Utah Water Research Laboratory Uses Unique Facilities to Serve Public in More Ways Than Just Research

A California firm that builds high pressure steam valves for the U.S. Navy brought the valves to the Utah Water Research Laboratory for testing to assure that they met the navy's specifications.

An Oregon company needed to make certain it was getting a correct measurement in a 50-inch trunk sewer line. It asked UWRL to calibrate the flume used to measure the flow.

An Illinois manufacturer couldn't find anyone to test its flow controllers for city water systems until it found the UWRL had the capability.

Planning a major dam construction, a consulting engineering firm has asked UWRL to build the project to 1/30th scale first, to assure best design and safe operation of the spillway.

"Part of our mission is to provide these kinds of services to the people of the state of Utah and the region as well. We have a facility that is unique in its ability to serve the people and industry," says Calvin G. Clyde, associate director of the Utah Water Research Laboratory at Utah State University.

Serves Two Areas

The lab, in addition to its work in water research, provides service in two areas, Clyde points out.

One is testing and calibration of valves, meters, flumes, pipes, and fittings. The other is doing hydraulic model studies.

While the model studies are not usually classified as research, Clyde explains, they do involve the innovative application of well known principles to new situations.

"We have one of the few facilities in the country where many kinds of tests of water-related equipment can be made. Many laboratories can't do some of the things we can," Clyde claims.

For example, a high pressure pump at UWRL provides a volume of water for testing that is not available at most laboratories.

The lab has a capability of turning a substantial stream of water from the Logan River or from a storage impoundment just above the lab into a system of channels and experimental equipment in the lab.

"The customer gets work done he can't get done elsewhere. It helps us because we can give students work to support their education and to give them some good experience and training as well," Clyde explains.

Clyde, who is a professor of civil and environmental engineering, supervises all the work closely to assure its correctness and accuracy.

Saves Money

Having the planning and testing done at UWRL can often save the user a lot of money.

It can also help prevent damage to a company's reputation. If a manufacturer promises its buyers a given level of performance, it must be sure that its product will deliver as promised. Clyde cites an example:

A firm advertised that the flow controllers it manufactured would regulate the flow in a certain way. Tests at the water lab showed that one model worked perfectly, but another model failed to perform as advertised. This gross failure to do the job advertised would have hurt the company's reputation, Clyde noted.

But after the testing, the company took the device home, spotted a minor defect that caused the malfunction and easily corrected it.

"Your help was invaluable," company officials told Clyde.

It is important to make model tests of dam spillways, because poor design can lead to expensive maintenance, or worse, loss of the structure and even loss of life, the UWRL associate director said.

"In model testing you must build the model so that it truly represents nature. Then you have to be wise enough to ask the right questions so the model tests will give you the information you need," he explained.

In the past, models of such Utah structures as the Porcupine and Woodruff Narrows dam spillways have been tested at UWRL.

The extensive customer service program includes testing of current meters to check river flows, pressure relief valves and vacuum relief valves for irrigation lines.

"We try to go beyond simple testing for our customers. Where it is appropriate, we make suggestions for improvement. A valve we tested last summer didn't work correctly. We suggested a low-cost modification that made it meet specifications," Clyde relates.

On another occasion a Logan contractor suspected a meter it was using was giving wrong answers. Contract payments depended on accurate information. UWRL found the company's suspicion was correct and calibrated the meter so correct measurements could be obtained.

"Utah State University engineers have been leaders in developing flumes for measuring open channel flow. This (continued on page 4)
Editorial: Frankly Speaking

Western Drought Nears Panic Stage

We are indebted to Mr. Archie M. Kahan, Chief of the Division of Atmospheric Water Resources Management, United States Bureau of Reclamation for the "Hydro-illegible cycle" reproduced here. I print it because it expresses my own views about the way people, in general, respond to weather conditions. From the news media coverage of the existing drought conditions, we can see we are approaching the "panic" stage. Governors are mobilizing forces, legislators are being pressured into action, mayors and councilmen are looking for ways to plug leaks, and university "experts" are giving advice. Money is being appropriated to seed clouds and every white wisp in the sky is being cultivated in hopes of producing a storm.

As in any emergency situation, panic produces bad judgment and illogical decisions. Much of the advice given and alarms sounded are wasted energy and only tend to excite not to inform or to produce. I have been told to put a brick in the storage compartment of my toilets at home to save water. I computed that this would save one quart each flush—but wait. I used the word "save." Am I really saving water? What I don't flush through my water meters flows back into the river to Great Salt Lake—and come to think of it, what I do flush goes down the river to Great Salt Lake. So what have I gained? I looked out my window here at the Water Lab and see 50,000 gallons of water going past every minute and where is it going? To Great Salt Lake to be evaporated—every last drop of it—returned to the atmosphere to form a white wisp that somebody can seed. Then this thought occurs to me. This water flowing past is not this year's rain (how could it be, we haven't had any). It belongs to last year, or the year before, or the year before that. Who knows? It's coming from nature's reservoir.

This drought and our frantic effort to make it rain, regardless of the method used—sprinkling clouds with silver iodide, hiring a tribe of Indian rain dancers or just praying—should make us realize this great truth—that water is a mobile transitory product of nature not a product of man. Man's part is to produce the facilities to use what nature provides. If our facilities are inadequate, we may have to share by putting rocks in our toilet closets and in other ways conserving; but we are not saving water—water cannot be saved. We are only making greater use of our limited facilities. The dry farmers' winter wheat would not have withered and died this year if we had facilities to "make rain" with some of the water now going into Great Salt Lake. The water is there—it just isn't raining naturally. Could it be that we have spent too much time and money building surface storage facilities to capture the immediate storm and too little time on developing base flow and underground sources? In an extended drought an empty reservoir is of no more value than no reservoir, while nature's reservoir will always be the last to dry. It's ironic, too, that it is cheaper to drill wells than to build reservoirs. Maybe it's also cheaper to irrigate in the winter than it is to seed clouds.

So, don't panic during this drought. Do what I do—pray a lot and dig a well in your back yard.

Water Resources Group Meets in SLC

The fifth annual conference of the Utah Section of the American Water Resources Association was held in Salt Lake City February 24, 1977. "Critical Water Problems in Utah" was the theme of the meeting which was co-sponsored by the Utah Water Research Laboratory and the Utah Division of Water Resources. The conference plans called for panel discussions on the following subjects: Water Quality (208 studies PL\$2.50); Energy Policy related to Water Reserves and the Utah State Water Plan; Financing Future Water Development; and the New and Future Great Salt Lake Fluctuations.

Dr. Allen B. Davis, Political Scientist at Weber State College and President of the Utah Section of AWRA, welcomed the members and guests who had assembled at the Rodeway Inn to attend the conference. Dr. Davis introduced Jack A. Barnett, Director of the Western States Water Council, who presided at the morning session of the conference and Lloyd Austin, Hydrologic Engineer with the Division of Water Resources, who chaired the afternoon events.

The panel on water quality heard reports from David W. Eckoff, Project Manager of the Salt Lake County 208 Water Quality Project; Calvin Sudweeks, Chief, Water Quality Section, Bureau of Environmental Health; David Ovard of the Salt Lake County Water Conservation District; and D. Craig Bell, Assistant Director of the Western States Water Council.

Speakers Express Concern

The panel expressed concern over the need to limit the adverse effects of pollutants in water, particularly during a drought year and also over the rising cost of administering clean water legislation. The dominance of the federal agencies in water quality control was also pointed out with similar concern.

The problems of fluctuating levels in Great Salt Lake received attention in the afternoon session with Dallin Jensen, Assistant Attorney General for Water Rights, describing the recent legislation which determined the ownership of the lake and also pointing out the problems in the disputes over the railroad causeway.

(continued on page 4)
Research Proposals Reflect Creativity

The measure of a research laboratory's success is often by the number of proposals funded, but the effort and creativity of the researcher is more easily appreciated by the number and titles of the proposals submitted. The unsuccessful or unfunded proposal never receives mention in the news media and often is forgotten. We reproduce here the titles of many of the proposals submitted by OWRT and UWRL researchers up to the first of the year. Perhaps some of them will catch the eye of the man with the money and become a funded research project.

OWRT Proposals Submitted for FY 1978 Matching Grant Consideration

Erosion Rate Verification Using a Rainfall Simulator.
Identification of Presumptive Carcinogenic Compounds Released to Water Supplies by Oil Shale Development.
Wind Surges and Seiche in Shallow Basins.
The Effect of Sinamycin upon an Aquatic Food Chain.
Predicting Erosion in the Western United States.
Energy Requirements to Meet the Objectives of the Federal Water Pollution Control Amendments of 1972 in the Region of the Colorado River Basin.
Stochastic Modeling of Water Surface Elevations for Terminal Lakes.
An Automatic Flood Detection and Self-Reinforcing Warning System.
Optimum Design of Water Distribution Networks.
Prediction of the Biological Impact of Heavy Metals on the Aquatic Environment by Use of Simulated Ecosystems.

Use of Warm and/or Saline Effluent Waters from Electrical Generating Power Plants in Food Production.
Use of Saline Water in Energy Development.
Salinity Reduction in On-Stream Reservoirs.
Aspen to Conifer Succession: A Process Aggravating the Salt Pollution Problem in the Colorado River Basin.
The Effectiveness of Water Conservancy Districts in the Realization of Optimal Water Allocation and Management.

The Integration and Testing of Social and Economic Assessment Techniques for the Construction and O&M Phases of Water Development.
Economic and Political Feasibility of State Water-User Fees for Financing Water Development and Cost Sharing.
Stochastic Consideration in Wastewater Treatment Facilities Design.
Predicting Crop Production as a Function of Soil Moisture and Salinity Stress.
Overland Flow of Ponded Dairy Cattle Waste Runoff as a Pollution Control Alternative.
Use of Energy Flow Analysis in Evaluating Water Management Alternatives.

Non-OWRT Proposals

Ecological Effects on Highway fills on Wetlands.
Potential of Interflow as a Salt Transport Mechanism in the Colorado River Basin.
Site Selection and the Potential for Wind Energy.
Experimental Investigation of Cloud Seeding Potential in Winter Orographic Storms.
Economic, Social, & Environmental Effects of Flood Plain Regulation.

Seour at Culvert Outlets in Mixed Bed Materials.
The Effects of Silver from Cloud Seeding on the Microbial Activity of Lakes and Lake Sediments.
Peak Flows in Rural Domestic Water Systems.
Model Testing of Spillway for North Powder Project.

Aquarius "Pop" on Schedule

The editors of Aquarius have been pleased with the response to the questionnaire included in the last issue. We announced at that time our intention to publish a series of pamphlets describing in popular language, the research effort being directed toward the solution of a variety of interesting water problems. The first issue on the Great Salt Lake will appear about May 1 and will be offered to all those on our current mailing list. If you know of others who would like to be included, please let us know. Instructions on how to receive your copy will appear in the next issue of AQUARIUS.

Future "Pop" issues will probably discuss those topics first which received the greatest interest response on the questionnaire. One topic seemed to lead all others with 76 percent of the respondents selecting this category. It is "Political and Legal Problems with Water, Including Water Districts and Citizen Involvement." This will present an interesting challenge to our editorial staff, but we'll see what we can come up with.

Two Water Workshops Offered Same Week

The Utah Water Research Laboratory and the Department of Civil and Environmental Engineering at Utah State University are offering two related workshops for consulting and municipal engineers and others interested in improving their skills in water planning and design. The first short workshop, to be held May 31-June 2, 1977, is entitled "Optimal Planning of Water Supply Systems Using Recent Computer Methods" and is under the direction of Dr. Trevor C. Hughes. The second workshop will begin June 2 and end on June 4, 1977. This workshop, under the direction of Dr. Roland W. Jeppson, is entitled "Analysis of Steady Flow in Pipe Networks." The two short courses are so designed that an individual can take both of them if he so desires. For further information contact the Conference and Institute Division, Utah State University, Logan, Utah 84322, Telephone (801) 752-4100 Ext. 7283.
Coming Events

May 2-5, 1977
"International Conference on Desertic Terminal Lakes." Weber State College, Ogden, Utah. Deon C. Greer, Chairman.

May 16-19, 1977

May 26-27, 1977

June 29-July 2, 1977

October 25-27, 1077
The Second AMS Conference on Hydrometeorology. Harborm Castle Hotel, Toronto, Canada. H.L. Ferguson, Program Chairman, Atmospheric Environment Service. ARQH 4905 Dufferis Street, Downsview, Ontario, Canada.

OWRT Accepting Proposals for FY 78

The Office of Water Research and Technology will now receive proposals for FY 1978 funding in the subjects of "Methods of Technology Transfer," and in "Water Reuse." Exact deadlines have not been announced, but notice will be sent to associations as soon as they are made known. For guidelines and forms, see or write to Mardyce Matthews at the Center.

Two water reuse proposals have already been submitted to the Office of Water Research and Technology for FY 1977 funding. Proposals for allotment support have now been screened, and six out of twenty have been selected for final review and selection.

Water Resources Group Meets in SLC

(continued from page 2)

Doug Stewart, Director, Great Salt Lake Division along with Leonard Smelser, Meteorologist with the Western Region Headquarters, National Weather Service, discussed plans for developing the resources of the lake and the problem of forecasting future lake levels.

Dr. Davis ended the meeting with the announcement of next year's theme and a call for papers. Next year's proceedings will be published, and the announced subject is "Water Rights."

Publications

PRAE-027 "The Effects on Agriculture in Utah of Water Transfers to Oil Shale Development," B.D. Gardner, Kenneth S. Lyon, and Roger O. Teiw. $3.00

Dept. of Outdoor Rec. USU "Methods for Determining Recreational, Environmental and Economic Consequences of Alternative Development Programs for the Bear Lake Area," John F. Hoaglund, David D. Iverson, and Larry S. Davis. $5.00

PRAE-015 "An Empirical Analysis of Predictors of Income Distribution Effects of Water Quality Controls," John E. Keith, M.C. Chen, Don C. Reading, and D. Johnson. $5.00


Water Lab Serves

(continued from page 1)
reputation brings us requests to check other flumes for accuracy," Clyde observed.

"We have the facilities to provide known flow rates so we can calibrate instruments accurately. We have the engineering skills to tell the user what his equipment will do, and to suggest improvements when needed. Utah Water Research Laboratory is providing a valuable service," the associate director said.
Special Edition of Aquarius Ready

First International Conference on Desertic Terminal Lakes Held at WSC

The Utah Water Research Laboratory, in cooperation with the National Oceanic and Atmospheric Administration, the Utah State Department of National Resources, and Weber State College, helped to sponsor the first International Conference on Desertic Terminal Lakes May 2-5, 1977 at the Fine Arts Center, Little Theater, at Weber State College, Ogden, Utah.

Terminal lakes (lakes without outlets) were once regarded as “dead seas,” places so desolate and useless that they held little attraction for man. That idea has changed in recent years as the true value of these lakes has become apparent due to the discovery of their mineral resources and other assets.

“A terminal lake can even be used to convert solar energy into electricity,” said Dr. Deon Greer, chairman of the WSC Geology-Geography Department and organizer and chairman of the conference. “In addition, the Great Salt Lake contains many billions of dollars worth of chemicals. Terminal lakes can, however, face problems such as desiccation (drying up into mud flats) and pollution,” he said.

Scientists from all over the world gathered to discuss mutual problems of terminal lakes. Several speakers from Israel discussed development of the Dead Sea as a source of mineral resources. Other familiar lakes were brought to light by speakers from Canada, India, French Guiana, Australia, and Kenya. Only one of the involved Soviet Russian scientists was able to attend the conference.

The Utah Water Research Laboratory was represented by David S. Bowles, Craig T. Jones, Calvin G. Clyde, William J. Grenney, and J. Paul Riley.

One of the more interesting papers was presented by Dr. Gad Assaf, from the Weizmann Institute of Science, Rehovot, Israel. Assaf represents a team of scientists who are now designing a power plant to produce electricity directly from the dead sea brines. Dr. Greer explains the process as follows: “It has been discovered that in solar ponds the brine stratifies, with the lightest brine on top and the heaviest at the bottom. Floating grids are then used to keep the brine from mixing so that no heat is lost.

The light brine on top allows sunlight to penetrate while the dense brine underneath traps the sun’s energy. The Israelis have achieved temperatures in excess of 90 degrees centigrade (194 degrees Fahrenheit) from test ponds. They propose to circulate this hot brine through a converter using alcohol or some other medium with a lower boiling point than water to drive a turbine and create electricity. A pilot plant is being built in Israel now.

The principal deterrent for the use of this type of energy in Utah is that we...
New Research Funded

WG-216 - Dissemination of Information on Dealing with Emergency Drought Conditions among the Western States - Andrews
WG-216 - Use of Warm and/or Saline Effluent Waters from Electrical Generating Power Plants in Food Production - Bagley
WG-217 - Testing a McNally 24" Butterfly Valve - Clyde
WG-215 - Identification of Presumptive Carcinogenic Compounds released to Water Supplies by Oil Shale Development - Adams
WG-214 - Stochastic Modeling of Water Surface Elevations for Terminal Lakes - Bowles
WG-213 - National Water Assessment - E.C. Israelens
WG-211 - Measurement and Evaluation of Atmospheric Variables Relevant to Weather Modification in Winter - Hill
WG-210 - Laboratory Measurements of Detrital Efforts of Aluminum additions to freshwater lakes of Northern Utah - George
WG-209 - Evaluation of Conshoring Elements in making Water use changes - Bagley
WG-208 - Consumptive use and Water Requirements for Utah - A.L. Huber

Drought Prompts Water Stretcher Newsletter

A drought information program with the 11 western states participating, is being coordinated by the Utah Water Research Laboratory and the Utah Center for Water Research. To better disseminate information on drought related problems, a newsletter entitled, "Western Water Stretcher," is being printed and circulated. Dealing with problems of water conservation practices, water management practices, and special drought induced problems, the newsletter hopes to create a forum for the exchange of useful and vital information. Anyone desiring information or having information to contribute are asked to write to the Drought Information Program, Utah State University, UMC 82, Logan, Utah 84322.

Will Great Salt Lake Continue to Rise?

Since the waters of Great Salt Lake reached the historic low level of 419.6 feet in 1963 there has been a gradual rise in the lake level. In 1976 the mineral industries felt threatened and public officials became excited when the level reached 420.2. Plans to dewater the lake by pumping units to western desert, and other grandiose schemes were discussed. Then came the long, dry winter of 1976-1977. Six months without a rain storm. Will the level of Great Salt Lake continue to rise?

Terminal Lakes Conference

(continued from page 1)

have a large supply of cheap fossil fuels. Solar energy would have to prove itself cheaper than oil or coal but such a possibility does exist. It is conceivable that chemical firms already located on Great Salt Lake could supply their own electrical needs in this manner.

The assets of Utah's own terminal lake, the Great Salt Lake, were demonstrated by representation of the mineral industries who conducted guided tours through the working plants as part of the conference activities. Dr. Greer emphasized the value of the lake when he pointed out that the present worth of the Lake's minerals is limited at $75-90 billion. "That's more than 50 times what we've already taken out of the Kennecott Copper Mines," commented Greer.

Porcella Named UWRL Associate Director

Dr. Donald B. Porcella, Associate Professor of Civil and Environmental Engineering at Utah State University, has been named Assistant Director of the Utah Water Research Laboratory, beginning September 1, according to Dr. L. Douglas James, UWRL Director.

Dr. Porcella is currently on sabbatical leave from the University and is with the Environmental Protection Agency's Pacific NW Environmental Research Laboratory at Corvallis, Oregon. He joined the Utah Water Research Laboratory in 1970, and has served as Head of the Division of Environmental Engineering. Dr. Porcella received the AB degree in 1959, the MA degree in 1961, and the PhD degree in 1967 from the University of California at Berkeley.
Civil Engineers Meet to Discuss Groundwater

The Utah Section of the American Society of Civil Engineers held their annual meeting at Park City, Utah, May 12, 1977. Devoting one session to "The Use of Groundwater to Alleviate a Drought," the conference heard various experts describe the "good news" and the "bad news" of groundwater development.

Keynoting the conference was Lt. Governor David S. Monson who described the severity of the drought as he had observed it from his visit to various parts of the state and as the state's coordinator of drought relief programs. Following this gloomy picture, a panel of experts next addressed the subject of how existing groundwater could be used to alleviate the drought. Jay M. Bagley, Professor of Civil and Environmental Engineering at Utah State University, moderated the panel and introduced each speaker.

Mr. Ted Arnow, Chief of the United States Geologic Survey and an experienced groundwater hydrologist, explained the "good news." He said that the groundwater basin underlying Salt Lake Valley was "full and over flowing." Describing the aquifers as being over 400 feet thick and being recharged from the mountains on both sides of the valley, the total amount of water available for use is about 60,000,000 acre feet. (That's enough water to meet the present municipal demands of Salt Lake County 6,000 times!) The average annual recharge to the groundwater basin is near 125,000 acre feet more than the present municipal demand. Arnow indicated pumping 35,000 additional acre feet in a drought year would produce no ill effects and pumping an additional 100,000 acre feet for several consecutive years would probably have little consequence on the pump lift in the valley. He concluded by stating that for maximum benefit to the citizens of Utah, plans should be made to exploit groundwater.

Responding to a question by Dr. Calvin G. Clyde, on what could be done to set aside artificial recharge areas, Arnow said that previous attempts to define recharge areas in the Davis County area resulted in flooded basements which he said indicated a full underground reservoir. "You cannot recharge without first lowering the water table," Arnow said.

Dr. Vaughn E. Hansen, an engineer in private practice with considerable expertise in groundwater development, told of his experience in discovering new underground reservoirs and in developing water discovered in mines. He told of one such discovery in the mine west of Castle Gate, Utah, where the capacity of the reservoir is double that of Schofield Reservoir, is of good agricultural quality, and will pump lifts well within the economic range of agricultural development. He encouraged Utahns to take a broader look at the underground resources.

Mr. Terry Holzworth, engineer for the Salt Lake County Water Conservancy District said he agreed with the philosophy of groundwater development as expressed by Arnow and Hansen, but that he had run into some practical problems that he had not solved when he tried to pump from wells. He said the problems were political and institutional and that for proper groundwater development there was a need for coordinated groundwater management. All wells must be managed together. Individual well owners disputing each other over interference problems and priorities create an attitude not conducive to groundwater use. Holzworth said the

(continued on page 4)

Special Edition of Aquarius Ready

(continued from page 1)

healthy anxious spirit and we're glad you intend to make us produce.

The interest categories you voted for were also very interesting. Your interest in good government and citizen participation was evident by your more than two-thirds majority in the topic, "Political and legal problems with water, including districts and citizen involvement." It also indicated a healthy citizenry to have most of you vote for many subjects and not narrow your interests to just one.

The categories in order of preference were: political and legal problems with water, including districts and citizen involvement; water involvement; water salvage and reuse; the role of state government in water; cloud seeding and weather modification; federal legislation, its impact on water resources; the Great Salt Lake; coal and oil shale development; small domestic and urban water systems; and federal reclamation in Utah.

In addition, our readers added the following additional categories: economics of water; community use patterns of alienations; groundwater; water conservation, financing of water projects; consolidation of irrigation systems, use of saline waters; weather trends; pros and cons of the Central Utah Project; and environmentalists arguments.

There is a big job ahead for the editors of Aquarius! Watch for future special issues.

ORDER FOR SPECIAL ISSUES OF AQUARIUS:

Please send ________ copies, at $1.50 each, of

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(continued on page 4)
Civil Engineers Meet to Discuss Groundwater

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District has emphasized surface use because of its commitment to pay the costs already expended for development and that the reservoirs are already there and need to be used (even though costs are higher).

The concluding panel speaker was Dee Hansen, Director of the Utah Division of Water Rights and State Engineer. Hansen repeated the problem mentioned by Holzworth saying that if there were only one underground water user (one owner of water rights) his job would be easier and groundwater development would proceed faster. Indicating he favored groundwater development, Hansen said his main responsibility was to preserve and protect water rights. This meant that sometimes he had to reject filing for new appropriation even though there was still undeveloped and unappropriated groundwater. Some changes in the groundwater law may be made by the special legislative session in June. "This will help groundwater development," Hansen concluded.

As the conference concluded and the attendees began to leave Park City it started to rain! And it didn't stop raining until the Memorial Day weekend, after accumulating nearly 5 inches of much needed water.

PUBLICATIONS

New publications recently completed at the Utah Water Research Laboratory include:

PRWRI-1 "Iron Dynamics in a Gas-Water-Sediment Microcosm" by Peter A. Cowan, V. Dean Adams, and Donald B. Forcella. November 1976. ($3.00)


PRWR&T167-1 "Upgrading Aerated Lagoon Effluent with Intermittent Sand Filtration" by Richard P. Bishop, James H. Reynolds, Daniel S. Filip, and E.Joe Middlebrooks. June 1977. ($3.00)

PKJER081-1 "An Energy Accounting Evaluation of Several Alternatives for Hydropower and Geothermal Development" by J. Clair Batty, J. Paul Riley, William J. Grenney, and David A. Bell. June 1976. ($3.00)


These publications may be obtained by writing to:
Utah Water Research Laboratory
UMC82
Utah State University
Logan, Utah 84322

News Notes

Dan Filip attended a special conference on the "Mechanics of Lake Restoration" in Madison, Wisconsin, April 25-26, 1977. This conference was sponsored by the University of Wisconsin and the Wisconsin Department of Natural Resources.

David Bowles will present a paper at the Third Fort Collins International Hydrology Symposium June 27 through June 29, 1977.


Coming Events

The 23rd annual Institute of the Rocky Mountain Mineral Law Foundation will be held on the shore to Lake Tahoe's Crystal Bay near Incline Village, Nevada, July 14, 15, and 16, 1977. The program will include a section on water law.

The Second International Conference on Transfer of Water Resources Knowledge will be held June 29 through July 2, 1977, also at Fort Collins, Colorado.

The Third Fort Collins International Hydrology Symposium will be held June 27-29, 1977, at Fort Collins, Colorado.
Water Lab Assists Congressional Study

Utah's congressional representative Dan Marriott asked the Utah Water Research Laboratory to undertake a "quick" study of the feasibility of accelerating the construction schedules for the Central Utah Project (CUP) to determine if it would be advantageous to reduce the time to completion. Director L. Douglas James assigned the task to Trevor C. Hughes, Frank W. Haws, and C. Earl Israelsen who spent part of their Christmas vacation collecting data. With the cooperation of the Bureau of Reclamation and the Central Utah Water Conservancy District, the researchers were able to put together a report entitled, "Feasibility of Accelerating Construction of the Central Utah Project" before Congress convened again in January.

The construction schedules examined included periods of 8, 13, and 22 years. The 8 year period would require an annual expenditure of about $50 million, the 13 year period an annual expenditure of about $50 million and the 22 year period an annual expenditure of about $33 million. These costs are for the Bonneville Unit only. The amount suggested in President Carter's budget message would extend the construction period for 23 years.

(continued on page 3)

Rains Reduce Drought—Now Floods?

This winter bears little resemblance to the one of just a year ago when the heavens seemed to be sealed and no rain fell for almost five months. This year the ski resorts are back in business, the snow surveys report above normal amounts of water in the snowpack, and the forecast for next summer is bright and wet. In fact, some parts of the West are already beginning to feel the effects of too much water. Even California's reservoirs are beginning to fill, and floods are occurring in areas where water rationing had become the accepted mode of living.

Last summer we talked with Joel Fletcher about the drought and asked him about the probability of having two extremely dry years in a row. Joel dug into the records, even examining tree ring records, to determine how often past history has recorded two back-to-back years of severe drought. In all the 700 years of written and tree-recorded records, Utah has experienced only one case in which two consecutive years had precipitation less than 60 percent of average. This means that the probability of such an occurrence is about 1 in 700. On the other hand a dry year followed by a wet year has occurred often in Utah history. The probability of a year wetter than this 60 percent of average following a dry year is close to 100 percent.

The drought is just a memory now, and certainly for some a bad memory. But for some it was business as usual, and if it hadn't been for the continued reminder of the news media, some would have been unaware a drought existed. One who was aware and who was called upon to do more than usual was the State Engineer, Dee Hansen and his core of workers throughout the state who settle water disputes and handle all new applications to appropriate water.

We asked Michael Turnipseed, area engineer for the Northern Utah area which includes Box Elder, Cache and Rich counties, what kind of special problems he encountered.

He said that the first thing that happens when a drought occurs is a rapid influx of persons seeking to file new applications to appropriate water. Most of that activity is for new wells to water livestock. Turnipseed implied that the motivation to drill a well is not always lack of water; for many it is the financial assistance from public agencies that is made available during a drought season. The tremendous number of additional applications that must be processed, advertised, and approved or disapproved slows down the processing machinery and as a result some critical needs receive approval too late to do

(continued on page 2)
New Research in Progress at the UWRL

"Instrumentation Development for Measuring Two Phase Flow" is a new research project directed by J. Paul Tulis and Calvin G. Clyde and funded by Electric Power Research Institute. At present there is no satisfactory way of measuring water and steam flow in the piping systems of power plants. A flow meter is being developed and used to determine the conditions that can be expected.

G.E. Hill is heading a project "Evaluation of Winter Cloud Seeding to Increase Precipitation in the Mountains of Utah." He is developing cloud seeding criteria and methods for conducting and evaluating weather modification activities for the Utah Division of Water Resources.

"Model Testing of Spillway for North Powder Project" is being conducted by project leader Calvin G. Clyde and C. Earl Jarrell. The model testing will improve the final design of the spillway for a dam to be built in Oregon. The research is sponsored by CH2M Hill and the Soil Conservation Service.

"An Operational Test of Factor Profiles in Forest Service Planning" is a project aimed at developing and testing procedures for organizing information about forest management alternatives. It will aid the public and the Forest Service in discussing the merits of alternatives and choosing the one that is in the best public interest. The study is sponsored by the U.S. Forest Service. Project leader is Mac McKeen.

J. Paul Riley is heading a study of "The Potential of Water and Salt Yields from Overland Flow on Natural Resource Lands in the Price River Basin" for the Bureau of Land Management. An evaluation is being made of the runoff and the salinity carried from lands managed by BLM to the Price River. Measurements are being made on three typical watersheds in the Price River drainage and then these measurements will be used to estimate flow and salinity quantities from these lands within the river drainage through a computer model.

J. Paul Tulis is "Collecting and Evaluating Prototype Data in a Piping System with Air Release and Column Separation," in a study for the National Science Foundation. The rapid starting and stopping of waste in a pipeline causes high pressures which can rupture the pipe and damage other parts of the system. This study will help improve the predictions of such pressures for large pipe systems and enable better designs.

"Frequency/Damage Analysis for Management of the Water Resources System of the Great Salt Lake" is another study for the State of Utah headed by J. Paul Riley. The project is part of a large effort to assess the benefits and damages resulting from various possible options for managing the water level of the Great Salt Lake. Decision-makers will then be in a position to select those options providing the greatest level of benefits or minimizing damage costs associated with lake levels.

"Historical and Projected Municipal and Industrial Water Usage in Utah Counties from 1960 to 2020" is the title of a study for the Bureau of Reclamation headed by H.B. Fullerton and David S. Bowles. Utah's municipal and industrial water users are being surveyed to determine historical water usage from 1960 to present. Using socio-economic models, future water use will be projected to the year 2020. This information will aid federal and state officials in their water resources planning.

COMING EVENTS

The sixth annual conference of the Utah Section of the American Water Resources Association will be held in Salt Lake City, March 9, 1978, at the Ramada Inn. This conference is co-sponsored by the Utah Water Research Laboratory and the Utah Division of Water Resources. The theme this year is "New Directions in Water Law."

An Interstate Conference on Water Problems is being planned for April 11-12, 1978 in Reno, Nevada. The IWP is an organization of the natural resource representatives of each state. This year the conference is co-sponsored by OWRT and will feature a workshop on technology transfer.

—Now Floods?

(continued from page 1)
much good. Some of the federal aid, Turnipseed said, may have gone to the earliest applicants whose needs for water were less critical than some of the slower applicants.

Some of the problems of dividing the water during a drought year are caused by man as much as by nature, Turnipseed said. Many of the measuring devices, which are not used when water is plentiful, were not in working condition during the drought. Long periods of nonuse or misuse and lack of proper maintenance were the cause of head gates and measuring devices not functioning when they were really needed.

On Logan River, in Cache Valley, a 50 year old structure known as the "Y," which is used to divide the flow into two streams leaked so badly it was of little use. Rich county had similar problems when the flow of Elig Creek dropped from a normal of 60 cfs to 3 cfs.

Another problem mentioned by Turnipseed was man's inability to outguess nature. In the fall of 1976 the Woodruff narrows reservoir in Rich County was drained to kill trash fish. Lack of rain during the next four months prevented the reservoir from filling and by January 1977 it contained only 7 percent of its capacity. By May it still contained only 32 percent of capacity. If the water users had tolerated the trash fish and had not drained the reservoir, they could have started the season with essentially a full reservoir.

The staff of the area office was also kept busy answering complaints about someone interfering with the established rights of someone else. A water measurement and a slight adjustment of a headgate probably solved the problem and perhaps avoided bloodshed. Our thanks to these un-heralded public servants.

Aquarius

a newsletter for the
Utah Center for Water Resources Research
Utah Water Research Laboratory
Utah State University

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We invite you to submit your news items for inclusion in the Aquarius Newsletter. The letter will be sent free of charge to those requesting it.
Workshops Held On Water Systems And Pipe Networks

Two short-course workshops for consulting and municipal engineers were held during the week, January 9 to 14, 1978, at Utah State University, to upgrade the capability of engineers to plan water systems and design pipe networks. The first workshop entitled "Optimal Planning of Water Supply Systems" was under the direction of Trevor C. Hughes, with Hughes, Paul E. Pugner, and Calvin G. Clyde as instructors. The second workshop was under the direction of Roland W. Jepson with Jepson, Gary Z. Watters, and A. Leon Huber as instructors. Both workshops are products of research conducted by the workshop directors and instructors at the Utah Water Research Laboratory.

Dr. Huber reported that the workshops this year were very successful and that most of the 16 participants attended both workshops. Participants came to Logan for the workshops from all parts of the United States including Florida, Oregon, Colorado, and California.

Manual Prepared

"WASOFT Users Manual, an Integer Programming Methodology for Municipal/Regional Water Supply Planning" has been prepared by Trevor C. Hughes, Paul E. Pugner, and Calvin G. Clyde.

The Manual presents a systems analysis methodology for identifying the least cost combination of municipal water supply facilities and operating rules.

The Manual is available from UWRL for $5.00. Please request PRWG 109-2 and address Publications, UWRL, UMC 82, Utah State University, Logan, Utah 84322.

Congressional Study

(continued from page 1)

The reports concluded that there would be definite benefits to completing the project in the shortest time possible. A realistically achievable level of financing, the report says, is between $60 and $70 million per year which would complete the project in 10 or 11 years. The report says this recommendation compromises between economy, quicker realization of benefits, adequate time for the deployment of personnel to make sound and safe decisions, and adequate consideration of environmental issues.

Citizen Advisory Council Meets, Reviews Progress, and Suggests New Directions

Members of the Citizen Advisory Council for Water Resources Research were guests of the Utah Water Research Laboratory on November 11, 1977, and listened to staff researchers explain their latest findings in water research. The 15 member council meets annually to review progress and to suggest new directions for research that will best serve the interests of Utah citizens.

After a welcome to the university by Dean E.J. Middlebrooks and hearing a report from Water Lab director, L. Douglas James, the council listened to Bartell Jensen, Vice President for Research at USU, express some of his concerns for the future of research at the University. Although the research expenditure at USU in 1978 was over $23 million dollars, Jensen explained that in real dollars (discounting effect of inflation) there was less money expended for research in 1978 than there was a decade ago. He said that nationwide a larger part of the research and development dollar is going to development and that development is going to private sources. He was also concerned about the trend toward "targeted" research by funding agencies, replacing "free" competition for the best ideas, was stifling creativity and that the innovative ideas of University researchers were "going begging" for want of a sponsor. He also indicated that future water research would emphasize water needs for energy development as well as the pathologic affect of chemicals injected with the water supply.

Among the research projects reported that held special interest for the council was the development of a solar powered water pump—the brain child of electronic engineer, Duane G. Chadwick. Chadwick's pump has no moving parts and requires no external energy supplement. It is designed specifically for use by small householders in developing countries. Also of interest was a project under the direction of a visiting researcher from Israel, Gad Assaf, in which the potential use of Great Salt Lake as an energy source was being explored. Also in the energy field was a project reported by Calvin Clyde on the use of low-head hydropower.

The council, short one member because of the resignation of Chairman Angus Belliston, Vice President of Zion's First National Bank of Provo, has been led by Vice Chairman Dan Lawrence. A new member of the council this year is Genevieve Atwood, who replaced Leonard Johnson who transferred to Illinois as director of natural resources activities for the American Farm Bureau. Atwood is presently serving as a representative in the Utah State Legislature. The council now consists of Genevieve Atwood, Jay R. Bingham, Lloyd Bliss, Wayne D. Criddle, Frank N. Davis, Ival V. Goslins, Dee C. Hansen, Gordon E. Harmston, Daniel F. Lawrence, Dixie Leavitt, Lynn S. Ludlow, Ray Nielsen, Chandler F. St. John, Lynn M. Tatch-er, and Charles Wilson. Dixie Leavitt, president of Dixie Leavitt Insurance Company, Cedar City, Utah, was elected new chairman of the council for 1978.

Mardyne Matthewson, administrative coordinator for the Utah Center for Water Research, is now distributing copies of the 1977 Annual Report of the Center. This year's report has an attractive full color cover and an inside format which makes reading it a comfortable and enjoyable experience. If you would like to have a copy, write to Mardyne at the Utah Water Research Laboratory, Utah State University, UMC 82, Logan, Utah 84322.
Rep. Marriott Fights To Have Law Changed

A federal law dating from 1902 is the cause of considerable controversy. Western water users and Utah's Representatives in Congress agree that the law is outmoded. Rep. Dan Marriott is one of those who hopes to solve the problem by repealing that part of the Federal Reclamation Act that restricts a farmer to the use of 150 acres if he receives water from a federal reclamation project.

The controversy began when Secretary of the Interior, Cecil Andrus, announced his intentions of enforcing the 75-year old law. The law has been severely criticized on grounds that it is outdated and that farming practices and lifestyle have changed considerably since 1902. Andrus has been quoted as saying, "while conditions of family farming may have changed in some areas since the Reclamation Law was passed in 1902, Congress has not seen fit to change the law." If the law is enforced, many large farms would be broken up and sold by lottery, a practice which many farmers believe robs them of a personal privilege.

The law originated in the first place as a carry-over of the Jeffersonian period when land was plentiful and a family could subsist on a small number of acres. Thomas Jefferson reasoned that Americans could remain free and equal if each family owned and managed his own farm. Surdism and tenant farming of the Old World would thus be avoided in America. He could not foresee, however, the vast unfarmable deserts and mountains, the lack of rainfall needed to mature crops, nor the effect of the industrial and technical revolution, and the interdependence, today, of a multitude of varying occupations. The farm today is more than subsistence living. It's a commercial business and as one California farmer said, "how can we continue efficient operation" if our farms are reduced in size. The effect on Utah farmers may not be that severe, but most will agree with Rep. Marriott that the law is outmoded.

Special Aquarius Issue Delayed

The special issue of Aquarius which was scheduled originally to come out in November will be mailed to subscribers as soon as it comes off the press, probably near the end of March. The task of describing "Political and Legal Problems with Water, including Water Districts and Citizen Involvement" was a big list for our engineer-writers who were sandwiching their effort between proposal writing, report writing, and keeping up with their research. They have also started a third issue on Cloud Seeding and Weather Modification. If you'll bear with us and continue to be patient, we hope to have these issues ready for distribution soon. If you're not a subscriber, you should be. Each approximately 40-page presentation in magazine format can be obtained for $1.50 by writing AQUARIUS, Utah Water Research Laboratory, UMC 82, Utah State University, Logan, Utah 84322.

Capsule Reports Available On Water Research

The U.S. Department of the Interior, through the Technology Transfer Program of the Office of Water Resources Research has instituted a series of publications called "Water Research Capsule Reports." The purpose of these publications is to give national recognition to successful water resources research and make available the usable research results and application to potential users throughout the United States.

The first two issues are off the press and have been distributed to the various state centers. The first issue is entitled "Water Conservation Devices—Residential Water Conservation." California and Pennsylvania are the chief contributors to this research effort but the water saving devices described have application in any area where reduced use will conserve water. The second publication is entitled, "Scale-Free Vapor Compression Evaporation," and is the result of development done by the Resources Conservation Company aided by grants from the Office of Saline Water. It describes a method of removing dissolved solids from wastewater, making a high quality water available for re-use.

Copies of these two publications can be obtained as long as the supply lasts by writing to the Utah Center for Water Resources Research at Utah State University, Logan, Utah 84322.