwater irrigators in Clay, Hamilton, Seward and York counties must have adequate systems to control irrigation runoff water. In addition, written consent of the GWCD will be required before an irrigator can allow his irrigation runoff outside of lands under his supervision.

Axthelm said the purpose is to conserve groundwater by forcing irrigators to control water now lost through evaporation and surface drainage.

NITROGEN IN NEBRASKA'S ENVIRONMENT

The Nebraska Agricultural Extension Service will sponsor a conference entitled "Nitrogen in Nebraska's Environment" on April 18-19, 1973 at the Nebraska Center for Continuing Education, University of Nebraska, Lincoln, East Campus. A select audience will comprise varied disciplines from the university community, state and federal agencies and other groups interested in nitrogen and the environment.

The main objectives of the conference are: (1) to provide a forum for common understanding of nitrogen aspects in relation to human and animal health; (2) to bring professional people up-to-date on the status of nitrogen in the environment; (3) to review the effects of nitrogen on the land and water environment.

The conference is aimed at county agents and professionals in state, federal and local agencies and commodity-oriented associations who may deal with these problems in a public or educational way.

A published proceedings will be available after the conference. For further information, contact Mr. Deon Axthelm, Water Resources Specialist, 214 Ag. Engineering Bldg., University of Nebraska, Lincoln, Nebraska 68503.

NATIONAL NEWS

WHITE HOUSE AIDES CHOSEN

President Nixon has appointed Dr. John C. Whitaker as Interior Undersecretary. Whitaker was former deputy assistant to President Nixon for the environment, natural resources, and energy and succeeds Dr. William T. Pecora in his new post. The position of Interior Undersecretary has been vacant since the death of Pecora on July 19, 1972.

Dr. Whitaker received his Ph.D. in Geology at Johns Hopkins in 1953. He was Vice-President of International Aero Service Corporation in Philadelphia, specializing in aerial mapping and geophysical surveys. He is a member of the American Association of Petroleum Geologists, the Geological Society of America and the Society of Exploration Geophysicists.

It was also announced that Ronald H. Walker will succeed George B. Hartzog, Jr. as Director of the National Park Service. Walker was a Special Assistant to former Interior Secretary Walter J. Hickel until his move to the White House in 1969.

REAP AND WATER BANK PROGRAMS ABOLISHED

President Nixon has abolished the Water Bank Program and the Rural Environmental Assistance Program, (REAP) which were considered low priority. Orders were sent to state officials for immediate termination of both programs.

The administration ordered federal spending to be held to a level of \$250 billion for fiscal 1973. The REAP program was allotted \$225.5 million for this year to help farmers with water pollution and conservation projects on their land. Ten million dollars was awarded the Water Bank Program for preserving migratory water fowl wetlands.

The REAP program was originated in 1930. Under its policy, farmers collected 50 percent of the cost of conservation programs on their lands. The Water Bank program was created in 1971 to preserve waterfowl.

NEW EPA TRAINING GRANT RULES

The Environmental Protection Agency has issued a new set of proposed regulations relating to the administration of training grants and fellowships. The new EPA rules contain the following summary statement:

"Publication of these proposed rules is a continuation of an effort to coordinate and conform grant award and administration policies, procedures, and terms for the various EPA grant programs, to improve administration of these grant programs and to furnish applicants, grantees and the public with a more explicit statement of grant award and administrative requirements. Newly enacted legislation and changes in program emphasis have resulted in the following major revisions in the training grant and fellowship regulations:

- (a) Student support for training grants will be changed from traineeship to scholarships (tuition and fees only);
- (b) Special stipends will be established to provide additional support where needed to attract students to specific programs; and
- (c) A pilot fellowship program will be developed to promote attractiveness of state and local employment."

For further information on the new EPA training grant regulations, contact the EPA Office, 1735 Baltimore Avenue, Kansas City, Missouri 64108.

WATER FUNDS LAWSUIT

Senator Edmund S. Muskie, D-Maine, stated at a news conference that he wants the Senate Public Works Committee, or even Congress, to go to court to force full appropriation of funds in the 1972 Water Pollution Control Act.

Muskie said cities would want to participate in the court battle since they may encounter expensive penalties under the act unless water is cleaned by the deadline. Funds for the cities' water pollution control have been cut off.

Muskie said "That \$6 billion (impounded funds) also represents a priority that Congress set for this program, based on clearly expressed public demands. It represents a congressional and public insistence that the budgetary process reflect that priority." President Nixon had vetoed the measure but the veto was later overridden by Congress.

WATER AGENCIES, INC.

Senator Frank Moss, D-Utah, has proposed a Department of Natural Resources and Environment rather than the Nixon Administration's plan for a Department of Natural Resources. The difference between the two is that Moss would place environmental agencies into the new department.

The proposed department would include EPA, Water Quality Office, Solid Waste Office, Air Pollution Control Office, Pesticides Office and Radiation Office. Nixon's plan would isolate EPA from all others.

The Bureau of Reclamation, Office of Saline Water, Office of Water Resources Research, hydropower marketing agencies of the Interior Department, Soil Conservation Service, much of the Corps of Engineers, and the Water Resources Council are among water development agencies in Moss' proposal.

PROPOSED DRINKING WATER STANDARDS

Warren G. Magnuson, D-Wash., Chairman of the Senate Commerce Committee, submitted a proposal to create federal standards for drinking water and for the operation of water systems.

A study by the Environmental Protection Agency has shown that approximately 8 million people in the U.S. drink potentially dangerous water.

Chief conditions of the Safe Drinking Water Act will include: (1) funds to help states pay for drinking water programs; (2) an EPA survey of rural water supplies; and (3) authorization of citizen suits against violators of basic drinking water standards.

EPA ISSUES NEW WATER POLLUTION CONTROL STANDARDS

The Environmental Protection Agency has released a new set of water pollution control standards for 27 industries under the 1972 pollution control legislation.

According to the Federal Water Pollution Control Act Amendments of 1972, the standards are to be distributed within one year and must be based on the best available pollution control technology.

LASER BEAM ERADICATION

Dr. Ralph A. Scott, Jr., (formerly with the Corps of Engineers) received a patent on a laser beam method used to destroy plant life in rivers and lakes.

Dr. Scott signed a license permitting federal, state and local governments the right to use his method on a royalty-free basis.

Scott's invention permits a selective elimination of plant life in water as well as land. With his method, no chemicals are used or released so air and water pollution are avoided. The laser beam method wilts the plant immediately after the treatment and destroys it in 8-12 weeks.

MIT OFFERS PROFESSIONAL DEGREE - ENVIRONMENTAL ENGINEER

Beginning next June, the MIT School of Engineering will offer an interdisciplinary graduate study program in environmental engineering leading to the degree of Environmental Engineer.

The program is designed to prepare students for careers in government, industry and private practice where technical decision-making is integrated with environmental planning and management functions. In addition to intensive preparation in an environmentally-related area of engineering, students in the program will receive a background in relevant areas of social science, management and law.

The purpose of the new degree is to provide appropriate and distinct recognition and certification for a coordinated program of graduate study which is characterized by its breadth of scope and by its overriding concern with the interactions between technology and the environment.

The program will be directed by a standing interdepartmental committee composed of faculty from the various departments within the School of Engineering and from relevant areas other than engineering.

ENVIRONMENTAL QUALITY IMPROVING

The Council on Environmental Quality, in its third assessment of the nation's environment, says air quality is improving, while problems with water quality are increasing. The environmental clean-up cost for the past ten years was \$287 billion. Rural and urban land runoff received particular attention.

A report to the President refers to measurements showing improvement of air quality in urban areas between 1969 and 1970.

The report states: "The data on water pollution, however, are less encouraging. Among other things, they indicate that land, as opposed to discharges from cities and factories, has a much greater impact on water pollution than we realized. In all types of river basins, the concentration of nutrients, which can eutrophy our lakes, is increasing.

"These data indicate that while we carry on our major efforts to clean up pollution from municipal and industrial sources, we must increasingly turn our attention to land runoff--of nutrients, fertilizers, pesticides, organic materials, and the soil particles that often transport the others."

In discussing data from Enviro Control, Inc., a consulting firm, the report states that runoff sources (such as farms, feedlots and possibly urban runoff) appear to overshadow point sources of organic and nutrient pollution such as industrial and municipal discharges. However, it is

noted that these runoff trends may also be caused by other factors such as scouring of pollutants from river beds by high flow. Recent emphasis on runoff sources seems to say, in essence, that even if all discharges of municipal and industrial pollution were stopped, many streams would still be polluted because of discharges from runoff sources.

GAO URGES CHANGES ON 160-ACRE LIMIT

The Government Accounting Office has urged Congress to review the 160-acre limitation under reclamation law and determine its justification. The main objective of the 160-acre limitation, as spelled out in the Reclamation Act of 1902, was to discourage large private land holdings and to encourage family-size farms.

If the law is justified, Congress should provide new legislation to prevent large landowners from evading the limit on how much land in single ownership can receive irrigation water from a federal reclamation project. If the law is not justified, Congress should stipulate what the limitation should be, and make certain that landowners receiving water for excess lands pay the total cost of the water.

The basis for GAO's recommendations was a study of the Central Valley Project in California where landowners will receive \$1.5 billion subsidization over the project's 83-year repayment period.

"WHAT ABOUT WATER?"

"What About Water?" is the title of a 57-page publication by the House Committee on Science and Astronautics. The guide should help water authorities identify individuals involved in water research.

The booklet mentions principal government agencies, some state programs and a few private organizations engaged in water research.

The staff admits that the report is very general in nature and "does not attempt to assess whether current research efforts are adequate to obtain the most efficient utilization of this crucial resource which makes life possible on earth."

To obtain a copy, write: Committee on Science and Astronautics; House of Representatives; Washington, D. C.

CONFERENCES

PECORA CONFERENCE ON WATER AT PRINCETON

A two-day conference at Princeton University on "Water and the Environmental Crunch" is planned for April 26-27, 1973.

The conference is dedicated to the memory of William T. Pecora, who served most recently as Undersecretary of the Interior, and whose overall views on the environment won him praise from all sides. Four panels will be presented on: (1) Environmental Aspects; (2) Industry at Grips with the Water Problem; (3) Research in the Area; and (4) Planning for the Future.

The conference is a cooperative effort between Princeton's Water Resources Program and the OWRR, Delaware Water Resources Center and Rutgers Water Resources Research Institute. For further information contact: The Princeton University Conference; New South; Princeton University; Princeton, New Jersey 08540. Telephone (609) 452-3372.

WATER RESOURCES SYSTEMS - SHORT COURSE

Case Western Reserve University will host a one-week short course on "Hierarchical Approach in the Planning, Operation and Management of Water Resources Systems." The conference, to be held May 21-25, 1973, is designed for engineers and public officials concerned with the planning, operation and management of regional water resources systems.

The purpose is to present a comprehensive survey of the applications of the hierarchical approach to large complex water resources systems. Discussion will center on the applications of decomposition and multi-level optimization techniques to multiobjective functions in water resources; multiregional conjunctive use of ground and surface water resources; modeling and identification in water resources; regional management of complex multiple purpose water resource and hydrologic systems; regional water quality control and management; flood control analysis; and recent research results and applications in current literature.

For further information, write: Mrs. M. E. Mullins; Secretary to Dr. Y. Y. Haimes; Systems Research Center; Case Western Reserve University; Cleveland, Ohio 44106.

CASE STUDIES IN WATER RESOURCES PLANNING

A special summer program entitled "Case Studies in Water Resources Planning" will be held at MIT from June 25-June 29, 1973.

This program will use the case study approach to explore the systematic formulation and solution of several real problems in water resources.

For further information write to: Director of the Summer Session; Room E19-356, MIT; Cambridge, Massachusetts 02139.

WESTERN RESOURCES CONFERENCE

The University of Colorado at Boulder will host the 15th Annual Western Resources Conference on "Salinity: A Critical Review of Causes and Control" from July 9-11, 1973. The Conference, through expert speakers and workshop groups, will assess the state-of-the-art of diagnosing causes and designing efficient controls over growing salinity in water supplies.

For further information, write: Bureau of Conferences and Institutes; Division of Continuing Education; University of Colorado, Boulder, Colorado 80302.

INTERDISCIPLINARY WATER RESOURCES CONFERENCE

The American Society of Civil Engineers has scheduled an Interdisciplinary Conference on Water Resource Analysis in Boulder, Colorado, on June 19-22, 1973. The conference will consist of two panel sessions and six major papers on the interdisciplinary aspects of water resources planning and management. The six papers are: Interdisciplinary Studies of Large Reservoirs in Africa; Interdisciplinary Modeling of Limnological Aspects of the Great Lakes for Planning Purposes; Interdisciplinary Approach to Geothermal Development; North Atlantic Regional Water Resources Study; Corps Urban Planning in St. Louis, Maline Creek, An Interdisciplinary Effort; Interdisciplinary Research on Water Quality Management.

Anyone interested in preparing a formal discussion of one of the papers should contact: Mr. Leo R. Beard; Center for Research in Water Resources; The University of Texas; Route 4, Box 189; Austin, Texas 78757. Some financial support for travel is available for formal discussants.

Information for attending the conference can be obtained from the Bureau of Conferences and Institutes; University of Colorado, 130 Academy Building; 970 Aurora Avenue, Boulder, Colorado 80302.

ENGINEERING CONTROL OF INDUSTRIAL WASTE WATER

A short course on "Engineering Control of Industrial Waste Water" will be presented June 11-15, 1973 at Cornell University, Ithaca, New York.

The course is designed for engineers and scientists who are responsible for industrial wastewater control. It is intended to improve their ability both to produce wastewater effluents which will meet the increasingly severe limitations imposed by regulatory agencies on all effluents discharged to natural waters and to reclaim effluents for recycle.

Topics will include water pollution control legislation, regulations and standards; industrial wastewater disposal alternatives, including reclamation and recycle; biological and physical-chemical treatment process theory and application; synthesis and cost estimation of wastewater treatment systems; and solids disposal. On the last day the participants will use the presented material in developing a preliminary design for an industrial wastewater treatment plant.

For further information contact: Director of Continuing Education; Carpenter Hall; Cornell University; Ithaca, New York 14850.

RESEARCH REVIEW

PROJECT: Ecological Impact of Surface Water Impoundments in the Great Plains Area

PRINCIPAL INVESTIGATOR: Dr. C. Michael Cowan

In the North-central plains region of the United States one of the most important river systems west of the Missouri River is the Platte. The river bisects Nebraska eventually flowing into the Missouri River just south of Omaha. The Platte River is also one of the most important water resources in the region. The character of this river has been changed greatly in the last century, but changes in the past have provoked little controversy while those contemplated for the future are vigorously debated. Such was the case in 1970 when the U.S. Corps of Engineers suggested that a 125-square-mile reservoir be constructed on the Platte at a critical point between Lincoln and Omaha, Nebraska. During the ensuing arguments between those favoring and those opposing the construction, three things became apparent: (1) Not much was known about the changes in the environment which would result if the reservoir were built; (2) Much of the information that was available was conflicting; (3) There was no objective method available to predict what environmental fluctuations could be expected as a result of the project or, for that matter, if the project was even environmentally feasible. It was on the basis of these criteria that this project was organized.

A technique was developed which offers an objective approach to environmental analysis and an alternative to the more subjective cost-benefit ratio.

The philosophy behind the method is founded on statements of relative truth while the actual technique is based on the probabilities of occurrence of resources and the desires or demands for the resources.

The application of the method to the Platte Dam using the categories of Agriculture, Recreation, Bird Habitat, Mammal Habitat and Fish Habitat indicated that, from the standpoint of the aforementioned categories

the Platte Dam would have been feasible assuming optimum water levels were maintained. The Agriculture and Mammal Habitat categories scored in favor of the present river system, while the other three categories favored the lake.

For those interested in learning more about the details of this study, copies of the Project Completion Report may be obtained from the Nebraska Water Resources Research Institute; 472-3307.

PUBLICATIONS

1. "Water Quality Simulation Model for the Upper Wabash River," J. M. Bell, Purdue University, January 1973.
2. "Operating Policies for the Upper Wabash Surface Water System," T.P. Chang, G. H. Toebes, December 1972, Purdue University.
3. "Revegetation Augmentation by Reuse of Treated Active Surface Mine Drainage," F. J. Zaval, J. D. Robins, for EPA, November 1972.
4. "Evaluation of Planning for Wetlands Drainage Projects in the Southeastern Coastal Plains," M. E. Rulison, C. B. Martin, Research Triangle Institute, December 1972.
5. "Correlated Studies of Vancouver Lake--Water Quality Predictions Study," S. K. Bhagat, W. H. Funk, D. L. Johnstone, R. S. Kerr Research Center, November 1972.
6. "Ammonia Removal in a Physical-Chemical Wastewater Treatment Process," R. A. Barnes, P. F. Atkins, Jr., D. A. Scherger, for EPA, November 1972.
7. "A Pressure Sewer System Demonstration," I.G. Carcich, L. J. Hetling, R.P. Farrell, for EPA, November 1972.
8. "Selected Urban Storm Water Runoff Abstracts July 1971-June 1972," Mrs. D. A. Sandoski, for EPA, December 1972.
9. "Investigation of Factors Relative to Ground Water Recharge in Idaho," University of Idaho, R. E. Williams, A. T. Wallace, June 1972.
10. "Legal Aspects of Water Salvage," R. L. Dewsnap, National Water Commission, September 1971.
11. "Extending Utility of Non-Urban Water Supplies," J. M. Bagley, Utah State University Foundation, February 1972.
12. "Administrative Allocation of Water," E. W. Clyde, National Water Commission, July 1971.

13. "Future Alternatives Affecting the Agricultural Demand for Water and Land; The Effects of Soy Protein Meats Nitrogen Fertilizer Restrictions on Future Water and Land Use," H. C. Madsen, E. O. Heady, S. H. Hargrove, K. J. Nicol, Iowa State University, June 1972.
14. "Interbasin Water Transfers a Political and Institutional Analysis," D. E. Mann, for the National Water Commission, March 1972.
15. "Courts and Water the Role of the Judicial Process," Environmental Law Institute, for the National Water Commission, July 1972.
16. "Precipitation Modification," J. D. Lackner, National Water Commission, July 1971.
17. "Groundwater Law, Management and Administration," C.E. Corker, National Water Commission, October 1971.
18. "Potential Technological Advances and Their Impact on Anticipated Water Requirements," National Water Commission, June 1971.
19. "The Water Resources Council, National Water Commission, May 1972.
20. "Acreage Limitation in the Federal Reclamation Program," H. J. Hogan, National Water Commission, 1972.
21. "Regional Economic Development - The Role of Water," W. C. Lewis, Utah State University Foundation, October 1971.
22. "Public Regulation of Water Quality in the United States," N.W. Hines, National Water Commission, December 1971.
23. "Pricing and Efficiency in Water Resource Management," R. K. Davis, George Washington University, December 1971.
24. "Environmental Quality and Water Development," Vol. I, C. R. Goldman, University of California, 1971.
25. "Water Resource Planning," National Water Commission, June 1972.
26. "The Water Use and Management Aspects of Steam Electric Power Generation," National Water Commission, May 1972.
27. "Recycling and Ecosystem Response: Special Study 8D Recycling and Ecosystem Response to Water Manipulation," Michigan State University, February 1972.
28. "Groundwater Management in Development of a National Policy on Water," L. E. Mack, National Water Commission, January 1971.

29. "Population Growth in Communities in Relation to Water Resources Policy," RivKin/Carson, Inc., October 1971 for the National Water Commission.
30. "Institutions for Water Planning. Institutional Arrangement: River Basin Commissions, Interagency Committee, and Ad Hoc Coordinating Committees, G. W. Hart, September 1971.
31. "Federal Decisionmaking for Water Resource Development, Impact of Alternative Federal Decisionmaking Structures for Water Resource Development," for the National Water Commission, December 1971.
32. "Economic Value of Water, Concepts and Empirical Estimates," Colorado State University, March 1972.
33. "Economic Value of Water in a Systems Context," Washington State University, May 1972.
34. "Legal and Governmental Structures for Water Management in Metropolitan Areas," O. E. Delogu, University of Maine, July 1971.
35. "Intergovernmental Relations in Water Resources Activities," Wendell and Schwan, 1972.
36. "Agricultural Water Demands Future Water and Land Use: Effects of Selected Public Agricultural and Irrigation Policies on Water Demand and Land Use," E. O. Heady, Iowa State University, November 1971.
37. "Institutional Arrangements for Water Resource Development," V. Ostrom, Indiana University, December 1971.
38. "Major Interbasin Transfers Legal Aspects-Legal Study No. 7," R. W. Johnson, National Water Commission, July 1971.
39. "Market Transfers of Water Rights: Toward an Improved Market in Water Resources," C. J. Meyers, National Water Commission, July 1971.
40. "A Historical and Functional Analysis of the Appropriation System," C. J. Meyers, National Water Commission, July 1971.
41. "Federal-State Relations In Water Law," F. J. Trelease, National Water Commission, September 1971.
42. "Forecasting Water Demands," National Water Commission, November 1971.
43. "Wastewater Reuse," J. Gavis, July 1971.
44. "Water Pollution Control in the United States," A Panel Report, for the National Water Commission, November 1971.

45. "Bibliography of Livestock Waste Management," J. R. Miner, D. Bundy, G. Christenbury, R. S. Kerr Environmental Research Laboratory, for EPA, December 1972.
46. "A Case Study of the Hydrogeologic Conditions in the Outcrop Area of an Aquifer," D. M. Keady, E. E. Russell, Mississippi State University, 1972.
47. "The Use of Moments for Mapping Vertical Variability of Cretaceous Aquifers in Mississippi" D. M. Keady, Mississippi State University, 1971.
48. "Rapid Detection System for Organophosphates and Carbamate Insecticides in Water," Midwest Research Institute, for EPA, August 1972.
49. "Hydrogen Peroxide Control of Sewage Hydrogen Sulfide," FMC Corporation.
50. "Hydrogen Peroxide for Industrial Pollution Control," W. H. Kibbell, C. W. Raleigh, J. A. Shepherd, FMC Corporation, May 1972.
51. "Eighth Annual Report, Rhode Island Water Resources Center," October 1972.
52. "Survival of Enteric Bacteria and Viruses in Oxidation Pond Systems," Research Report #6 Water Resource Research Center, University of New Hampshire, October 1972.
53. "Crusting and Swelling Effects on Water Infiltration into Soil," D. L. Nofziger, D. Swartzendruber, L. R. Ahuja, Purdue University, January 1973.
54. "Regional Development of Public Water Supply Systems," J. M. Higgins, D. A. Okun, University of North Carolina at Chapel Hill, September 1972.
55. "Further Characterization of the Water Quality of the New Hope and Lower Haw Rivers including Benthic Macroinvertebrate Diversity and Trace Metal Analyses," C. M. Weiss, T. W. Yocum, J. E. Minogue, University of North Carolina at Chapel Hill, November 1972.
56. "An Investigation of Curricula, Materials and Methodology for Training Operators of Wastewater Treatment Plants," J. C. Brown, University of North Carolina at Chapel Hill, December 1972.
57. "Mathematical Models of Water Quality Parameters for Rivers and Estuaries," R. W. Hann, Jr., P. J. Young, Texas A&M University, October 1972.
58. "Proceedings Irrigation Short Course," University of Nebraska, January 29-30, 1973.

59. "A Feasibility Demonstration of an Aerial Surveillance Spill Prevention System," R. I. Welch, A. D. Marmelstein, P. M. Maughan, for EPA, January 1972.
60. "A User's Manual for Three-Dimensional Heated Surface Discharge Computations," K. D. Stolzenbach, E. E. Adams, D. R. F. Harleman, for EPA, December 1972.
61. "The Regional Planning Concept," E. A. Imhoff, University of Nebraska, January 1973.
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63. "Hollow Fiber Technology for Advanced Waste Treatment," J. D. Bashaw, J. K. Lawson, T. A. Orofino, for EPA, December 1972.
64. "Rehabilitation of a Brine-Polluted Aquifer," J. S. Fryberger, for EPA, December 1972.
65. "Removal of Dissolved Contaminants from Mine Drainage," Dr. J. D. Miller, for EPA, December 1972.
66. "Water Resources Review for Streamflow & Groundwater Conditions," Jan. 1973, USGS.
67. "Calcium Phosphate Precipitation in Wastewater Treatment," A. B. Menar, D. Jenkins for EPA, December 1972.
68. "Oily Waste Disposal by Soil Cultivation Process," C. B. Kincannon, for EPA, December 1972.
69. "Continuation of Studies on the Hydrology of Ponds and Small Lakes," E. R. Allred, P. W. Manson, G. M. Schwartz, P. Golany, J. W. Reinke, Agricultural Experiment Station, University of Minnesota, 1971.
70. "Activities in Environmental Science & Technology," Midwest Research Institute.
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INQUIRIES

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