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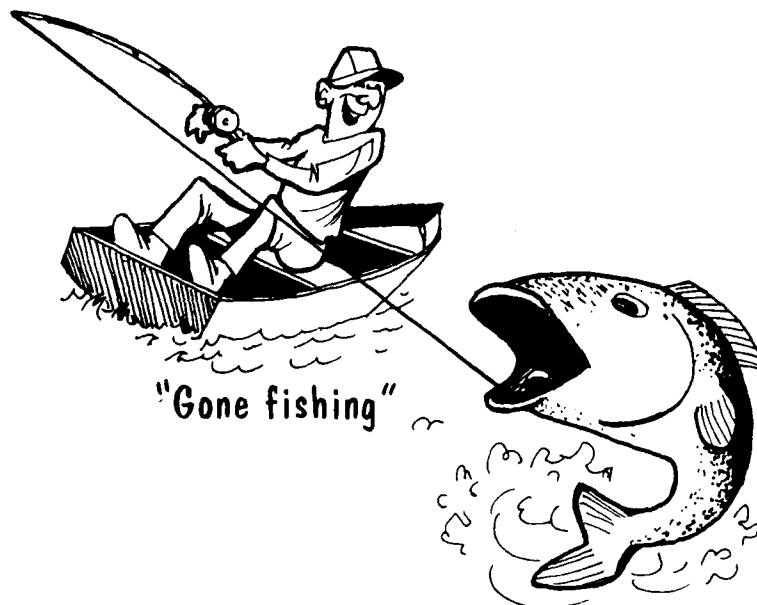
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# Water Current

Millard W. Hall  
Volume 9, Number 3

Karen Stork, Editor  
May/June 1977

FROM THE DESK OF THE DIRECTOR . . .



NEBRASKA WATER RESOURCES CENTER

## ON THE HOMEFRONT

### NEW PERSONNEL TO JOIN WATER RESOURCES STAFF

The Nebraska Water Resources Center is proud to announce the addition of two new staff members. The Water Resources Specialist position has been filled by Ms. Mary Louise Quinn of Berkeley, California. Mr. Don Wilhite of Columbia, Missouri has accepted the position of Water Resources Management Specialist.

Ms. Quinn began work on June 1, 1977. She received her B.A. in 1967, her M.A. in 1971 and her Ph.D. in 1976, from the University of California at Berkeley. She has served as a teaching assistant in geography with the University of California, and as a historical researcher with the U.S. Army Corps of Engineers.

Dr. Wilhite will be joining the staff on August 1, 1977. He received his B.S. in 1967 from Central Missouri State University, his M.S. from Arizona State University at Tempe in 1969 and his Ph.D. from the University of Nebraska at Lincoln in 1975. Don was a laboratory teaching assistant for the Physical Geography Department at the University of Nebraska from 1971-72, a part-time instructor from 1972-74 and a research assistant in Agricultural Climatology from 1974-76. He has also served as a Senior Professional Officer in Agricultural Climatology at the Soil and Irrigation Institute in Pretoria, South Africa from 1976-77. He is presently a research associate in the Department of Agronomy at the University of Missouri at Columbia.

The Water Resources Center is very fortunate that such dedicated and experienced people will be joining our staff.

### EPA GRANT AWARDED

The Nebraska Water Resources Center has been awarded a grant for \$78,382 from the Environmental Protection Agency for a project entitled, "Development of a Manual on Alternative Irrigation Management Practices and Their Effects on the Environment in the Central Plains."

A principal investigator will be sought to head this effort, and will work with various other University faculty and staff members as well as local, state and federal officials in compiling and analyzing information for this task. The objective of the project is to produce a manual providing technical guidance on the best available practices for controlling non-point pollution associated with irrigation agriculture in the Central Plains. Special emphasis will be given to the impact of management practices on subsurface pollution.

The manual will consider: (1) the impact of current practices in irrigation agriculture on water pollution, specifically nutrients, pesticides and sediment; (2) the effects of management alternatives to current practices on the distribution of these pollutants; and (3) social, legal, institutional, economic and planning considerations in implementing management alternatives for control of these pollutants in irrigation agriculture.

Faculty and staff of Agricultural Engineering, Agronomy, Agricultural Economics and other departments will be assisting in this effort.

#### 208 PLANNING PROJECTS ACCEPTED

A Letter of Intent has been signed between the University of Nebraska and the Nebraska Natural Resources Commission for two research projects under the 208 planning effort (Water Quality Management Planning) set out in P.L. 92-500. The Nebraska Water Resources Center will have the responsibility of administering these two projects.

The first project involves a study to quantify the influence of silt runs on reducing canal seepage losses. The principal investigator is Dr. Robert J. Edling of the Panhandle Station who will concern himself primarily with canals in the Panhandle area of Nebraska. The second project involves an evaluation of the impact of irrigation return flow and the accompanying suspended solids on the biota of Nine-Mile Creek. The principal investigator is Dr. Edward J. Peters, Department of Poultry and Wildlife Science.

Both projects are scheduled to begin immediately and will run until July 31, 1978.

#### PROPOSAL SUBMITTED UNDER EMERGENCY DROUGHT ACT OF 1977

The Nebraska Water Resources Center in cooperation with the Cooperative Extension Service and the Department of Agricultural Engineering has submitted a proposal in the amount of \$595,000 to the Bureau of Reclamation under the Emergency Drought Act of 1977 recently signed by President Carter. The study will be conducted by Paul E. Fischbach and Thomas L. Thompson, Department of Agricultural Engineering.

The objectives of the proposed project are: (1) to train personnel on the most advanced methods of conservation of irrigation water and fuel resources under drought conditions; (2) to provide selected items of irrigation scheduling equipment to Nebraska's county extension agents located in the major irrigation areas of the state; and (3) to provide communication access to irrigation extension specialists in the state so, in turn, they may provide timely answers to irrigation questions.

The current drought has emphasized the need for irrigated food and fiber production. This has tremendous economic and environmental ramifications for Nebraska and other western states. It is important that a way be found to reduce energy and water consumption while at the same time maintaining crop yields. It is felt that this proposal will go a long way toward this goal.

## WATER RESOURCES IN NEBRASKA

### FIELD STUDY BY CONSERVATION AND SURVEY

A field study to investigate the hydraulic connection between adjacent aquifers and the stretch of the Republican River from McCook to Cambridge has been undertaken. The study is being made by Fred Grosskopf, a graduate student in the Department of Geology, under the direction of Darryll T. Pederson, Associate Professor of Geology and Research Hydrogeologist with the Conservation and Survey Division. The Nebraska Water Resources Center is providing support for the study.

## FEDERAL HIGHLIGHTS

### DROUGHT RELIEF REGULATIONS ANNOUNCED BY SECRETARY ANDRUS

President Carter has proposed a comprehensive \$844 million drought assistance package and Secretary of the Interior, Cecil D. Andrus, has explained the Bureau of Reclamation policies and procedures in administering the 1977 drought legislation. \$132.3 million will be made available to augment and conserve water supplies for irrigation farming projects constructed or funded by the Bureau. It will also be shared for Indian irrigation projects constructed by the Secretary of the Interior and for non-federal irrigation projects and certain fish and wildlife activities. Remaining funds will be used to establish water banks to augment water supplies, to study ways to utilize and conserve water supplies and to assist state water resource and wildlife agencies.

### NATIONAL WATER CONFERENCE

At the National Water Conference held May 23-25 in St. Louis, Missouri Interior Secretary Cecil Andrus outlined the objectives of President Carter's review of the nation's water resources policy. Andrus noted that a six-month review of the nation's water resources policy would focus on "caring," and he listed nine major points which he believed were "essential to put us on the road toward a comprehensive and realistic national water policy."

These nine points noted by Secretary Andrus are: (1) principles and standards; (2) deauthorization of old projects; (3) cost-sharing; (4) institutional reform; (5) wise water use; (6) Indian water rights; (7) water quality; (8) safety; and (9) conservation. These points will be part of a review to be conducted by the Office of Management and Budget, the Council on Environmental Quality and the Water Resources Council. Andrus stated that specific policy recommendations will be reported to the President within six months, after consultation with Congress and the public.

At the close of the National Water Conference, participants issued a statement entitled, "Four Important Problem Areas and the Problem Solving Process" which was forwarded directly to President Carter. The four problem areas listed were: (1) the energy and water issue; (2) water allocations and priorities; (3) land-water problems of urbanization; and (4) a complex of environmental questions.

The summary statement concluded with the following:

"We consider the four problem areas discussed above to be of national importance. However, it will not be easy to find the best solutions. As President Carter has told us, to such problems there are no easy answers. Many decisions will have to be made this year, because events will not wait upon our deliberations; but the National Assessment findings indicate that the water deficiencies will accentuate with the years ahead. To meet these clearly impending adverse future situations, we need to support more research and better comprehensive planning and to train talented young scientists and managers to solve the problems to tomorrow. What we have done so far is not good enough."

## CONFERENCES

### IAWPR CONFERENCE

The International Association on Water Pollution Research (IAWPR), the South African National Committee for IAWPR and the Israeli National Committee for IAWPR are sponsoring a conference on "Advanced Treatment and Reclamation of Wastewater." It will be held in Johannesburg, Republic of South Africa on June 13-17, 1977 at the Carlton Hotel.

More information can be obtained from the Conference Secretary, S.131, CSIR, P.O. Box 395, Pretoria, 0001, Republic of South Africa.

### A NATIONAL SPECIALITY CONFERENCE

The American Society of Civil Engineering is presenting a National Speciality Conference on "Energy, Environment and Wild Rivers in Water Resources Planning and Management," on July 6-8, 1977.

The program includes the following subjects: water resources planning, operations and management, impact analyses education and training, water resource systems, social and environmental objectives, water law, research and information.

The conference will be held in the Student Union Building, University of Idaho, Moscow, Idaho.

For registration information, contact: Florence Jamison or William H. Knight, Engineering Extension Service, Washington State University, Pullman, Washington 99164. Telephone: (509) 335-4677.

For meeting arrangements, contact: Professor C. C. Warnick, Committee on Arrangements, Civil Engineering Department, Moscow, Idaho 83843. Telephone: (208) 885-6429.

### INVITATION TO SUBMIT PAPERS

Plans are now being made for the 9th International Conference of the International Association on Water Pollution Research (IAWPR) which will be held in Stockholm, Sweden on June 12-16, 1978. The conference will cover the topics of advanced wastewater treatment, sludge treatment, urban run off and receiving waters.

For additional information about the conference or to submit papers, write to: R. S. Engelbrecht, Department of Civil Engineering, University of Illinois, Urbana, Illinois, or: Secretary-Treasurer, International Association on Water Pollution Research, Chichester House, 278 High Holborn, London WC1, England.

### PUBLICATIONS

#### HIERARCHICAL ANALYSES OF WATER RESOURCES SYSTEMS

Y. Y. Haimes' new technical book entitled, "Hierarchical Analyses of Water Resources Systems: Modeling and Optimization of Large-scale Systems," is now available for sale to the public at a price of \$39.00. The text is divided into two parts. Part I provides most of the mathematical and systems engineering background needed for understanding the discussion and utilizing the results of Part II. Part II is a panorama of systems methodologies and analytical tools. Water quality and quantity of both surface and groundwater resources are considered. Land management is also considered as it contributes to non-point sources of pollution.

To obtain a copy, write to: Peter R. Karsten, College Division, 27, McGraw-Hill Book Co., 1221 Ave. of the Americas, New York, New York 10020.

### RESIDENTIAL WATER CONSERVATION

The University of California Water Resources Center is offering, for public use, the report on "The Design of New Residential Water Consumption Systems." This non-technical report is intended for homeowners, builders, developers, architects, planners, utility company managers, plumbingware manufacturers and lawmakers who are seeking ways to reduce residential water consumption.

Highlights of the report are as follows: (1) typical residential consumption profile; (2) brief history of how water has been used in the home; (3) the impact of economic, institutional, socio-cultural, and technological factors; (4) a survey of relevant aerospace technology, i.e., Apollo and Skylab systems, commercial jet aircraft, trains and ships, to show new water-conserving fixtures and appliances; (5) different strategies for reducing water consumption by reducing the demand for the homeowner; and (6) recommendations for specific actions to be taken by utility companies, lawmakers and plumbingware manufacturers to reduce residential water consumption.

The price of this publication is \$7.50 per copy (prepaid, postage and handling included). Make checks payable to: Water Resources Center and mail to Director's Office, Water Resources Center, 475 Kerr Hall, University of California, Davis, California 95616.

### SALINITY MANAGEMENT CONFERENCE PROCEEDINGS

"Proceedings of the Conference on Salt and Salinity Management," Report No. 38 is now available at \$4.00 per copy.

The conference dealt with legislative and political aspects of salt and salinity management as well as a better understanding of the new technology affecting operations and management.

For a copy, write to: Office of the Director, Water Resources Center, University of California, Davis, California 95616.

### WATER SUPPLY AND POLLUTION CONTROL

This third edition written by John W. Clark, Warren Viessman, Jr., and Mark Hammer, reflects the new advances in wastewater treatment, water quality improvement, solid waste disposal as well as changes in federal laws. Many chapters were rewritten to show increased involvement in federal and state governments, new scientific research, and the updating of engineering problems.

The cost of this book is \$21.50. Copies may be obtained by writing to: Larry Hager, A Dun-Donnelley Publisher, 666 Fifth Avenue, New York, New York 10019.



## INTRODUCTION TO HYDROLOGY

Warren Viessman, Jr., John W. Knapp, Gary L. Lewis and the late Terence E. Harbaugh have combined efforts to present the second edition of Introduction to Hydrology. The book presents a quantitative approach for students and practicing engineers. New chapters have been added and others have been re-written and updated. Many problems and examples have been added throughout.

To request a copy of this text at a cost of \$19.50, write to the attention of Larry Hager, A Dun-Donnelley Publisher, 666 Fifth Avenue, New York, New York 10019.

## POSITIONS AVAILABLE

### ASSISTANT PROFESSOR OF HYDROLOGY AND WATER RESOURCES

An appointment as assistant professor to start August 1978, is being offered by the Department of Hydrology and Water Resources at the University of Arizona. This is a teaching and research position that emphasizes water resource administration in an interdisciplinary academic department.

Requirements include a Ph.D. in some field related to water resources, ability and willingness to establish interdisciplinary expertise, significant training in the socio-economic aspects of water resources, and training in the physical and engineering aspects of water resources.

Duties include teaching and advising at the undergraduate and graduate level and initiating an active research program.

Preference will be given to those candidates whose dissertation and job experience have included substantial work with water resources. Applicants will be reviewed during the fall of 1977 and selected candidates will be interviewed in late 1977 and early 1978.

Interested applicants should send a resume and full academic transcripts to: Chairman, Department of Hydrology & Water Resources, University of Arizona, Tucson, Arizona 85721.

The University of Arizona is an Equal Opportunity/Affirmative Action Employer under state and federal laws and regulations including Title IX, Education Amendments.

### ASSISTANT OR ASSOCIATE PROFESSOR OF CIVIL ENGINEERING

The Department of Civil Engineering at the University of Mississippi has an opening for an assistant or associate professor of Civil Engineering beginning in the fall of 1977.

A Ph.D. is required along with an interest and background in hydrology and water resources systems analysis. Duties will include participating in cooperative research programs with the USDA Sedimentation Laboratory, teaching graduate and undergraduate courses and directing graduate students.

The application deadline is June 15th. Interested applicants should send vita to: Dr. Samuel Deleeuw, Chairman, Department of Civil Engineering, University of Mississippi, University of Mississippi 38677.

The University of Mississippi is an Equal Opportunity Employer.

#### CO-LEADER POSITIONS

The North Dakota Natural Resources Council is currently seeking co-team leaders to provide expertise and coordination in developing rural water delivery systems within a five-state region. The duration of the program will be approximately two and one-half years. The two positions that are available are as follows: (1) Economist . . . 3-4 years minimum experience, Masters Degree, Ph.D. preferred, salary range of \$22,000 - \$25,000; and (2) Civil Engineer . . . 3-4 minimum experience, Masters Degree, Ph.D. preferred, salary range of \$22,000 - \$25,000.

Resumes and inquiries should be directed to: Dr. Charles F. Metzger, Chairman, Natural Resources Council, Office of the Governor, State Capitol, Bismarck, North Dakota 58505.

#### DIRECTOR

The New Mexico Water Resources Research Institute at the New Mexico State University is seeking applications for a Director.

The Director would be responsible for the successful maintenance and enhancement of ongoing programs of the Institute and is responsible for the administration of all state and federal funds. The Director is expected to provide leadership in water-related research and educational programs and should act as coordinator for such activities.

Applicants must have earned doctorate or equivalent experience and have established interest in water research. Administrative experience in water resources research preferred. The closing date for applications is October 1, 1977. Applications should be submitted to: Samuel P. Maggard, Chairman, Search Committee, Box 3CE, New Mexico State University, Las Cruces, New Mexico 88003.

The New Mexico State University is an Equal Employment Opportunity/Affirmative Action Employer.

## RESEARCH REVIEW

Project Title: Nitrogen Source Differentiation Through Carbon Isotopes

Principal Investigator: Roy F. Spalding  
Conservation and Survey Division  
University of Nebraska, Lincoln

An abundance of high concentrations of nitrogenous components is common to most agricultural regions. The sources of these concentrates may be fertilizers, animal wastes, sewage wastes, or natural soil nitrogen. Under favorable leaching conditions nitrate from any of the above will infiltrate to the groundwater. Past investigations in the Central Platte Region and in Holt County have conclusively indicated large zones of relatively uniform high nitrate nitrogen. These zones are increasing in areal distribution and concentration and therefore warrant concern from a water quality standpoint.

In an effort to estimate the relative contribution of the above potential sources to the aquifer, an investigation of the isotopic ratio of  $N^{15}/N^{14}$  in the nitrogenous sources (Figure 1; Gormly and Spalding) and in the groundwater nitrate from Merrick County is almost complete. This method utilizes an isotope ratio mass spectrometer to analyze  $N^{15}/N^{14}$  ratios. Figure 1 shows that isotopic fractionation within the nitrogen cycle creates distinct ranges of  $\delta^{15}N$  for the various types of nitrogen compounds allowing the identification of the major source of nitrogen to groundwater in the majority of instances. (Gormly and Spalding in preparation). Occasionally the isotopic ratio may be a result of a mixture of sources with no one source predominating. When mixtures occur additional supporting evidence is helpful in defining the sources.

Further supporting evidence is theorized to be the  $C^{13}/C^{12}$  stable isotopic ratio of the groundwater dissolved organic and inorganic carbon. The ratio is expressed by comparing the ratio in the water sample to that of a standard by the formula

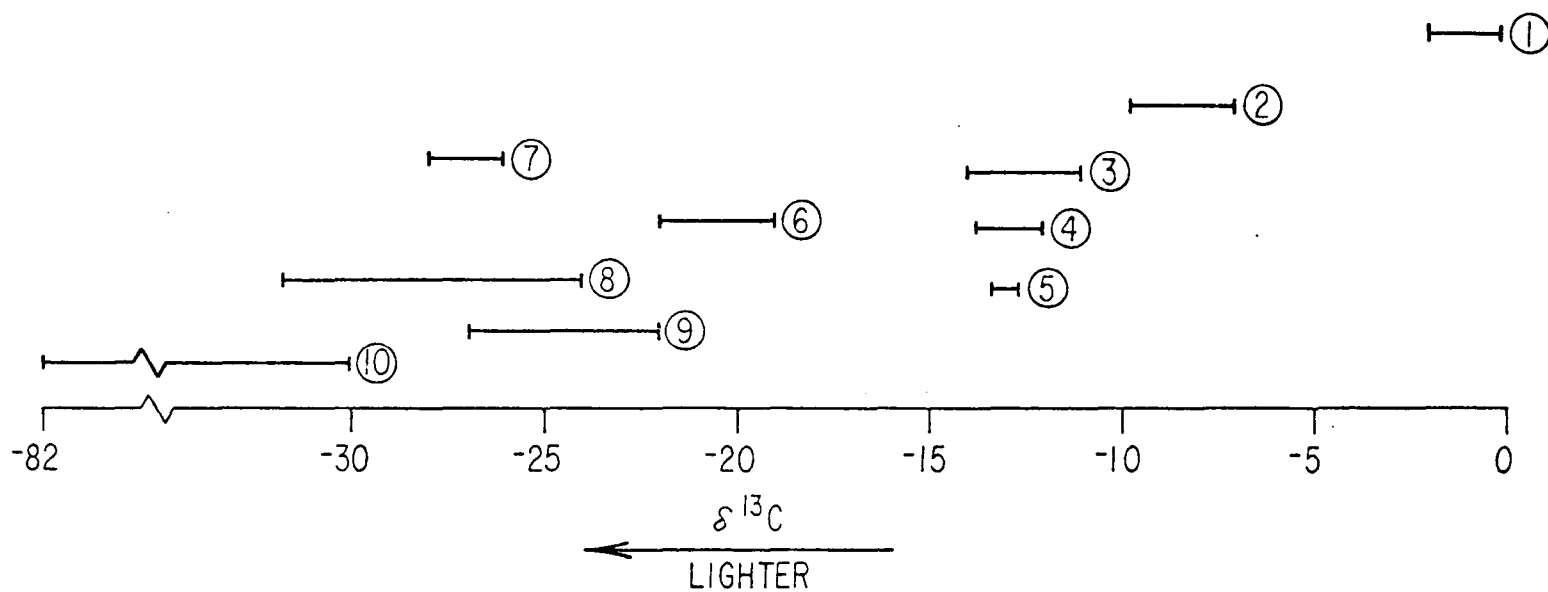
$$\delta^{13}C = \frac{(C^{13}/C^{12}) \text{ sample} - (C^{13}/C^{12}) \text{ standard}}{(C^{13}/C^{12}) \text{ standard}} \times 1000.$$

Previous investigators have reported significant fractionation in sewage and plant derived carbon (Figure 2). The distinct ranges of  $\delta^{13}C$  between tropical grasses, range grass, and waste should allow for differentiation of the source by  $\delta^{13}C$ . The dissolved organic carbon (DOC) should reflect the  $\delta^{13}C$  of its source.

These carbon isotope measurements may provide a cross check for the nitrogen isotope analyses, eliminating some potential sources, and/or lending support to others.

Fifty well samples have been collected from an ongoing water quality investigation that is utilizing sets of specially constructed cluster wells on the north side of the Platte River near Shelton. For this project analysis of  $\delta^{13}C$  and DOC is now underway.

Completion date for the project is October 1977. At that time an assessment as to the feasibility of this procedure will be complete.



① BICARBONATE

② ATMOSPHERIC  $\text{CO}_2$

③ Corn

④ Sorghum

⑤ Sudan Grass

— TROPICAL GRASSES

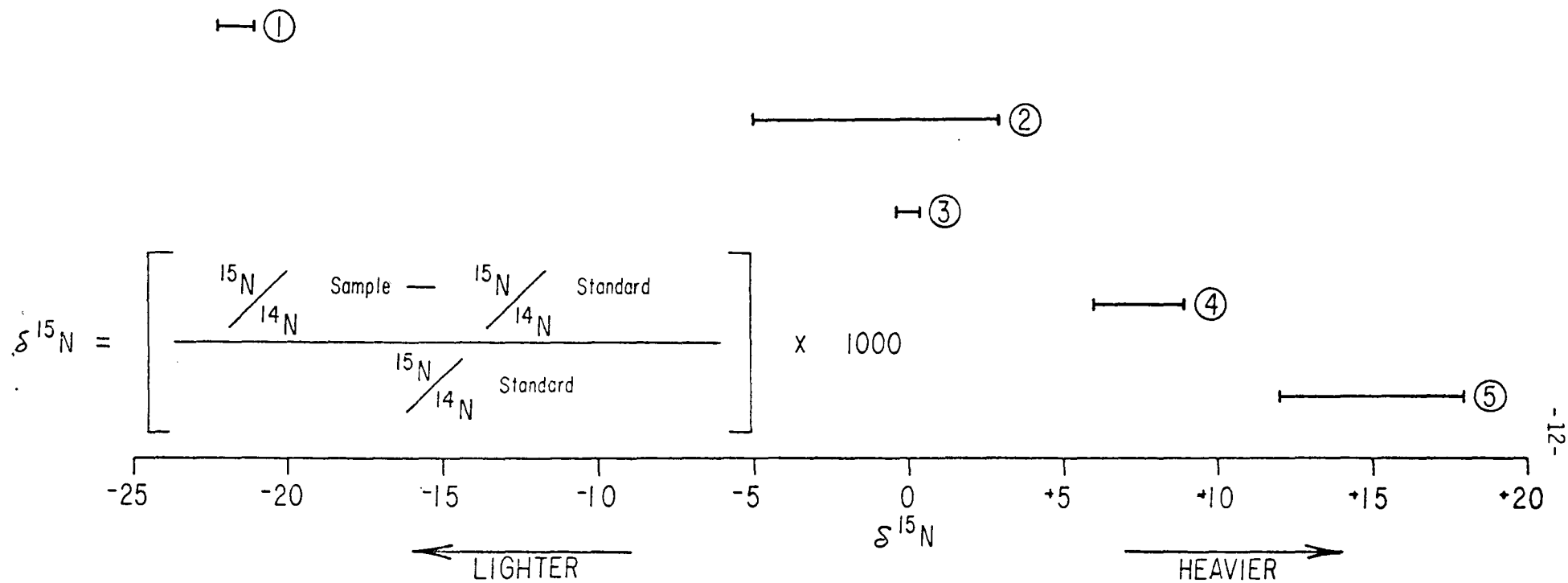
⑥ SEWAGE ORGANIC CARBON

⑦ RANGE GRASSES (*timothy, oats, wheat, and barley*)

⑧ CRUDE OILS

⑨ COALS

⑩ NATURAL GAS



- ① AMMONIA OVER FEEDLOT
- ② FERTILIZERS
- ③ ATMOSPHERIC NITROGEN

- ④ SOIL NITROGEN
- ⑤ DECOMPOSING ANIMAL WASTES