Underground Water Supply Investigated By Salt Lake County

Calling it a “program of definition,” Sandy Mayor W. Paul Thompson, chairman of a Salt Lake County Council of Governments Committee to Investigate the Supply of Underground Water greeted participants assembled for what may be the first Groundwater Seminar to be held in Salt Lake County.

The February 8 meeting which drew 122 participants, including water supply officials, interested private citizens and representatives of local, federal, and state agencies, was sponsored by Sandy City and the Salt Lake County Water Conservancy District. Speakers addressed the probable extent, quality, and reliability of groundwater resources in Salt Lake County.

Setting the stage for following speakers, Ted Arnow, District Chief, Water Resources Division, U.S. Geologic Survey, viewed the findings of groundwater investigations conducted by his office since about 1905. Arnow stated that the USGS has been studying groundwater in Utah and in Salt Lake County longer than anyone else and “we are still carrying on the most comprehensive groundwater studies in the county.”

With maps and diagrams, Arnow showed that the valley floor in Salt Lake County is filled with unconsolidated materials which have come from the surrounding mountains and are now saturated with water to depths greater than 700 feet, averaging about 400 feet. He said water from rainfall, the runoff from the mountain streams, and water flowing from the mountain rocks directly into the valley fill annually recharge this underground reservoir to the extent of about 367,000 acre feet.

Arnow said that since the reservoir is full, the same amount (367,000 ac. ft.) flows out of the reservoir each year. Part of this goes into Jordan River, some to evapotranspiration, and some directly into Great Salt Lake. The underground reservoir contains about 60,000,000 acre feet of water, much of which could be pumped out for water supply if needed.

“We don’t have to worry about pumping it dry when we consider how much there is and how much recharge there is,” Arnow said. You would have to withdraw more than 367,000 acre feet annually before you even start to use the 60,000,000 acre feet in storage. In fact, you can’t even talk about artificial recharge until you start to draw down the reservoir to provide space for new recharge.

Present use from the groundwater reservoir in Salt Lake County is about 125,000 acre feet. Future projections of water demand by the year 2015 as given by Gale Moore, Chief of Water Resources Division of the U.S. Water and Power Resources Service (formerly the Bureau of Reclamation) is about (Continued on page 2)

Conference Planned On Future For Utah’s Water Policies

The League of Women Voters of Utah will sponsor a conference, “Challenges of the Future for Utah’s Water Policies,” on March 18 at the Ramada Inn in Salt Lake City from 9 a.m. to 3:30 p.m.

The conference is funded by a National Science Foundation grant “Science for Citizens” program. The purpose of the grant, the first awarded in Utah, is to provide a forum for dissemination of information for community debates on issues involving science and technology.

The focus of the conference will be on three problem areas: 1) conversions of agricultural water to energy/industrial use; 2) conversions of water when rural areas become urbanized; and 3) preservation of instream flows.

These problems will be addressed from the perspective of an economist, an engineer, and an attorney.

The engineer is Dr. Lee Brown, Director of the Bureau of Economic and Business Research, University of New Mexico, and the author of a soon to be released book (with Allen Kneese), Natural Resource Development Issues in a Regional Setting.

Dr. Brian Mar of the University of Washington in Seattle is the Engineer. Dr. Mar has done extensive research on the problems of instream flows.

Mr. William A. Hillhouse II is a partner with Davis, Graham and Stubbs, Denver, Colorado. As a practicing attorney, he has written several legal articles and serves as a staff attorney for the National Water Commission.

The luncheon speaker is Dr. Evan Vlachos, Professor of Sociology and Civil Engineering at Colorado State University. His topic is “Water and Culture in the Arid West: Problems and Prospects.” Dr. Vlachos is presently the Director of the Environmental Resources Center at CSU.

The afternoon sessions will be devoted to workshops which will further explore the morning topics. The emphasis on the afternoon workshops will be information sharing between the conference participants. As part of the project funding, the League will publish and distribute briefing papers on the conference topics.

The Conference is free and the cost of the luncheon is $3. The League has some monies for travel scholarship for participants. To register and for further information, please call 801-328-4532.
OWRT Asks For Review And Goals

The Office of Water Research and Technology is asking each state water resources research center to review current water problems and its past research performance and to set some definite goals for the next 5-year period. The Utah Center, under the direction of L. Douglas James, is beginning the process of collecting comments and research ideas which will then lead to recommendations and goals. James has asked Drs. Jay M. Bagley, Jay J. Messer, and Michael S. Gould to assist him in conducting interviews, sifting ideas, forming conclusions, and making recommendations. The results will be discussed with the Advisory Council for their input before a final report for the State of Utah is sent to Washington. There it will be integrated with inputs from other Colorado River Basin states in defining goals for our region and with other regions in formulating goals for the total national water research program involving many agencies besides OWRT.

Underground Water Supply

(Continued from page 1)

302,000 acre feet, 70,000 acre feet coming from the CUP and only 140,000 acre feet used from ground water.

Based on this description of the enormous ground water reservoir available and the apparent lack of use planned for the ground water reservoir, many in the audience began to question the urgency to complete the billion dollar Bonneville project to bring additional water into Salt Lake Valley.

Responding to questions from the audience, Arrow indicated the danger of salt water getting into the underground supply was remote and would require lowering the level several hundred feet. He also said that because the valley sediments had been previously compacted by ancient Lake Bonneville, the chances of significant land subsidence was minimal. Other speakers to address the group were Dan Lawrence, Division of Water Resources, Earl Staker, Division of Water Rights, Gayle Smith, State Board of Health, and Richard Chagnon, Hydrologist, Johnson Well Screes.

Are new bond issues good or bad?

Financing Water Projects In Utah

The 1980 budget session of the Utah Legislature passed a senate bill (SB-62) which allows the state to sell 25 million dollars of general obligation bonds. This money when added to the 1978 bond issue of the same amount makes 50 million dollars available to obtain water development projects in Utah. Governor Matheson has said that it is his intent to get this fund eventually to 100 million dollars. When these money are added to the Revolving Construction Fund and the Cities Water Loan Fund, the state would have in excess of 130 million dollars to invest in water development projects.

This increased commitment to water resources development is triggered by the new water needs emerging within Utah's water dependent economy and reflects the desire of the state to take a greater role in the development and management of its own water resources. Commenting on the bond issue, Governor Matheson said, "What a thrill it was to see the State of Utah making its own policy and spending its own dollars to enhance opportunity. This will be repeated time after time after time as we proceed through the decade of the 80's."

Others are less enthusiastic because of worry over environmental impacts or desire to minimize governmental expenditures. From both viewpoints, it is important to sort out the implications of expanding state water financing programs and to assess their adequacy, effectiveness, and appropriateness in meeting today's needs. Dr. Jay M. Bagley, UWRL Researcher, points out the importance of discussion by an informed public and debate between those of opposing viewpoints in helping the Governor and agencies reach the management decisions serving the best long run public interest.

Another UWRL researcher who has studied social-economic impacts of water development, Kirk R. Kimball says, "If policymakers desire a greater and more active role for the state in water development, they must face some important issues which are the same ones that federal water development agencies have been wrestling with for many years. The answers arrived at by the federal agencies may or may not be the best answers for Utah programs. Only an active public discussion and information exchange will help us to find our own best approach."

Among the issues which need to be addressed, according to Kimball are:

1. The selection of an appropriate discount rate for evaluating state water projects.
2. The determination of an appropriate repayment interest rate to charge for state funds advanced.
3. The delineation of any circumstances which might justify some form of public subsidy to disadvantaged groups within the state.
4. The adoption of evaluation procedures for use by administrative agencies to give an explicit measure of project desirability and provide a foundation for public discussion of the projects.

"There are no absolute answers to these issues," says Kimball, "the answers must be based on what Utahns feel is in their own best interest. Those answers will determine the amount of capital that will be withdrawn from the private sector to be invested in public water projects, the type and number of projects that can be built, and the ultimate distribution of project costs and benefits."

Aquarius invites your thoughts on these issues. Opinions from private individuals and from public water administrators, if received, will be published in forthcoming issues. If sufficient interest is manifest, Aquarius will produce a special issue devoted entirely to financing water development in Utah.

Building Update

Interior beams get plastered!
Researchers Report On Flood Damage Mitigation In Utah

As experienced in January and February 1980, Utah is subject to flash flooding in mountain canyons, mudflows and shallow water flooding on lowlands at the canyon outlets, storm water flooding after thunderstorms in urban areas, and prolonged periods of inundation in certain lowland areas during snowmelt periods.

A report, "Flood Damage Mitigation in Utah," written by L. Douglas James, Dean T. Larson, Daniel H. Hoggan, and Terrence L. Glover, analyzes the history of flood damages in Utah, shows that the national flood control program is creating problems as well as solving them, and concludes with recommendations for new methods for flood hazard mapping and structural and nonstructural flood control design. The study found that the flood hazard in Utah is much more concentrated in smaller basins than is so for other parts of the country and that the major problem lies at the base of the mountains where major damages are regularly being caused by flows at mountain hollows too small for hazard areas to have been mapped through the National Flood Insurance Program.

The report stresses that better methodology needs to be developed and applied for delineating hazard areas from mudflows and shallow water flooding on alluvial fans and other lowlands at the mountain base; attention needs to be given to the effects of irrigation canals and bridges on the risk; and designs need to be developed that work with nature in dispersing the flood water and recharging much of it to underground aquifers instead, rather than against nature in concentrating the flows in a downstream direction.

State actions recommended in the report include 1) providing a continuing forum for interaction among federal agencies and local communities, 2) providing technical support for local communities including review of proposed designs for safety, 3) developing structural and flood proofing designs that will be effective in Utah conditions, and 4) interacting with federal agencies on behalf of the local communities.

Copies of the report are available from the laboratory for $5.00. Please request Water Resources Planning Series report UWRL/P-80/01.

Water Leader Steps Down

After 53½ years as an employee of the Salt Lake City Water Department, Charles Wilson has retired. Head of the department since 1952, Wilson has achieved many constructive changes in water development including the building of three water treatment plants, the drilling of many wells, the construction of efficient shop facilities and the "unconditional certification" of his city's water supplies.

Mr. Wilson served for many years on the Citizen Advisory Council to the UWRL and his contributions to Utah's water scene have been great. We hope, Charley, you'll write it all down now so future generations will also benefit.
New Spillway Model Being Constructed

Floor space in the laboratory has been scarce since the building program began, and many items, which will eventually go into the new and remodeled sections have been temporarily stored in the area normally used for experimentation. This is all changing now as Gilbert Peterson and his crew move things out to make room for a new model study for the Tarrant County Water Control and Improvement District No. One from Fort Worth, Texas. This Texas-size study will be conducted by Paul Tullis over the next 36 weeks with a scale model of the service spillway of the proposed Richland-Chambers Reservoir. Cost of the study will be $125,000.

Project leaders: if you can't find the item you knew was there yesterday, try looking under that pile of boxes near the west entrance behind the crate of new refrigerators!

AWRA PLANS MEETING

The Eighth Annual Conference of the Utah Section of the American Water Resources Association will be held Thursday, March 20, 1980, in the Business Lecture Hall, Room 101, University of Utah, Salt Lake City, Utah.

The theme this year as announced by Chairman Sheldon Talbot is, “Focus on Ground Water Issues and Problems.” The conference is also co-sponsored by the Utah Water Research Laboratory and the Utah Division of Water Resources.

ANNUAL REPORT NOW AVAILABLE

The Annual Report of the Utah Water Research Laboratory and Center for Water Resources Research, combined with Agricultural and Irrigation Engineering, is now available for distribution.

The 180-page report contains the director’s report, an outline of the total research program, and a one or two page description of each of the research projects active during Fiscal Year 1979.

A Summary Annual Report is also available in a 20-page format. It contains sentence descriptions of the 115 active research projects, along with the director’s report.

Both Summary Report and Annual Report are available from the Utah Center for Water Resources Research, UMC 82, Utah State University, Logan, Utah 84322.

Pan Evaporation Data Published By UWRL

A report “Tabulation and Application of Pan Evaporation Data for Utah Through 1976,” has been completed by Kenneth G. Hubbard and E. Arlo Richardson of the Utah State Climatologists Office, Utah Department of Agriculture, and printed through the Utah Water Research Laboratory.

The report provides a complete history through 1976 of monthly values of evaporation, wind movement and water temperatures for all available stations in Utah. A brief review is given of factors which effect evaporation along with several examples of how pan evaporation data are used.

Copies may be obtained for $5.00 each from the Utah Water Research Laboratory. Please request Atmospheric Water Resources Series report UWRL/A-79/02.

SHORT COURSE

A short course on “How to Use and Design Advanced Wastewater Treatment Processes” will be held at Lake Tahoe, Nevada, in April. The objectives of this course are to present the current state-of-the-art of advanced wastewater treatment, to elucidate design criteria and procedures, and to demonstrate experience with existing facilities. For further information contact P. A. Krenkel, Executive Director, Water Resources Center, DRI, P.O. Box 60220, Reno, NV 89506; phone (702)673-4750.

Advisory Council Meets March 27

The Citizen Advisory Council will hold its annual spring meeting in Salt Lake City, March 27, 1980. The group will be considering projects for future funding.

Utah Center for Water Resources Research
Utah Water Research Laboratory
UMC 82, Utah State University
Logan, Utah 84322
UWRL BUILDING DEDICATION DECEMBER 4
Building Board Gives Final Approval, University Takes Over

Fifteen years ago, December 6, 1965, Cache Valley was cold and foggy—mostly foggy. And the fog was dense enough in Salt Lake Valley to virtually close the airport to all air traffic. Out of state visitors coming into Logan to attend the dedication of the new Utah Water Research Laboratory had to come into Salt Lake City by train and finally get to Logan by slow and cautious auto.

To forestall a repeat of those conditions, Director L. Douglas James has placed an order for better weather this December and invites all friends of the UWRL to come to Logan December 4, 1980, for the dedication of the new addition to the lab.

USU President Stanford Cazier will preside at the formal dedication at 2 p.m. Speakers have been invited from the top levels of state government and from the Utah Congressional delegation. Dedication activities begin at 9 a.m. with tours and demonstrations. There will be seminars on water quality and groundwater hydrology and a noon luncheon with a speaker, and an historical perspective from the former and current directors of the lab. Further tours and demonstrations will conclude the day.

The original laboratory was dedicated on December 6, 1965. It contained over 80,000 square feet of floor space and was constructed at a cost of 1.5 million dollars. The new construction added about 12,000 square feet of new floor space for use as a water quality lab and created about 7,500 square feet of floor space within the old structure as new offices and project work rooms. Cost of providing the new space was just over one million dollars.

All friends of the UWRL are invited to visit the lab and attend the dedication services.
HYDROPOWER – Should We Use More Of It?

Two factors should be self-evident to consumers today. First, we (as individuals and as a nation) are continually using more energy, and second, that energy is costing more and more each year. The cost increase has been especially noticeable with gasoline prices, but electricity, with its dependence upon fossil fuel for thermal power plants, has also increased.

Thermal power plants had their beginning about 50 years ago and began at that time to replace hydropower as the most attractive new source of energy. Over the years many of the smaller hydroplants have been abandoned because repair and/or replacement costs on a per kilowatt-hour basis were too high to compete with large steam generation plants. At one time, however, hydro was king—and was the principal source of industrial energy.

Utah a hundred years ago was almost entirely dependent upon water for its industrial power needs. Logan City, for example, was a hive of water power activity with 12 separate mills standing side by side on a “power” canal using water from Logan River to generate a total of 300 horsepower!

With the invention of electric energy generation and transmission this picture soon changed and by 1902 the Hercules Power Company had built one plant in the mouth of Logan Canyon that produced over 4700 horsepower (about 2.5 megawatts). Since that was far too much power for Logan and Cache Valley, the surplus was transported and sold in the mines fields of Colorado. Utah State University President John A. Widosek saw what was happening in expanding needs for energy and in about 1913 had a generating plant built on Logan River on what is now called “First Dam” and produced enough power for all university needs plus the needs of the State Capitol Building in Salt Lake City.

Times have changed, and only one of these historical units is still being used (the First Dam Unit, although out of service today because of lighting damage). Even the Hercules Plant has been abandoned (about 1972). But, fuel costs may reverse the trend and hydropower may increase in importance once more. For this to happen, we must start to “think small.”

We have lots of moving water in Utah, not only in mountain streams and valley rivers, but in canals and pipelines. There may be in many of these places, opportunities to build small hydropowerplants, even small home units which produce 1000 watts or less. The accumulated effect of numerous small units could add up to many megawatts and save much oil. It is estimated that the total potential hydropower in the U.S. is over 300,000 megawatts! The goals of the national hydropower program are more realistic, however, and aim to have 1000 megawatts developed by 1985 and 20,000 megawatts by the year 2000.

Can it be done? There are those who think it can. At the UWRL Professor Calvin Clyde has surveyed potential sites for the Utah Power and Light Company. The company itself is making more detailed assessments of the most promising. Researchers from other states and from the Department of Energy are making numerous assessments and promoting opportunities. Equipment manufacturers are optimistic and small turbines and generators are now being manufactured to meet the coming market.

Pelton wheels as small as 4 inches which will produce 40 watts with 14 gallons per minute of water at 25 feet head are being produced, as are cross flow and vertical turbines which will operate at heads as low as 3 feet. German and Swedish units are being imported and new high efficiency very low head units are being developed. The U.S. Water and Power Resources Service is examining existing dams to determine if power units can be added. Farmers and irrigators should be looking at drops, checks, and pipelines to see if power plants could serve as energy dissipaters or pressure reducers.

The potential is there, the equipment is ready, people are encouraged, but one important problem needs to be solved. How can the power be marketed once it has been generated? Times no longer make it reasonable to use the power directly to pump water, grind wheat, or light a house. The only practical method would be for power utilities to purchase the generated power and distribute the energy to its customers. The utilities can easily adjust by holding water in conventional hydrofacilities or they can reduce their consumption of fuel at thermal plants.

Clyde says, “Public utilities should encourage the development and use of alternate sources of energy like water power. Some states” he continued, “require the utilities to purchase such power.” Utah utilities could avoid such legislative pressure and offer to buy such power at rates that would make such an alternative attractive.

UWRL Helps SCS
Pressure Transients Cause Problems In Pipes

When a new concrete pipeline breaks every time you close a valve you might get a little exasperated and maybe a little hot under the collar. The pipe builder, the pipeline designer, the chief engineer, or the contractor may be called unpleasant names and begin to feel the fury of your wrath unless the problem is defined and solved.

Such has been the experience of the Soil Conservation Service recently when the pipeline they designed and had installed for the Fielding Ditch Company in Box Elder County, Utah, just didn’t perform as specified. Breaks were all too frequent and apparently unexplainable.

To help solve the problem, SCS engineers came to UWRL. Aid was given in two ways. As a result of a small testing program in pressure transducers, UWRL researcher Duane Woffinden was able to recommend a system that would measure and record the pressure in the pipe. When this was installed in the pipeline, SCS engineers were able to determine that it was not the operating pressure (which was very low) but the surges of energy that occur in a pipeline when water is suddenly stopped that were causing the breaks.

These surges of energy, or transients, (water hammer) are now being studied by Calvin Glyde and Roland Jepson who will make a computer model of the pipeline, verify their results with measurements made by the pressure transducers, and then test alternatives for operating the pipeline or for pressure relief so that breaks will not occur.

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

Utah State University is an equal opportunity employer. All programs are available to everyone regardless of race, color, religion, sex, age, or national origin.
Reader Responds
Is Salt Lake County Running Out Of Groundwater?

The April 1980 issues of Aquarius printed 2 headlines from the Salt Lake Tribune which appeared to be contradictory. One implied Salt Lake County was drying up—the other that there is an unlimited supply. In August 1980 Aquarius printed parts of letters from Mr. Robert Hibert, General Manager of the Salt Lake County Water Conservancy District and from Mr. Ted Arnow, Chief, Water Resources Division, United States Geological Survey. We now print a letter from college Professor Allen D. LeBaron, Agricultural Economics Department, Utah State University.

Editor, Aquarius

Your conclusion that “both headlines are right” certainly goes an extra mile where Mr. Hibert’s “answer” is concerned. For example, to experience declining well water levels is not the same thing as “running out of water.” The USGS has maintained for some time that the aquifer in question needs to be pumped—it cannot be managed as it is because in a general sense it is full and overflowing. (Some persons may feel this is a necessary condition to prevent salt water intrusion, but I don’t think Mr. Arnow supports this view.)

We do know other things, however: 1) there has been a general tendency of Utah Water developers to approach water development (for M & I purposes) along the Wasatch Front in the context of shortage and scarcity where there exists considerable evidence of surplus; 2) as far as M & I supplies are concerned, future needs along the Wasatch Front could be met (could have been met) by radically different and lower cost projects than those in the CUP. (Mandal feasibility of certain irrigation projects cannot be assessed without M & I elements which are ordinarily expected to at least pay their share, and in some cases contribute to the general irrigation subsidy. The question that should be asked of Mr. Hibert is whether he requested the newspaper that carried the erroneous report to print a correction to dispel any fears of “scarcity” that the original article would have placed in the public mind.

Saline Water Use

A research study and report have been completed on “Use of Saline Water in Energy Development” by C. Earl Israelsen, V. Dean Adams, J. Clair Batty, Dennis B. George, Trevor C. Hughes, Albert J. Seierstad, H. C. Wang, and H. P. Kuo.

As energy costs continue to rise, incentive for new energy resource development mounts. Problems in obtaining needed water could limit development of these resources in the semi-arid western states that contain coal, oil shale, tar sands, oil, natural gas, and uranium ores. In most areas containing fossil fuel there is an abundance of underground water that is very saline. Use of this water for energy development is reported in this study.

The report includes a literature review of information relevant to the use of saline waters in energy development and groundwater quality and quantity in the Colorado River Basin; investigation findings of using saline water for cooling coal-fired electrical generating plants, and the costs of using this salty water for power plant cooling; and results of laboratory study using saline water for transporting coal in a pipeline. Copies are available from UWRP. For $6.00 each. Please request Water Resources Planning Series UWRP/P-80/04.

National AWRA Conference Held

“Water Resources Issues in the 80’s” was the theme of the week long series of meetings held in Minneapolis, Minn., October 12-16, 1980, under the sponsorship of the American Water Resources Association (AWRA).

Several Utahns had papers read at the conference including Daniel H. Hoggan, Jay M. Bagley and Kirk Kimball’s on “Inadvertent Income Redistribution Effects of State Water Development Financing” and Visvanatha Narasimhan, A. Leon Huber and J. Paul Riley’s on “Sensitivity of System Identification Criteria on Management Studies using Hydrosalinity Models.”

A paper on “Assessment and Implementation of Water Resources Research Goals” by L. Douglas James and Jay Messer was also read. Rangesan Narayanan collaborated with Roger D. Hansen on “Time-series Analysis of Municipal Water Demand.” Alten B. Davis from Weber State College addressed the subject “There can be no last water hole.”

Salinity Management Strategies Reported

A report “Development of Procedures to Evaluate Salinity Management Strategies in Irrigation Return Flows” has been completed by V.A. Narasimhan, A. Leon Huber, J. Paul Riley, and J. J. Jurinak.

The purpose of the research was to assess the state of the art of hydrosalinity modeling in order to develop a practical management tool for predicting how the salt outflow from irrigation agriculture is affected by various farm management practices.

A review of hydrosalinity models identified one of the major gaps in modeling which is inadequate understanding and representation of the quantity and quality interrelationships between surface water, drainage, and groundwater. The study also identified that a site specific equilibrium “threshold concentration” (TC) of dissolved solids can be adequately estimated and represented in a model.

The model termed BSAM-SALT was also tested using field data from irrigation areas in Grand Valley, Colorado, and the Circleville subbasin of the Sevier River Basin in Utah. A set of management runs was made to demonstrate the utility of the model in predicting the salt loading caused by irrigated agriculture in the Grand Valley area.

Copies are available from UWRP. For $2.00 each. Please request Water Resources Planning Series UWRP/P-80/03.

Nevada Center Plans Short Course January 12-16

A short course on Water Quality Modeling will be held in Las Vegas, Nevada, January 12-16, 1981. The objectives of this course are to define the need and justification for water quality criteria, to establish the constraints imposed by current regulations, to present the fundamentals of modeling techniques and to demonstrate their applicability to the rational solution of water quality management. The course is designed for aid managers, technicians, regulatory personnel and others who are intimately involved in the decision making process regarding water quality control. For further information contact P. A. Krenkel, Executive Director, Water Resources Center, Desert Research Institute, P.O. Box 60220, Reno, NV 89506.
NEWS NOTES

Changes in personnel at the UWRL include:

Susan Burt has joined the staff as secretary, filling the vacancy left by Michelle Kruschke who resigned in September.

Herbert Richl, research technician in the hydraulics and fluid mechanics area, has returned to school full time.

UWRL world travellers include Trevor C. Hughes who recently left for Austria for an 18 month sabbatical, and Jay M. Bagley, who is in China as a member of a Soil and Water Delegation for the U.S. Department of Agriculture Office of International Cooperation and Development. The delegation, participating in a scientific and technical exchange, is visiting water, power, and irrigation research organizations in China.

ASCE Unites Energy And Water Resources

The American Society of Civil Engineers has created a new Task-Force committee consisting of representatives from all ASCE Water Resources divisions and the energy division. The new committee will plan two conferences in mid 1981 to discuss the impact of energy on water resources. Chairman of the 13-man committee is J. Paul Riley, SUU.

Evaluation Of Livestock Runoff

"Evaluation of Livestock Runoff as a Source of Water Pollution in Northern Utah" has been completed by Stephen T. Wieneke, Dennis B. George, Daniel S. Filip, and Brad Finney.

The research reported in this study combined an inventory of feedlots in Cache Valley, measurement of their pollution loading to receiving streams, more detailed measurements during storm events, analysis of the effectiveness of buffer zones in reducing pollution loadings, and an evaluation of problems and management practices from the basinwide viewpoint.

It was reported that pollution loadings to the streams increased during rain storms but were still generally within accepted biochemical oxygen demand standards. The major violations of the standards were associated with snowmelt runoff during the winter thaws. Grasslands and other overland flow areas between the feedlots and the streams were generally effective in reducing the loadings and can usually be provided at low cost.

Reports are available for $5.00. Please request Water Quality Series UWRL/Q-80/02.

MEETINGS

Plan to attend a one-day short course on Groundwater Heat Pumps - Dec. 9, 1980, Salt Lake City Hilton—sponsored by National Water Well Association

"What’s Happening to Utah’s Water" is the theme for the Ninth Annual Conference of the Utah Section of the American Water Resources Association. Set your calendar for Thursday March 19, 1981, in Salt Lake City.

The 53rd Annual Conference of the Water Pollution Control Federation was held in Las Vegas, Nevada, September 29-October 3, 1980. UWRL attendees included Dean Adams, Dennis George, and Jay Messer.

Cosponsored by the Universities Council on Water Resources, the U.S. Water Resources Council and the Office of Water Research and Technology, a conference was held September 21-26, 1980 at Pacific Grove, California, on “Risk/Benefit Analysis in Water Resources.” Participating in a panel discussion on “The role of government in assessing the acceptability of risk and the efficacy of safety” was David Bowles from UWRL. Bowles also chaired an ad hoc committee meeting on case studies of “Risk and Uncertainty in Water Resource Planning.” Also in attendance at the meeting was UWRL’s Daniel Hoggan.
New Additions To UWRL Building Dedicated

A dream which began in 1949 was finally realized on December 4, 1980, when the recent construction at the Utah Water Research Laboratory was dedicated. The dreamer was Vaughn E. Hansen who became the first director of the laboratory and supervised the design and construction of a building which was dedicated in December 1965, but which was never really "finished."

The original design envisioned office space and small laboratory rooms occupying the north side of the main building. The money ran short and those offices were not completed. Director Jay M. Bagley, who succeeded Hansen in 1966, and his associate, Calvin G. Clyde, began immediately to seek funds to complete this needed space.

It didn't come easily, but finally after many tries, frustrations, and a lot of assistance from interested citizens and administrators, the work was finished. And with a bonus added—

not only did the lab get its additional office space on the north side but a whole new addition to house the expanded water quality research on the south side!

On December 4, 1980, the new addition which contains 11,000 square feet of water quality laboratory space and the 6000 square foot mezzanine office space on the north side, were dedicated.

The dedication speaker at the ceremony held at the laboratory was Lt. Governor David S. Monson. The dedicatory prayer was offered by Dixie Leavitt, Chairman of the Citizen Advisory Council. The present director, L. Douglas James, and the two past directors, Jay M. Bagley and Vaughn E. Hansen, spoke at the afternoon ceremony, which was preceded by seminars on water management and water quality and a luncheon address by Warren A. Hall, Elwood Meade Professor of Civil Engineering at Colorado State University, Fort Collins.

Past, Present Directors Give Views

Each had a chance to reminisce and look to the future of the Utah Water Research Laboratory during the dedication ceremonies.

Vaughn E. Hansen, first director and now an engineer in private practice, recalled the initial effort and the long legislative struggle to get state approval and money for construction. The lab was first approved by the legislature in 1959, but funds were not forthcoming until 1962, and dedication of the initial facilities did not take place until 1965.

Jay M. Bagley took over in 1966 and during the next ten years led the lab from a modest $400,000 annual research program to over $2,000,000 when he relinquished leadership in 1975. During this period most of the current staff members of the lab came on board, and to this staff Bagley gave praise and commendation.

L. Douglas James became director in 1976. He praised the foresight of those who built the laboratory and made Utah, one of the least populous states, a national leader in water resources research. "But," he said, "we live in a changing society," and some of the changes cause concern. Broad trends toward "consumerism"; satisfying the whim of the moment; toward reduced research budgets; and toward centralized management which (continued on page 2)
Speaker Advocates Research

The dedication luncheon speaker was Warren A. Hall, Elwood Meade Professor of Civil Engineering at Colorado State University. During the drought in New York City several years ago, he was asked how the city could solve its immediate problem. "Hire some Indian rain dancers and pray" was the answer he had to give because by that time it was too late to do anything else.

Real solutions need prior actions with sufficient lead time to get the job done, and many times the first step is research.

Directors' Views

(continued from page 1)

makes narrowly conceived requests for research with fast turn around time, thus stifling creative thinking. James is concerned about the trend toward awarding research contracts on criteria other than technical merit.

The cooperative spirit and the quality program that has been exemplified at the UWRL in the past will be threatened if these trends become the rule of the future. "Let us take the challenge," James concluded, "to come together, to objectively search out and consider facts, and to do so in the spirit of the 17th century king's musketeers to be "all for one, and one for all."

Experts Speak At Seminars

Groundwater Management

The dedication activities included two seminars. The first was given by J.D. Bredehoef, Regional Hydrologist with the U.S. Geological Survey in Menlo Park, California. Bredehoef told of his analysis of how best to combine surface with groundwater use in a farming area of northern Colorado where groundwater was plentiful, pump lifts shallow, and where farmers could economically install pumping capacity sufficient to meet their full crop requirement when surface supplies ran short.

He found that farmers were installing enough wells to have sufficient pumping capacity to be able to irrigate all their fields during the driest surface water years as insurance against drought, but not actually pumping from them when water could be obtained from surface sources. When they had to pump, the farmers arranged to share the cost of replacing the surface water due downstream users whose rights were diminished by upstream pumping from the groundwater. The replacement water also came from the groundwater, but was pumped directly into the stream.

Water Quality

The second seminar was on water quality in lakes and was presented by Peter Krenkel, Director of the Water Resources Center, University of Nevada System, Reno, Nevada, and Donald B. Porcella, Principal Scientist with Tetra Tech Corporation, Lafayatte, California, and former Associate Director of the UWRL.

Krenkel described Nevada experiences demonstrating that large costs for advanced waste treatment often could not be justified by environmental benefits. To some extent, this is the fault of modelers who are unable to predict the consequences of untreated pollution and thus lead to political decisions to minimize uncertainty.

Porcella described how modeling can be done at various levels of detail with costs increasing as one goes from seeking answers for public policy issues to sophisticated estimates of detailed changes to lake ecology.

Speakers at the dedication for the new UWRL facilities included former and current directors of the laboratory (1 to r) Vaughn E. Hansen, Jay M. Bagley, and L. Douglas James.
Reader Response

Responding to the question, "Is Salt Lake County running out of water?" (Aquarius, Vol. 11, No. 5) Lawrence G. Moore, Chief, Water Resources Division of the Water and Power Resources Service, Provo, Utah, referred us to the 1971 study of the USGS as reported in Tech. Pub. No. 34 of the Utah Department of Natural Resources. This report summarizes the results of a groundwater study using an electrical analog model developed by the USGS. The USGS, Salt Lake City, and the Conservancy District are now contemplating spending half a million dollars on a new study and a new sophisticated computer model to update the information in this report.

Moore has some sound points to consider and we quote him as follows:

Individual Wells vs Aquifer

Just because the long-term March to March groundwater levels have not shown a long-term major decline and indicate the system is in balance with present discharge not exceeding recharge does not mean that some wells are not running out of water during the heavy summer pumping season. Drastic lowering of water levels in such wells could be due to one or a combination of two factors: (1) lack of transmissivity or capability of the aquifer to move water to the wells in a heavy pumping area, and (2) insufficient, improperly constructed or poorly maintained well screens or perforations which could be restricting the flow of water into the well.

Wells Should Be Tested

Each well owner with a problem of excessive pumping drawdown should have his well properly tested to determine the cause. Testing would also show if remedial measures could be taken to correct the situation. This might involve relocating the well to obtain proper well spacing or reconstructing the well to increase its efficiency. Such actions are much easier to justify in today's energy critical times. In any event the groundwater basin as a whole should not be blamed for localized aquifer limitations or inefficient wells.

NEWS NOTES

Four women from the water quality staff at UWRL have been selected as Outstanding Young Women for 1980, and their biographical sketches and accomplishments to date will appear in the 1980 edition of Outstanding Young Women of America. Receiving this honor are Alberta J. Seierstad, Mary L. Pitts, Jolaine L. Selby, and Judy Dickson. We congratulate them on this honor!

-Kirk Kimball

Kirk Kimball has reduced his work load at UWRL to enter a PhD program at USU. We wish him success.

Report Completed

A report on the “Influence of Unsaturated Hydraulic Properties on Infiltration from Circular Surface Areas” has been completed by Abdolhossein Nassershad-Tabrizi and Roland W. Jeffsson.

The mathematics is relatively simple for estimating constant rates of water movement through saturated, uniform sand; but the prevailing situation in nature is that water moves at rates that vary during rain storms or irrigation cycles through soils containing very diverse patterns of sand, silt, and clay, and which are wet but not saturated. The general differential equations describing this water movement in the vadose zone (unsaturated soils above the water table) are very difficult to solve.

This study develops a method for obtaining finite difference solutions for water movement in the vadose zone, a topic recently given top national priority for research by a National Research Council panel.

From solutions in selected cases, the report concluded that 1) heterogeneity of the soil represented by any soil parameter (pore size distribution, water content, soil porosity, soil permeability, etc.) varying with depth has a significant effect on all infiltration characteristics, and 2) the additive law of effect can be used to determine the composite effect of several soil parameters varying simultaneously.

To obtain a copy of this report, request Hydraulics and Hydrology Series UWRL/H-80/03. Cost is $5.

Citizen Advisory Council Meets At UWRL

The Citizen Advisory Council held its annual meeting at the Utah Water Research Laboratory December 3, 1980. Director L. Douglas James conducted the meetings which consisted of presentations on accomplishments of the past year and alternative research goals for the near future by staff researchers from the various research study areas at the UWRL.

The Hydraulics Fluid Mechanics, and Soil Erosion group was represented by J. Paul Tullis; the Hydroclimatic Measurements group by Duan G. Chadwick and Duane Wolfinbarger; Hydrologic Analysis by J. Paul Riley, William J. Grenney, Gerald F. Gifford, and David S. Bowles; and the Water Resources Planning and Management group by Jay M. Bagley, Kirk R. Kimball, and Daniel H. Hoggan.

In the afternoon, Technology Transfer was presented by Frank Haws; the Water and Energy group was represented by J. Paul Riley, John E. Keith, and C. Earl Israelson; Water Quality Management by V. Dean Adams, Jay J. Messer, and Dennis B. George; Groundwater Resources by Calvin G. Clyde, and Atmospheric Water Resources by Geoffrey E. Hill.

Council Members

The Council this year consists of Dixie Leavitt, Chairman, Insurance Executive, Cedar City; Genevieve Atwood-Ferrari, State legislator; Jay R. Bingham, Consulting Engineer; Grace G. Brandt, League of Women Voters, Alvin E. Rieker, Health Department; Wayne P. Cridle, Consulting Engineer; Frank N. Davis, Utah Power & Light; Dee C. Hansen, State Engineer; Daniel F. Lawrence, Division of Water Resources; Lynn M. Thatcher, Citizen; and Donald Zillman, University of Utah Law Center, all of Salt Lake City; Reed C. Christensen, Forest Service, Price; Leonard H. Johnson, Farm Bureau, Sandy; Lynn S. Ludlow, Central Utah Project, Orem; Roy Nielsen, State Legislature, Fairview; and Donald A. Smith, Wildlife Resources, Vernal.
Utah Rural Water Association Formed

A new organization, the Rural Water Association of Utah, has been organized to facilitate training and provide a backup resource for supporting the managers and operators of small rural and municipal water supply systems who often find themselves responsible for providing safe drinking water for their community even though they have had no previous training and previously had no place to go for help.

Utah has 240 small systems which supply water to no more than 600 and an average of 114 families. That fact that an average monthly water bill of $10 gives such systems an average monthly income of only $114 gives some idea as to the financial situation these systems face as pumping costs rise.

This organization came about as a forum through which individuals responsible for management of small domestic water systems could be brought together to develop a plan of action for addressing these problems in Utah. The Association provides for sharing of very limited resources and makes Utah eligible for federal funding for system review and technical help.

A booklet “Management of Rural Domestic Water Systems in Utah” by Trevor C. Hughes documents the reasons for and purposes of this effort. Copies may be obtained for $1 handling fee by requesting General Series UWRL/G-80/01.

Effects Of Mining On Groundwater Reported

A report on the “Management of the Hydrologic System in Areas Subject to Coal Mining Activities” has been completed by Rollin H. Hotchkiss, Eugene K. Israelsen, and J. Paul Riley.

This report examines the effects of mining activities on surface and groundwater movement and identifies specific mining procedures and management techniques which not only minimize negative hydrologic impacts of mining operations (acid drainage, sedimentation, etc.), but which also enhance existing uses and provide potential new methods for water development.

Specifically, the study evaluates the potentials for using 1) underground coal mines to: tap previously inaccessible groundwater supplies; reduce the salt load to the Colorado River by decreasing the contact of groundwater with salt-bearing geologic formations; store water in abandoned mines; and 2) surface mined areas to collect surface runoff and thus; reduce the sediment loads to the Colorado River; and enhance water storage in the basin.

To obtain copies, request Water Resources Planning Series UWRL/P-80/05. Cost is $4.

1980 Annual Report Available

The 1980 Annual Report of the Utah Water Research Laboratory and Center for Water Resources Research, combined with Agricultural and Irrigation Engineering, is now available for distribution.

The report contains the director's report, a sentence outline of each project in the total research program, and a one or two page description of each of the research projects active during fiscal year 1980.

A Summary Annual Report is also available in a 28-page format. It contains the sentence descriptions of the active research projects, along with the director’s report.

Both Summary Annual Report and Annual Report are available from the Utah Center for Water Resources Research, UMC 82, Utah State University, Logan, Utah 84322.