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Water Current

Volume 7 Number 5

May 1975

ANNOUNCEMENT

Dr. Duane Acker, Vice Chancellor for the Institute of Agriculture and Natural Resources, is recommending to the Board of Regents the appointment of Dr. M. Wayne Hall as Director of the Nebraska Water Resources Research Institute. Dr. Hall was among the list of six top candidates submitted by the search committee. There will be no public announcement until about one week prior to the June 21 meeting of the Board of Regents when the agenda is made public. It is hoped that Dr. Hall can be on board by the middle of July.

FROM THE DESK OF THE DIRECTOR . . .

by

William E. Splinter, Acting Director

As noted in the above announcement, Dr. Wayne Hall will be recommended to the Board of Regents for the position of Director, Nebraska Water Resources Research Institute. Several of you have had the opportunity to meet with Dr. Hall, but for those who have not, some background material is presented here by way of introduction.

Dr. Hall is originally from near Griffin, Georgia. He attended Vanderbilt University, and in addition to obtaining a degree in Civil Engineering, he lettered in football. He served three years with the U.S. Army Corps of Engineers in Germany from 1956 to 1959.

Dr. Hall did his graduate work at the University of Illinois in Sanitary Engineering, receiving his M.S. in 1963 and his Ph.D. in 1968. He served as Instructor for one year at the University of Illinois and became Assistant Professor of Civil Engineering at the University of Maine, Orono in 1967. He was promoted to Associate Professor in 1970 and in 1972 was appointed Director of the University's Environmental Studies Center and Director of the Land and Water Resources Institute.

Dr. Hall has taught graduate and undergraduate courses in environmental and sanitary engineering. His areas of research have included eutrophication, wastewater treatment, land and water resources management and air pollution. He is a member of Sigma Xi (science honorary), the American Society of Civil Engineers, Association of Environmental Engineering Professors and the American Society of Limnology and Oceanography. He has sponsored a number of professional conferences and has served on numerous committees and boards. He is presently Executive Secretary for the Universities Council on Water Resources (UCOWR).

Everyone connected with the selection process for the new Director is pleased with the prospect of having Dr. Hall assume the Directorship. As Acting Director, I am more than pleased that someone may soon be on board to continue and to further develop one of the top water resources programs in the United States.

REGIONAL NEWS

FARMERS AND IRRIGATORS THREATENED BY POSSIBLE EXTENSION OF FEDERAL AUTHORITY FOR DISPOSAL OF DREDGED OR FILL MATERIAL

A recent news service release from the Department of Agricultural Communications at UNL warns that the possibility looms that a farmer would be required to get a federal permit to enlarge a farm stock pond, deepen an irrigation ditch or plow a field, if federal authority for disposal of dredged or fill materials is expanded under the Federal Water Pollution Control Act (FWPCA).

State officials, heads of water agencies and commissions and University of Nebraska-Lincoln water experts have joined in underlining the crucial significance of proposed rules and regulations for the U.S. Army Corps of Engineers to regulate disposal of dredged or fill material in "waters of the United States."

The term "waters of the United States" has not been defined by the Congress or the courts. However, the Corps of Engineers has been ordered this spring by the U.S. District Court to act within the concept used by the Environmental Protection Agency (EPA) in carrying out its discharge permit program under a section of the FWPCA, or so-called Clean Waters Act.

EPA regulations define "waters of the United States" as including not only "all navigable waters of the U.S. and their tributaries," already a controversial subject in Nebraska involving the status of the Platte River, but also all interstate rivers. Going far beyond the present responsibility and authority of the Corps relating to present or historically navigable rivers, however, is the EPA definition which specified "all lakes, rivers and streams within a state which are used by interstate travelers for recreation or other purposes, or which are used by interstate commerce, including agriculture."

Dayle E. Williamson, Executive Secretary of the Nebraska Natural Resources Commission, warned that "if the broad interpretation of the waters and lands affected is adopted, permits may be required for an enormous range of activities." Officials and leaders in the water field have urged a broad spectrum of farm organizations, water-related organizations and individuals to furnish comments to the Army Corps of Engineers by the deadline of June 6, 1975.

The Corps is offering four alternative regulations with varying scopes of application and inviting public comment to aid in adoption of a system of regulations to implement the court order.

Alternative 1, the broadest of the four, is favored by EPA and in essence extends federal jurisdiction over the disposal of dredged or fill material to virtually every coastal and inland artificial or natural body of water.

Alternative 2 includes a more limited definition of "waters of the U.S." Jurisdiction over inland waters would be limited to navigable waters of the U.S. and their primary tributaries up to their headwaters. (Under the present Corps policy, this would include the Platte River in Nebraska.) Under this alternative, a permit would not be required for the disposal of less than 100 cubic yards of dredged or fill material.

Alternative 3 adopts the same broad definition as Alternative 1, but permits would be required only for disposal of dredged or fill material in navigable waters. Applications for permits would be processed at the federal level only if there are no objections from appropriate state agencies. The state's position would be weighed heavily unless there is an "overriding national interest" to the contrary.

Alternative 4 is favored by the Corps of Engineers. It adopts the limited definition of waters in Alternative 2, and the initial state certification and authorization requirements of Alternative 3 prior to any federal processing of a permit to dispose of dredged or fill material in other than navigable waters.

Adoption of any of the alternatives, state officials feel, will result in much red tape and an inevitable delay in securing of permits--but they generally consider Alternative 4 as "the lesser evil."

As a general rule, according to the Federal Register, the average Department of Army permit requires four months to process if a routine, noncontroversial activity is involved. This time frame includes a 30-day public notice period in which comments are invited from a large number of state and federal agencies, including EPA and the U.S. Fish and Wildlife Service.

The time period is further increased--perhaps to as much as a year or more--if a public hearing is held as required under the Clean Waters Act and/or an environmental impact statement is prepared.

Comments on the proposed alternative regulations should be directed, in triplicate, to the Office of the Chief of Engineers, Department of the Army, Attention: DAEN-CWO-N, Washington, D.C. 20314; and Kenneth Mackenthun, Acting Deputy Administrator for Water Planning Standards, Office of Water and Hazardous Materials (WH-451), EPA, 401 "M" Street, S.W., Washington, D.C. 20460. Respondents are also urged to send a copy of their letters to EPA, the Corps of Engineers and to members of the Nebraska congressional delegation.

The Corps of Engineers stressed that "only comments which pertain to changes in the regulations will be considered." State officials advise persons or organizations responding with comments to clearly state their preference for one of the four alternatives, with reasons or documentation.

Organizations wishing a copy of the Federal Register containing the proposed Corps of Engineers rules are asked to contact the Nebraska Natural Resources Commission, 7th Floor, Terminal Building, Lincoln, Nebraska 68508.

FEDERAL HIGHLIGHTS

WATER RESEARCH AND EDUCATION ADVISORY COMMITTEE ESTABLISHED

The Secretary of the Interior and the President of the National Association of State Universities and Land Grant Colleges (NASULGC) recently signed an agreement to establish a joint Water Research and Education Advisory Committee. Formation of the new committee is expected to provide an important means to enhance cooperative state and federal planning of water resources research programs.

The committee will provide continuing advice to the Secretary of Interior and to the President of NASULGC and will develop recommendations for policy with respect to planning, evaluating, coordinating and supporting long-range water research programs; defining pressing water resource problem areas; establishing water research priorities; and delineating the appropriate areas of responsibility for federal and state agencies in carrying out water research and training programs.

The committee will be headed by co-chairmen appointed by the Secretary of Interior and the President of NASULGC and will include an equal number of representatives of USDI and NASULGC. Initial membership of the committee will be as follows:

USDI (7)

Assistant Secretary, Land and Water Resources (Co-Chairman)

Commissioner, Bureau of Reclamation

Director, Office of Water Research and Technology (OWRT)

Director, Bureau of Land Management

Director, Office of Land Use and Water Planning

Director, U. S. Geological Survey

Director, Water Resources Council

NASULGC (7)

4 Representatives of NASULGC--Chairman of the NASULGC Water Committee (Co-Chairman) and 3 others designated by NASULGC to include a President or Chancellor of a significant water science university, Vice President or Dean of Research or Graduate Studies of a significant water sciences university

Chairman of the National Association of Water Institute Directors (NAWID)

2 Representatives of the Universities Council on Water Resources (UCOWR)--Chairman and one other representative.

EPA STRATEGY PAPER LISTS 1976 PRIORITIES

A recent draft strategy paper published by the Environmental Protection Agency (EPA) lists program priorities for fiscal year 1976. These included the construction grants program and areawide and state planning.

Emphasis in the permit program is expected to shift from issuance of permits to enforcement and compliance monitoring. New emphasis during fiscal year 1976 will be given to areawide waste treatment and nonpoint source programs.

According to the EPA paper, new efforts will include the development of a strategy for controlling nonpoint pollution sources. Runoff problems will be examined including storm and combined sewers and emphasis will be placed on noncapital preventive methods. EPA also anticipates an effort to decentralize national water quality management responsibility to states. States will also assume increased responsibility for the permit program, construction grants, enforcement and monitoring.

Regarding the 1985 goal of zero discharge of pollutants in water, EPA felt this could not be implemented under the existing act. In fact, EPA noted, full achievement of the 1985 requirements may not be feasible or environmentally desirable.

CONFERENCES

AWRA SYMPOSIUM ANNOUNCED

The American Water Resources Association is sponsoring a Symposium on "Urbanization and Water Quality Control" June 30 to July 2, 1975 to be held at Rutgers University in New Brunswick, New Jersey.

The subject of the symposium is the relationship of urban runoff and unrecorded sources to water pollution control programs. Topics will include: the environmental quality objective; sources of pollution--urban runoff and nonpoint sources; technology of data gathering, analysis and treatment; alternative means of water pollution control; land use planning; water pollution analysis and planning under federal legislation.

Conference registration is \$33 in advance through June 16 and \$40 thereafter for three days of the conference. Symposium proceedings will be available approximately November 30, 1975 at a cost of \$10 per copy.

For additional information and registration forms contact: Gen. William Whipple, Jr., Water Resources Research Institute, Box 231, Rutgers University, New Brunswick, New Jersey 08903. Telephone (201) 828-2808.

ENGINEERING SUMMER CONFERENCE

The University of Michigan announces a 1975 Engineering Summer Conference on "Industrial and Municipal Water Pollution Control--Physicochemical Processes" to be held August 18-22, 1975. The fee for the course is \$300.

The course will consist of an in-depth analysis of conventional and advanced physicochemical processes for treatment and reclamation of industrial and municipal wastewaters. Process concepts, specific applications and economics will also be covered.

For further information contact: Walter J. Weber, Jr., Chairman, Continuing Engineering Education, 300 Chrysler Center - North Campus, University of Michigan, Ann Arbor, Michigan 48105.

CALL FOR PAPERS - 1976 SPECIALTY CONFERENCE

The 1976 Specialty Conference will be held at the University of Ottawa July 21-23, 1976 in cooperation with Environment Canada, University of Ottawa Civil Engineering Department, and the Canadian Society of Civil Engineers Hydrotechnical Division. The theme of the conference will be "Environmental Aspects of Irrigation and Drainage." The conference will be held just prior to the finals of the 1976 Olympics at Montreal (July 14 - August 1)

which is about 100 miles from Ottawa. Dormitory and dining facilities will be provided by the University of Ottawa.

Papers on the effects of irrigation and drainage on ecology, water quantity and quality, erosion and sedimentation, reservoir management, flood control, water requirements to maintain environmental quality, and the state-of-the-art will be considered. Particular emphasis will be given to USA-Canada water requirement problems associated with water shared by the two countries, or rivers that flow from one country to the other.

Anyone wishing to prepare a paper should contact Peter J. Reynolds, Environment Canada, Inland Waters Directorate, Ottawa, Ontario, K1A 0E7, before June 11, 1975. Authors are asked to send a tentative title, authors, complete mailing address of the person who will handle correspondence, an advance summary not to exceed 300 words if possible, and indicate whether or not the paper will relate to the theme. The final copy of approved papers will be due in Ottawa April 2, 1976 which will allow discussions to be considered.

WPCF 48th ANNUAL CONFERENCE

The Water Pollution Control Federation (WPCF) is holding its 48th Annual Conference in Miami Beach, Florida October 5-10, 1975. Topics to be discussed at the conference include: research symposia (six sessions of scientific and engineering papers on all aspects of wastewater treatment and effects of water pollution); industrial waste treatment; economic impact of PL 92-500; land treatment and disposal; plant operations; international water pollution control; nonpoint source pollution; water reuse; solids handling; and many others. A detailed conference program will be available July 1.

Conference registration is \$50 for WPCF members and \$60 for non-members (does not include banquet or social program). For further information on the conference, contact WPCF Headquarters, 3900 Wisconsin Avenue, Washington, D. C. 20016.

20th ANNUAL MIDWEST GROUNDWATER CONFERENCE

The University of Kansas and the U.S. Geological Survey, Kansas District, announce the 20th Annual Midwest Groundwater Conference to be held October 29-31, 1975 in Kansas City, Kansas. The conference has no formal structure and no officers, but meets each year at the invitation of one Midwest state.

A call for papers is extended on the state-of-the-art themes. Emphasis of the program is planned on feasibility, especially the economic feasibility of models (theory and application), water management (efficiency, legal, political and economic) and water augmentation (importation of water, artificial recharge and weather modification). Please send titles, abstracts and suggestions by July 15, 1975 to Frank C. Foley, Kansas Geological Survey, Lawrence, Kansas 66044. Program and registration forms for the conference will be mailed during September.

PUBLICATIONS

IWRA PUBLICATIONS AVAILABLE

The International Water Resources Association (IWRA) announces the availability of the following publications:

Proceedings of First World Congress on Water Resources - A collection of papers on worldwide problems relating to water resources activities in various countries, administrative and technical coordination in international cooperation, innovative approaches for planning and management, new technology for solving water problems, and special sessions on systems analysis, thermal pollution, water pollution and post-construction assessment. The theme is water for the human environment.

- Vol. I Congress Papers
- Vol. II Country Reports
- Vol. III Technical Sessions
- Vol. IV Special Sessions

Price for each volume is \$10 for members and \$12.50 for non-members. A complete set of four volumes is \$32 for members and \$44 for non-members.

Proceedings of the International Symposium on Water Resources Instrumentation - A collection of more than 75 papers on measuring and sensing methods used in water resources and on techniques for data acquisition and analysis.*

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|---------|-------------------------------|----------------|
| Vol. I | Measuring and Sensing Methods | Price: \$22.50 |
| Vol. II | Data Acquisition and Analysis | Price: \$22.50 |
| | Complete Set (hard bound) | Price: \$37.50 |

Selected Works in Water Resources - A collection of 22 outstanding papers on various multidisciplinary aspects of water resources published during the past decade (hard-bound). Price is \$12.

These publications may be ordered from: IWRA Business Office, 425 Illinois Building, 113 North Neil Street, Champaign, Illinois 61820. Payment must accompany order.

*This item may also be purchased directly from: Ann Arbor Science Publishers, Inc., Post Office Box 1425, Ann Arbor, Michigan 48106.

RESEARCH REVIEW

Project Title: Pollution of Surface Irrigation Water by Plant Pathogenic Organisms

Principal Investigator: James R. Steadman, Associate Professor
Department of Plant Pathology
University of Nebraska-Lincoln

The critical need for irrigation water has placed considerable pressure on expansion of irrigated acreage and on water reuse. The inevitable consequence of reuse is that water, after passing through fields with diseased plants or infested soil and debris, may contain and thus disseminate phytopathogenic organisms.

Methods for sampling irrigation water within an irrigation project and evidence for the dissemination of three different groups of phytopathogens were developed in this research project. The three types of organisms detected by systematic sampling in the North Platte Project were: (1) a fungal pathogen infecting bean stems and foliage (Whetzelinia (Sclerotinia) sclerotiorum); (2) a bacterial pathogen infecting bean foliage (Xanthomonas phaseoli); and (3) a group of nematodes infecting sugar beet and other crop roots (Heterodera sp.) as well as other plant parasitic nematodes.

From 252 water samples collected during three growing seasons, 28 percent contained one or more viable sclerotia (resting structures) of the white mold fungus. There were two main periods of sclerotial distribution. In 1972 and 1973 the greatest recovery of these structures was in August. In 1974 it was primarily in July. This pattern correlates with severity of infection of the bean crop as well as irrigation timing and frequency. Sclerotia formed on diseased plants are returned to the soil by harvesting procedures. Sclerotia can survive in soil for at least three years, in dry storage for 12 years, and in flowing water for 10-21 days. The persistence of these structures explains their wide distribution in main canals, ditches, runoff from corn fields, runoff from bean fields and reuse ponds.

Evidence for common blight bacterial contamination of water was found in 22 percent of 137 water samples collected from 1972-1974. In contrast to S. sclerotiorum, X. phaseoli was only detected in runoff or ditches receiving runoff from common blight-infected bean fields and, in one instance, in a reuse system. Limited movement of this organism may be explained simply by the poor survival of the bacterium in water. Irrigation of beans with contaminated water can result in both common blight and white mold diseases.

Numerous nematode species including some plant pathogens were found throughout the waterways of the North Platte Project in Nebraska. The nematode which causes major problems in the valley, however, was found infrequently.

Since sugar beets are irrigated earlier than our sampling began, dissemination of cysts of this nematode could occur in May or early June. Results from field monitoring indicate that soil fumigation with 1, 3-dichloropropene can significantly reduce nematode levels (stylet and non-stylet types) in irrigation water.

Sedimentation in a settling basin was not efficient or practical as a method of minimizing organismal (particularly bacterial) pollution. Use of cleaners which screen debris from headwater sources in combination with a method such as chlorination offers promise for pollution abatement. Dissemination of phytopathogenic organisms in irrigation reuse systems as well as agricultural land runoff should be considered in irrigation planning and system designs.

QUESTIONS AND INQUIRIES

Newsletter items and inquiries should be sent to: Editor, Nebraska Water Resources Research Institute, 212 Agricultural Engineering Building 7R, East Campus, University of Nebraska, Lincoln, Nebraska 68503; or telephone (402) 472-3307.

NEWSLETTER ITEMS SOLICITED

The Water Current Newsletter will publish, without charge, announcements, programs for upcoming conferences, employment opportunities or other newsworthy items on hydrology, water resources or related topics. To insure timely publication, submit items before the 25th of every month.

PUBLICATIONS RECEIVED BY THE INSTITUTE

NWRRI LIBRARY

1. Modelling of Plant Growth for Yield Prediction, W. E. Splinter, Ag. Engr. Department, University of Nebraska, Lincoln, NE, 1974.
2. Land Use Forms and the Environment - An Executive Summary, Brian J. L. Berry, Office of Research and Development, U.S. Environmental Protection Agency, Washington, D.C., March 1973.
3. Evaluation of Alternative Methods for Financing Municipal Waste Treatment Works, R. J. deLucia, L. M. Koppel, D. F. Luecke, S. J. Robinson, P. H. Schafer, D. V. Smith, J. J. Wagner, Office of Research and Development, U.S. Environmental Protection Agency, Washington, D.C., March 1975.
4. This Land is Your Land - Water Supply, Volume III, Water Resources Management Alternatives for the Omaha - Council Bluffs Area, U.S. Army Corps of Engineers, Omaha District, Regional Planning Branch, Omaha, NE.
5. Proceedings of the Symposium on Water Policies on U.S. Irrigated Agriculture: Are Increased Acreages Needed to Meet Domestic or World Needs?, Victor A. Koelzer, Environmental Resources Center, Colorado State University, Fort Collins, Colorado, March 1975.
6. Evaluation Report of the Training Program on Transfer of Technology--- Training of Government Personnel in the Application of the Principles, Standards, and Procedures for Planning of the Water Resources Council; Dr. Douglas D. Sjogren, Robert D. Wittman, Environmental Resources Center Colorado State University, Fort Collins, Colorado, December 1974.
7. Manual for Training in the Application of Principles and Standards, Henry P. Caulfield, Jr., Harry A. Steele, Sam H. Johnson, III, Environmental Resources Center, Colorado State University, Ft. Collins, Colorado, 1974.
8. Groundwater Geology of Banner County, Nebraska, Frank A. Smith, Vernon L. Souders, Nebraska Water Survey Paper Number 39, Conservation and Survey Division, Inst. of Ag. and Natural Resources, Univ. of Nebraska-Lincoln, March 1975.
9. Water Resources Data for Nebraska - Part 1, Surface Water Records, U.S. Department of the Interior, Geological Survey, 1973.
10. Water Reuse - A Bibliography, Volume 3, Water Resources Scientific Information Center, Office of Water Research and Technology, U.S. Dept. of the Interior, Washington, D.C., March 1975.
11. Modeling Dynamics of Biological and Chemical Components of Aquatic Ecosystems, Ray R. Lassiter, National Environmental Research Center, Office of Research and Development, U.S. Environmental Protection Agency, Corvallis, Oregon May 1975.

13. Characterization of Fruit and Vegetable Processing Wastewaters. Michael R. Soderquist, Water Resources Research Institute, Oregon State University, Corvallis, Oregon, January 31, 1975.
14. Economic Impact of Public Investments in Small-Boat Facilities and State Parks in the Lower Umpqua River Area of Douglas County, Oregon, Wilson E. Schmisser, Russell C. Youmans, William Boodt, Water Resources Research Institute, Oregon State University, Corvallis, Oregon, March 1975.
15. Handbook of Radiochemical Analytical Methods, Frederick B. Johns, Editor, National Environmental Research Center, Office of Research and Development, U.S. Environmental Protection Agency, Las Vegas, Nevada, February 1975.
16. Effects of Mirex and Methoxychlor on Striped Mullet, Mugil cephalus L., Jong H. Lee, Colin E. Nash, Joseph R. Sylvester, National Environmental Research Center, Office of Research and Development, U.S. Environmental Protection Agency, Corvallis, Oregon, May 1975.
17. Suspended Solids Monitor, John W. Liskowitz, Gerald J. Franey, Joseph Tarczynski, National Environmental Research Center, Office of Research and Development, U.S. Environmental Protection Agency, Cincinnati, Ohio, April 1975.
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20. This land is your land, Recreation - Volume IV, Water Resources Management Alternatives for the Omaha-Council Bluffs Area, U.S. Army Corps of Engineers, Regional Planning Branch, Omaha District, 215 North 17th Street, Omaha, Nebraska 68102.
21. Competition in the U.S. Energy Industry, Thomas D. Duchesneau, Ballinger Publishing Company, Cambridge, Massachusetts, 1975.
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25. Stochastic Variations in Water Quality Parameters, Dr. Robert C. Ahlert, New Jersey Water Resources Research Institute, Rutgers University, The State University of New Jersey, February 1975.
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2. Quality of the Ground Water in Basalt of the Columbia River Group, Washington, Oregon, and Idaho, Geological Survey Water-Supply Paper 1999-N, R. C. Newcomb, U.S. Government Printing Office, Washington, D.C., 1972.
3. Silt Removal From A Lake Bottom, Constance L. Churchill, Clyde K. Brashier, Charles S. Johnson, Office of Research and Development, U.S. Environmental Protection Agency, Washington, D.C., February 1975.
4. Contributions of Tidal Wetlands to Estuarine Food Chains, Donald R. Heinle, David A. Flemer, Joseph F. Ustach, Richard A. Murtagh, University of Maryland, Water Resources Research Center, College Park, Maryland.
5. Biochemistry of Estuarine Ecosystem with Emphasis on Heavy Metals and Shellfish, Mark Keeney, Water Resources Research Center, University of Maryland, College Park, Maryland, December 1974.
6. Polluted Groundwater: Estimating the Effects of Man's Activities, John F. Karubian, National Environmental Research Center, Office of Research and Development, U.S. Environmental Protection Agency, Las Vegas, Nevada, July 1974.
7. Limnology of Lake Lansing, Michigan, Thomas C. Young, Robert K. Johnson, Thomas G. Bahr, Institute of Water Research, Michigan State University, January 1975.
8. Water Quality Effect of Diking a Shallow Arid-Region Lake, Dean K. Fuhrman, LaVere B. Merritt, Jerald S. Bradshaw, James R. Barton, National Environmental Research Center, Office of Research and Development, U.S. Environmental Protection Agency, Corvallis, Oregon, April 1975.
9. Automation of the Continuous Coagulation Monitor, Dee Mitchell, James J. Oakowis, Water Resources Research Center, University of Arkansas, Fayetteville, Arkansas, Publication No. 26, 1974.
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12. Kona Dam vs. Konatown - A Sociological Interpretation of Selected Impacts of Reservoir Development on a Community Field, Raghu N. Singh, Dept. of Sociology and Anthropology, East Texas State University, Commerce, Texas, February 1975.

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6. Polluted Groundwater: Estimating the Effects of Man's Activities, John F. Karabin, National Environmental Research Center, Office of Research and Development, U.S. Environmental Protection Agency, Las Vegas, Nevada, July 1974.
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11. Biochrome Analysis as a Method for Assessing Phytoplankton Dynamics Phase I, Richard L. Meyer, Arkansas Water Resources Research Center, University of Arkansas, Fayetteville, Arkansas, Publication No. 27, December 1974.
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