Wyoming Hydrogram

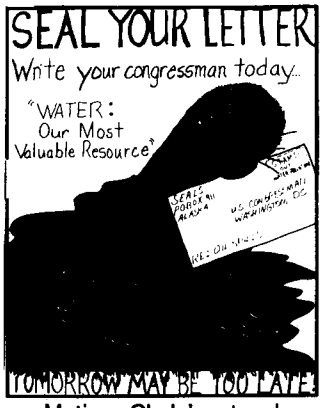
March 1992 — Wyoming Water Resources Center Newsletter — Vol. 4, No. 1

Water Center announces poster contest

The 1992–93 Powell Water Education Poster Contest is on! All elementary students, from kindergarten through sixth grade, are invited to enter the contest, in the seven Colorado River Basin states (Arizona, California-Los Angeles Unified School District, Colorado, Nevada, New Mexico, Utah and Wyoming). Students are invited to draw, color, print or paint a poster with the theme "Water: Essential to Life." Governor Mike Sullivan is encouraging Wyoming participation in the contest.

Each school may submit one entry per grade. Two winners will then be selected from each of the seven states. State winners will be featured along with their posters on a 1992–93 school year calendar. The calendar will also contain challenging questions and answers about water and environmental science as well as exciting water education activities for kids. A limited number of copies of the calendar will be distributed to all elementary schools in each state. Additional copies of the calendars will be available as a fund raising opportunity for schools.

Prizes for the state school winners include a computer education package with a CD–ROM and five



Matisse Clyde's artwork
fifth grade state winner
1990-1991 Poster Contest

disks valued at over $2,200, National Geographic Kids Network software, subscriptions to WonderScience from the American Chemical Society, Water Science Equipment Kits from the International Office for Water Education, Colorado River Posters from the Water Education Foundation, and "The Story of Drinking Water" book from American Water Works Association.

The Water Education Poster Contest is a pilot program for the region and the country, offering great opportunities for teachers, parents and students to learn together about the vital role water plays in our daily lives. The contest fits perfectly into the activities of the national observation of Earth Day, April 22 and National Drinking Water Week, May 3–8. The poster contest is sponsored by the Wyoming Water Resources Center and International Office for Water Education of Utah State University through a grant from the United States Geological Survey.

Poster contest entry information packets have been sent to principals at elementary schools in the state. Entries must be received at the Wyoming Water Resources Center by **May 15, 1992.** For further information contact Ari Michelsen at the WWRC, (307) 766–2143.

Changes made in WWRC name, committee members

The Research Review and Priorities Committee (RRPC) of the Wyoming Water Resources Center (WWRC) and the University Board of Trustees approved two significant changes in the WWRC last fall. The first change was in the name, from "Research" to "Resources" to better reflect the broader activities and programs the Center is involved with. Center Director, Steven Gloss said "There is no question that quality, objective research will continue to be the Center's foundation, however we also provide many other programs such as graduate education, technology transfer, and service to the state. The RRPC felt that a name which implied more than research was in order." Incidentally, Gloss is President–Elect of the National Institutes for Water Resources, which also recently changed its name to also reflect a broader range of activities.

The second change approved was an integration of the former Citizen Water Issues Advisory Council (CWIAC) into the WWRC Research Review and Priorities Committee. Following study of this issue by a sub–committee appointed last year by RRPC Chair Paul Schweiger, a recommendation to adopt the change was approved in November, 1991. The "new" RRPC now has six members of the former CWIAC appointed by the Governor. Two members serve at large while four represent each of the state's four administrative water divisions. New members and their terms are: Cynthia Nunley (at-large member, Jan. 1, 1992–Dec. 31, 1993), Lander; Steve Adams (at–large member, Jan. 1, 1992–Dec. 31, 1993), Baggs; Wendy Frueauf (Water Division 1 representative, Jan. 1, 1992–Dec. 31, 1995), Casper; Doyl Fritz (Water Division 2 representative, Jan. 1, 1992–Dec. 31, 1995), Sheridan; Beryl Churchill (Water Division 3 representative, Jan. 1, 1992–Dec. 31, 1995), Powell; and Jim Noble (Water

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Water supply outlook

As of March 1, 1992, most of the high mountain snowpack in Wyoming is below or much below average. Only small scattered pockets in the state are showing near average amounts of snow for this time of year. The top third of the state, the Blacks Fork and Henrys Fork drainages in the Uinta Mountains in the southwest corner, and the Upper Platte and Laramie Rivers in southcentral Wyoming and northern Colorado have snowpack accumulation that is 10 to 30 percent below average. The remainder of the state has a snowpack that is more than 30 percent below average for this time of year. Traditionally, the snowpack in Wyoming reaches its maximum depth in mid-April. At this rate, reaching that mid-April average depth will be difficult this year.

For the most part, major reservoirs in the state are holding more or about the same quantity of water as last year at this time. However, last year many reservoirs were below average. Along the North Platte River all reservoirs contain more water than last year but are all still below average for the first of March. Pathfinder Reservoir currently is only 53 percent of average for this time of year and Keyhole Reservoir in the northeast stands at only 28 percent of average – about the same as last year. In the Green River Basin, only Big Sandy is above average at 108 percent.

Water users in Wyoming face dim prospects as far as streamflow is concerned, if current trends continue. Forecasts indicate that streamflows will be below to much below average during the spring and summer months. The north one-third of the state will see runoff that is 10 to 30 percent below average, with the remaining two-thirds of the state more than 30 percent below average. Water users will need to plan ahead and use the best water efficient methods available to them. (Basin Outlook Report, USDA, Soil Conservation Service; Casper, Wyoming)

Cooperative weather stations receive honors

Four Wyoming Cooperative Weather Stations received recognition last fall for their 100 or more years of service. Heading the list of Wyoming's centennial stations receiving the honor is Yellowstone National Park headquarters where record keeping started in 1886, followed by Evanston 1 East in 1889 and Sheridan Field Station which followed in 1891. The University of Wyoming rounds out the centennial list for long term participation. Award ceremonies were held at each location. Bill Parker, meteorologist in charge and area manager for the National Weather Service, Victor Hasfurther, state climatologist, associate director of WWRC and professor of civil engineering at the University of Wyoming and Ray Kowrach, National Weather Service Cooperative Program manager for Wyoming, presided at each of the recognition ceremonies. Each program included a presentation on the Wyoming Cooperative Weather Program and the climate of Wyoming. Other long-term stations and their outstanding volunteers also received recognition at these ceremonies.

Bill Parker, (left), the National Weather Service manager for Wyoming, presents an award to Marla Smith, accreditation director of Evanston Hospital, representing the Evanston Station East. Victor Hasfurther, state climatologist, joins in congratulating.

A wide range of citizens, many of them farmers, ranchers, teachers, homemakers, students and retired citizens, have formed the vast corps of volunteers, operating 174 weather stations in Wyoming. Over 10,000 volunteers across the nation monitor stations, which are generally 25 miles apart. They report daily, weekly and monthly to the National Weather Service on data, such as daily temperature, precipitation, snowfall, evaporation, river levels and soil temperature. This data is made available to the public and archived as part of the nation's historic climatologic record. The record also serves as a basis for the study of global climate change and prediction of long term patterns.

The U.S. Department of Commerce National Weather Service developed the recognition program as part of a national effort to commend its volunteers in the Cooperative Observing Program. The Department of Agriculture, the American Meteorological Association and the Association of State Climatologists also contributed to this effort.

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Director: Steven Gloss
Associate Directors:
Donald Brosz, Special Projects
Victor Hasfurther, Research
Ari Michelsen, Information Transfer
Editor: Maija Devine
Layout: Mary Bower

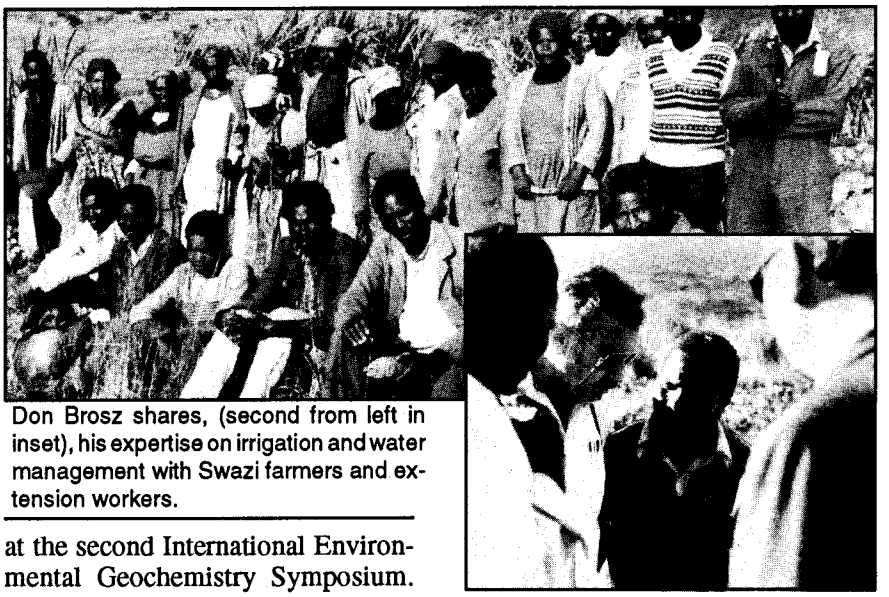
Wyoming Water Resources Center
Box 3067, University Station
Laramie, WY 82071-3067
Phone (307) 766-2143

Wyoming Water Resources Center staff share expertise abroad

Wyoming Water Resources Center scientists are taking United States environmental management practices worldwide. Donald Brosz, professor of civil engineering and WWRC associate director, returned from Swaziland last fall after serving two years as a research and extension specialist with a Pennsylvania State University team on a project for the U.S. Agency for International Development (USAID). Steven Gloss, associate professor of zoology and WWRC director, visited the Soviet Union last October on a two-week trip organized by the U.S. Citizen Ambassador Program. Ari Michelsen, associate professor of agricultural economics and

"Five specialists from the WWRC helped with natural resource development projects in the Soviet Union, Swaziland, China, India, Sweden and Taiwan."

WWRC associate director, visited the Peoples Republic of China twice in 1991 as a member of a team of specialists selected for a United Nations Development Program to teach and assist in water resources management for northern China. Katta J. Reddy, adjunct assistant professor of plant, soil and insect sciences and WWRC research associate, traveled to Sweden last September to present papers at the second International Environmental Geochemistry Symposium. Yeou–Koung Tung, associate professor of statistics and WWRC statistical hydrologist, recently returned from a one-year teaching and research sabbatical in Taiwan.



Don Brosz shares, (second from left in inset), his expertise on irrigation and water management with Swazi farmers and extension workers.

Donald Brosz: In the two years Brosz served as a research and extension consultant in Swaziland, he saw some dramatic improvements in the Swazi farmers' irrigation system. Even though they had a good supply of water to grow crops because of the distribution pipes and open canals built by the British during colonial times, the Swazis were importing 80 percent of their vegetables. They were only beginning to develop the flood-furrow irrigation system prevalent in many areas of the western U.S., and many farmers had never seen examples of irrigation in operation. So, Brosz and his team took the Swazis to Zimbabwe to observe examples of agricultural irrigation and learn about techniques.

Much of the water management training Brosz provided the Swazi farmers and extension workers involved guidance on the amount of water to use and the frequency of irrigation as well as some basic management areas, such as weeding. "The ditches were so packed with weeds growing so profusely that water could not get through," Brosz recalls. Brosz and his team worked on 24 irrigation "schemes" on 2,700 acres of farmland with 40–60 farmers on each scheme.

Brosz estimates that, after two years of work with the Swazi farmers, they have at least tripled their yield of vegetables, which included cabbages, peppers, carrots, tomatoes and even broccoli, which was new to them. "Within 10 years or sooner, I think they should not have to import vegetables as they do now, and they will make enough money with vegetables to buy the corn they need," he predicts.

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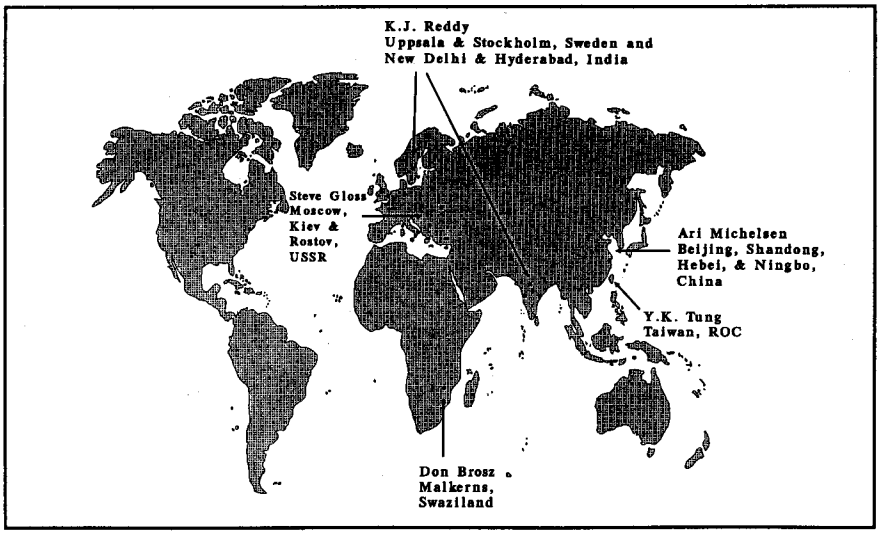

Last month, Brosz left for Swaziland again. On this month-long trip, he will be assisting the Swazi government to determine how much more land can be irrigated. He will be evaluating 100,000 to 150,000 acres of land for its suitability and water availability.

Steven Gloss: The purpose of the Citizen Ambassador Program delegates' two-week mission to the Soviet Union in which Gloss participated was primarily an information exchange. "The goal was to gain an understanding of the most pressing Soviet environmental issues and to inform them of ours," Gloss says. The delegation visited Moscow, Kiev and Rostov to examine environmental quality-of-life issues, including waste disposal, air and water quality, transportation and housing. "Their environmental problems seem to be more widespread and acute than ours," Gloss commented.

According to Gloss, one area the Soviets found unique about the way the U.S. manages environmental concerns was the close working relationships among federal, state and local governments. The U.S. delegation gained an understanding of how difficult it is for the Soviets to deal with their environmental issues because of the government structure and lack of financial resources. The Citizen Ambassador Program and its delegates will continue to explore opportunities for future cooperative programs including scholar exchanges and sabbatical leaves.

Ari Michelsen: During his trips to the Peoples Republic of China in 1991, Michelsen participated in water resource management projects in eight regions of the country, held workshops and seminars for Chinese scientists, worked with the Ministry of Water Resources, State Science and Technology Commission and engineers at Tsinghua University on water resource management.

"The use and management of water resources in China have not been based on scientific data and analysis methods," Michelsen reports. "The result, particularly in areas of high population density the semi-arid region of northern China, has been severe water shortages, groundwater mining and declining water quality. As China continues to develop, there is a critical need for improved water resources management.

Chinese scientists attended seminars as part of United Nations water resources management project.

The purpose of this United Nations Development Project is to teach Chinese scientists analysis methods to evaluate and implement comprehensive water management strategies."

One of the goals of the project is to assist in the development of macroeconomic-based multiple-objective analysis models. These state-of-the-art models are designed to simultaneously integrate economic, social, hydrologic and environmental objectives to analyze water management strategies.

The methods taught by the international team of specialists included basic and advanced economic techniques, decision support systems, mathematical optimization techniques, surface and ground water modeling and water quality modeling. The ongoing project includes training of Chinese scientists and study tours in the U.S. so that they can transfer these analysis techniques to other provinces.

Katta J. Reddy: Reddy presented two papers on soil chemistry during his trip to Sweden. He also met with representatives from the Swedish University of Agricultural Sciences, Estonia's Institute of Ecology and Marine Research, The Netherlands' Institute of Earth Sciences and the Geological Survey of Finland. He later visited India, where he met with officials of India's Council of Scientific and Industrial Research, to explore opportunities for future international exchanges.

Since his arrival back at the university, Reddy has received requests from Sweden, Finland and Estonia for the chemical models he has developed as part of his research at the University of Wyoming. His research has focused on predicting the chemical nature of soils and applying soil chemical principles to predict and minimize environmental contamination resulting from agriculture, mining and coal combustion. He developed a process that utilizes carbon dioxide from flue gasses as a means of stabilizing coal combustion by-products (solid wastes). This process minimizes environmental hazards and enhances re-utilization options.

Reddy states, "Several countries and organizations have also requested information about our models and are interested in using carbon-dioxide pressure and other techniques in the chemical modeling of soils and alkaline solid wastes."

Yeou-Koung Tung: Tung spent his year-long sabbatical in Taiwan in 1991 giving lectures and seminars on analyzing water resource systems and their reliability to scientists from several universities and staff at water-related government agencies. His stay was hosted by the Department of Civil Engineering at the National Chiao-Tung University in his native Taiwan.

Tung also conducted a research project sponsored by Taiwan's National Research Council on making

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Water seminars in Sheridan & Powell

The University of Wyoming's Water Resources Center and the Cooperative Extension Service sponsored public information seminars on water resources in Powell and Sheridan in January this year. Over 200 people attended the seminars with sessions that addressed water resource development, quality and management issues as well as how to get involved in the decision making process. A wide range of issues were discussed including the impacts of federal regulations on Wyoming water development projects, communicating concerns to elected officials, developing regulations for Best Management Practices, safe drinking water standards and regulations, movement of pesticides and herbicides in irrigated soils, who should be paying for added recreational uses on existing projects and Wyoming wetlands identification, regulation and costs.

Speakers at the seminars included State Senator Della Herbst and State Representatives Bill Bensel, Sylvia Gams, Ray Harrison, John Hines, John Marton, Peg Shreve, and Marlene Simons. State agencies and advisory groups were represented by Mike Purcell, administrator, Wyoming Water Development Commission; Jeff Fassett, Wyoming state engineer; Pete Petera, Wyoming Game and Fish Department; Beryl Churchill, member, Wyoming Water Development Commission; Bill Sheets, water commissioner, Cody; and Wendy Frueauf, chairperson, Governor's Nonpoint Source Task Force. Various water user groups and specialists that took part included Ed Norlin, manager, Shoshone–Heart Mountain Irrigation District; Trudie Lay, Small Systems projects manager, American Water Works Association; Dave Engles, Sheridan Area Water project manager; Tim Wade, Trout Unlimited; LaMar Empey, Greater Yellowstone Coalition; Chuck Hassler, Powell Tribune; Jenna Johnson, president, WIFE; Alan Blaylock, UW Research and Extension Center, Powell; and David Barkan, professor, chemistry, Northwest College.

Wyoming State Representative Sylvia Gams, Big Horn County, spoke at the Powell Water Resources Seminar.

The seminars were held in cooperation with Sheridan College, Northwest College, UW Powell Experiment Station, Wyoming Water Development Commission, State Engineer's Office, American Water Works Association, Shoshone–Heart Mountain Irrigation District, Wyoming Water Development Association, and Wyoming Small Business Development Center. WWRC Water Resources Seminars are held annually at two locations around the state.

WWRC shares

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cost and benefit projections involved in choosing water resource projects. In addition, he collaborated with the Council's researchers on assessing the rainfall-runoff modeling on hydraulic structure designs and evaluated the safety of in-stream hydraulic structures affected by migrating underwater mining pits.

"Practically all of Taiwan's major streams are heavily polluted by industrial and agricultural wastes," Tung reports. "Government agencies and the general public are also concerned about the safety of existing dams and finding ways to increase water storage."

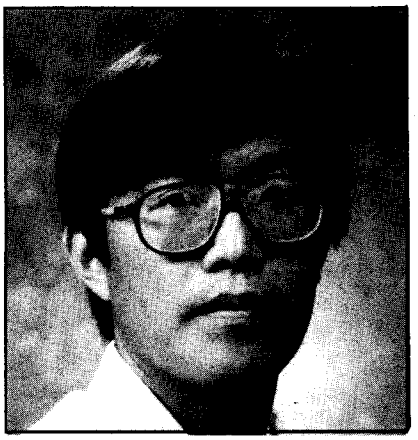
Tung feels that he contributed to advancing knowledge about analyzing the risks and reliability of hydraulic structures in Taiwan and providing practical methods of keeping surveillance to detect unusual occurrences in order to predict risks. He is currently participating in a team evaluation of twelve sedimentation models, a project sponsored by several Taiwanese agencies and the United States National Research Council.

New groundwater reference guide

An easy-to-use groundwater reference guide of some of the nation's best groundwater education materials has recently been completed by the University of Michigan Biological Station (UMBS) in Pellston, Michigan. Sixteen topics related to groundwater are contained in this 26 page user–friendly bibliography geared for a wide variety of audiences, including the general public, teachers and farmers. Title, author, type of publication, date, abstract, audience and cost are provided.

One copy of the guide is free. Additional copies are $.75 each. To order, contact UMBS, Pellston, MI 49769, (616) 539–8789.

Professor Tung's book on water resources bridges gaps



Yeou-Koung Tung

Three years of hard work went into Professor Yeou-Koung Tung's book, "Hydrosystems Engineering and Management," published by McGraw-Hill in January 1992. "Even though there are many textbooks on water resource management, none of them had all the components I wanted to see in one volume," states Tung, associate professor of U.W. Department of Statistics and statistical hydrologist at the Wyoming Water Resources Center. Tung's book provides an in-depth discussion on many subjects not thoroughly covered in other books, such as water demand forecasting and urban storm water management systems. The new book was co-written with Larry W. Mays, chairman of the Department of Civil Engineering at the Arizona State University.

In the book, the authors bring together the use of economics, operations research, probability and statistics with the use of hydrology, hydraulics and water resources for the analysis, design, operation and management of various types of water projects. The book not only provides an introduction to hydrosystems methods to students, but also serves as a reference for water resource practitioners—such as engineers, managers, planners and systems analysts.

According to a review of the book, published in Engineering & Computer Science News, No.3, the chairman of the Department of Civil Engineering at the University of Massachusetts at Lowell found Tung's book very useful in that it combines "mathematical modeling with management and economic considerations in the planning and execution of hydrosystem engineering because that is the way practicing engineers operate."

Tung joined the University of Wyoming in 1985 after serving four years as assistant professor of civil engineering at the University of Nevada at Reno. He received a B.S. degree in civil engineering (1976) from Tamkang College in the Republic of China, and M.S. (1978) and Ph.D. (1980) degrees from University of Texas at Austin. In 1987, he received the American Society of Civil Engineers Collingwood Prize, one of seven prizes awarded that year to outstanding scientists in the field of hydrology and hydraulics.

The University of Wyoming bookstore will handle orders for the book (766–3264). For more information, contact Tung at (307) 766–2143.

Water Engineering and Management Conference attracts 200 experts

Over two hundred water resource experts attended the "Colorado Water Engineering and Management Conference," and American Water Resources Association Colorado Section Symposium, held in Denver, March 2 & 3, 1992. Speakers included Gale Norton, Colorado attorney general, and former hostage Tom Sutherland, who gave a talk entitled "Middle East Issues and the Role of Water and Agriculture." The conference program included two plenary sessions, 56 technical presentations and a CSU 1992 Program of Excellence Distinguished Lecture. Vujica Yevjevich, professor emeritus of civil engineering at CSU, delivered the Distinguished Lecture, entitled "Water and Civilization."

The conference was sponsored by the Civil Engineering Department and Water Resources Research Institute, Colorado State University (CSU), Colorado Office of the State Engineer, and the AWR, Colorado Section. The Wyoming Water Resources Center co-sponsored the conference.

Changes

(Continued from page 1)

Division 4 representative, Jan. 1, 1992–Dec. 31, 1993), Cora.

Formerly, members of the CWIAC were advisory to the RRPC and had no voting privilages. The new members of the RRPC have full voting privilages. According to Gloss, "This change will provide even stronger input from the citizens of our state regarding WWRC activities and programs. We view this change very positively."

CALENDAR

Meetings for increasing sprinkler irrigation operating efficiencies set

Meetings are being held throughout Wyoming to share the results of sprinkler irrigation efficiency field studies and to present methods to improve pumping plant and sprinkler irrigation efficiency. Extensive field studies of Wyoming sprinkler irrigation systems were conducted during the 1990 and 1991 growing seasons by University of Wyoming researchers. The studies were undertaken to determine how efficiently irrigation pumping plants were operating and how efficiently irrigation sprinkler systems were applying water to the soil.

Field tests made on 130 irrigation systems indicate that on average ten percent or more in energy costs can be saved each year by making system changes, as determined by these field tests. Meetings with irrigators to share study results and discuss possible efficiency improvements have been held in Hot Springs, Washakie, Niobrara and Platte Counties. Meetings are scheduled for **April 14, 1992 at the Eden–Farson irrigation district** and on **June 2 and 3 in Natrona County**, with additional meetings to be planned for the fall and winter of 1992–93. Field demonstrations with irrigators are also being planned during the 1992 irrigation season.

For further information, contact Don Brosz, Wyoming Water Resources Center, Box 3067, Laramie, Wyoming 82071, (307) 766–2143.

Platte River study tours set

This summer three study tours of the Platte River system are being offered by Colorado State University. These tours will take participants from the headwaters of the North Platte River in Colorado and Wyoming and down along the mainstem of the river into Nebraska. Tour activities include on-site presentations by water commissioners, hydrologists, fishery and wildlife managers, government officials, irrigation and industrial water users, and will feature stops at historical points of interest. The tours are designed to increase awareness of the complex character of critically important water resources and to assist decision makers and regulators to better understand and manage the varied aspects of a river system.

Tour dates are: **#1 June 15–19; #2 July 13–17; and #3 August 10–14**. These tours are sponsored by the Civil Engineering Department of Colorado State University. Registration of $950 includes accommodations, bus transportation, continuing education and legal unit credit and a certificate. For more information contact Janet Lee Montera, Civil Engineering Department, CSU, Fort Collins, CO 80523; (303) 491–7425.

Public meeting on draft BMP'S

The Governor's Nonpoint Source (NPS) Water Quality Task Force will be accepting oral and written comments on draft Best Management Practices (BMPs) at a public meeting on **April 9, 1992**. The BMPs being considered for adoption as part of Wyoming's NPS Management Plan are for: **Urban Runoff, Silviculture, Cropland and Hydrologic Modification**. The NPS Task Force meeting will be held **April 9, 1992 at 2:00 pm** in Room 1299 of the Herschler Building.

Copies of the draft BMPs are available at County Libraries or from the Department of Environmental Quality, Water Quality Division, Herschler Building, 122 West 25th Street, Cheyenne, WY 82002; (307) 777–7781.

1992 is Year of Clean Water

Through a bill enacted by Congress, 1992 has been designated the Year of Clean Water. It is hoped this year–long focus on one of our most important natural resources will prompt greater personal and public commitment to a cleaner, safer water supply. For more information contact America's Clean Water Foundation, Hall of the States, 444 N. Capital Street NW, Washington, DC 20001.

National Drinking Water Week

National Drinking Water Week will be observed **May 3–8, 1992.** This is an excellent time to learn more about your drinking water. If you do not use a public water supply system it is recommended that you have your water quality tested at least once a year. For a list of water quality testing laboratories contact the University of Wyoming, Cooperative Extension Service Office in your area or the WWRC in Laramie.

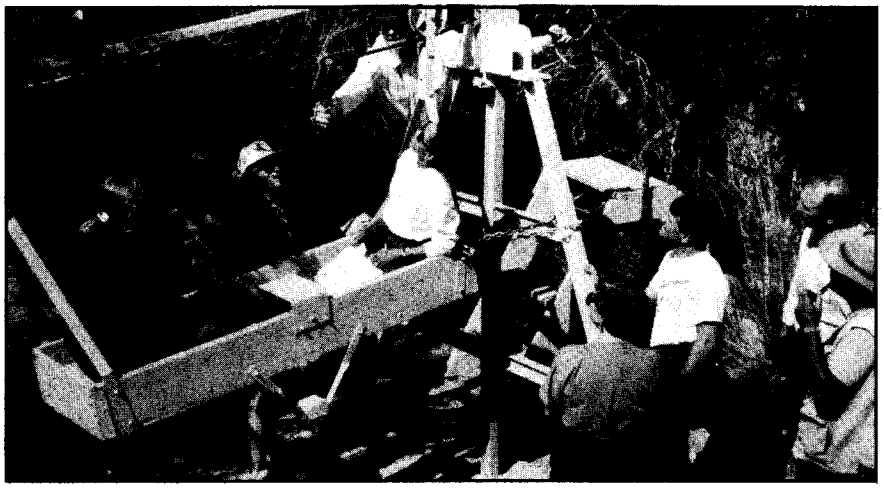
All you need is WIT - Water Institutes for Teachers

Two Water Institutes for Teachers (WIT) are scheduled for 1992 – the first **July 6–17** in Laramie at the University of Wyoming and the second **July 20–31** in Casper, Wyoming. WIT is a two-week course where teachers learn about our state's water resources and issues through classroom sessions, hands-on activities and field trips.

The Institute provides teachers with water resource concepts and activities that can be incorporated into their curriculum, while teachers earn two credits in NASC 4800. WIT includes sessions on Wyoming's water sources and uses, water quality, water law, evaluating instream flows and Project WILD–Aquatic. Instructors in the course include UW professors, state and federal government officials and elected representatives.

The WIT has been highly successful. One teacher commented, "All of our fellow teachers should take this workshop. The speakers were well-chosen and knowledgeable in their fields, and the fields trips were extremely informative."

The Water Institute for Teachers is sponsored by the Wyoming Water Resources Center and the Wyoming Institute for the Development of Teaching (WIDT). A limited number ofscholarships are available. For registration or more information, contact Jeanne Unruh at WIDT, (307) 766–6381, or Ari Michelsen at WWRC, (307) 766–2143.



Jim Pugh, (center), hydrographer commissioner, shows stream gauge during the 1991 Water Institute for Teachers.

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Wyoming Water Resources Center
P O Box 3067, University Station
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