ARIZONA WATER RESOURCES NEWS BULLETIN

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WATER RESEARCH PROPOSALS SUBMITTAL DEADLINE APPROACHES

Proposals for FY 1978 water resources research under the Title I Annual Matching Grant Program of the Office of Water Research and Technology (OWRT) should be submitted by Nov. 1 to Director Sol Resnick of the University of Arizona Water Resources Research Center. The tentative deadline in Washington, DC, is Dec. 1, 1976 for proposals to be funded in FY 1978 (Oct. 1, 1977 through Sept. 30, 1978). Accordingly, the Nov. 1 date has been set in order to allow time to process and forward proposals to the OWRT/Washington.

The OWRT is urging that full consideration be given to priority problems of a regional nature, and to research which has been identified by systematic anaylsis to be essential for the resolution of the most important water and water-related problems. Means by which water resources research can contribute to solving energy and land-use problems, to improving the environment, and to more efficient resource management should be emphasized.

Persons may contact the Office of the Director, Water Resources Research Center, University of Arizona, Tucson, AZ 85721 for further information, including instructions; updated proposal forms; lists of water-related research-need statements from Arizona state agencies; regional research-need statements; and national priority research subjects.

GROUNDWATER DATA FOR AVRA AND ALTAR VALLEYS AVAILABLE

(Editors' Note: The publication reviewed below represents the first comprehensive description of groundwater resources in the Avra and Altar Valleys during recent years. Aquifers in these valleys are becoming increasingly important sources of water for the City of Tucson and to satisfy other water requirements in the surrounding region.)

About 120,600 acre-feet of groundwater have been pumped annually from the aquifers of the Altar and Avra Valleys west of Tucson during 1965-73 for municipal and industrial uses and for the consumptive use of water for irrigation and recreation, according to a recent Agricultural Experiment Station publication. Some 1,800 acre-feet per year were transferred from the aquifers to the City of Tucson during the same period.

Technical Bulletin 232, *Groundwater in the Avra and Altar Valleys, Arizona,* by W. Gerald Matlock and George C.A. Morin, describes the groundwater resources of the 1,400 square-mile area using Spring 1974 as the base period. Changes which have taken place in the area since 1952 are delineated with emphasis on changes occurring after 1965.

The College of Agriculture Department of Soils, Water, and Engineering at the University of Arizona has been engaged in a comprehensive groundwater data gathering program involving portions of the Altar and Avra Valleys since 1952. The department has worked closely with federal and state agencies, the City of Tucson and Pima County in its efforts to gather and disseminate groundwater information about the study area. It is from this data base that Technical Bulletin 232 is drawn.

Groundwater levels in most of Avra Valley and near Three Points in Altar Valley have been declining steadily since 1952, primarily because groundwater withdrawals are in excess of natural recharge volumes. In the remainder of the Altar Valley groundwater levels have remained relatively static because the aquifer has not been subject to heavy development. Maximum water level declines between 1969 and 1974, 1965 and 1974, and 1952 and 1974 were 47.7, 87.0, and 193.4 feet, respectively. The declines of 87.0 and 193.4 feet occurred where the Santa Cruz River exits at the north end of the study area near Eloy and were due in part to groundwater pumping in the Eloy area. Central Avra Valley experienced the 47.7-foot decline which reflects the agricultural use of water in the area.

Depth to water in Spring 1974 ranged from 147 feet near Three Points (Robles Junction) to 780 feet in the bajada region of the Sierrita Mountains. Correlation of streamflow records and water-level measurements indicates that there is little natural aquifer recharge in those areas; however some recharge is effected along the Santa Cruz River by sewage effluent discharged from the City of Tucson treatment plant.

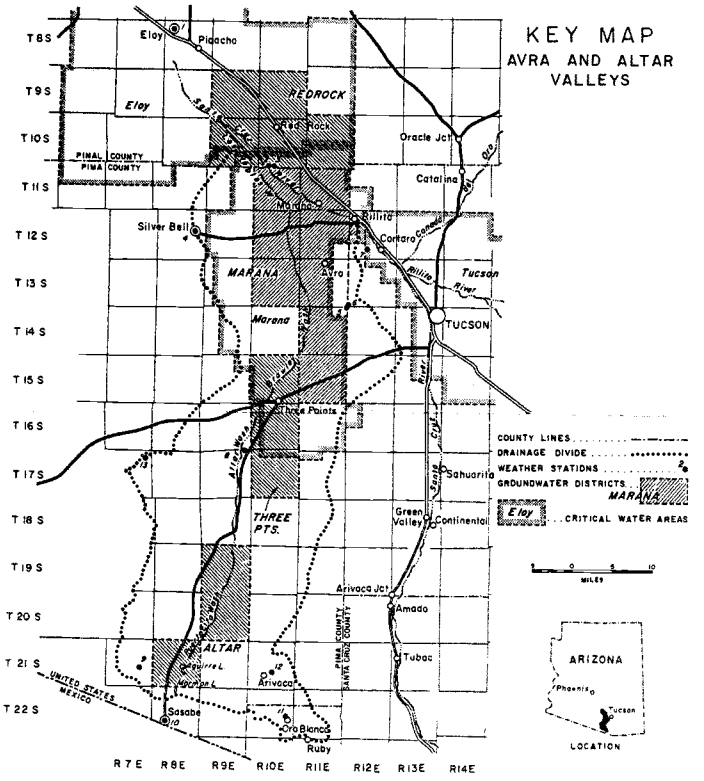
Chemical analyses indicate that most of the groundwater from the regional aquifer in the central portions of the Altar and Avra Valleys is suitable for municipal, industrial, irrigation, and recreational uses. Wells tapping local aquifers in the upland watersheds of the Altar and Avra Valleys produce water unsuitable for some or all of the use categories in many cases. Water from some wells along the Santa Cruz River contains nitrate concentrations above recommended U.S. Public Health Service limits.

Well drilling contractors' cooperation has permitted analyses of formation samples from new wells being constructed in the Tucson area. The analyses were used to locate areas of greater than average transmissivity and to delineate hard rock boundaries. Since 1972, formation samples have been collected from 23 wells in the study area.

Special studies have been conducted in the area to test irrigation wells, to determine the chemical quality of groundwater bordering the Santa Cruz River channel north of Tucson, and to study the possible mechanisms for exchanging Tucson sewage effluent for groundwater normally used for irrigation.

Irrigation demand in the Altar and Avra Valleys accounts for more than 90 per cent of the groundwater pumped in the area, according to the bulletin. Crop surveys of irrigated acreage are made semiannually. Net groundwater quantity used for irrigation is obtained then by multiplying the individual crop acreage by its respective consumptive water use requirement. Current water use for industrial purposes is slightly less than that for municipal purposes; however, possible increases in mining activities and expansion of industry in the Tucson area may reverse usage data.

The 59-page Technical Bulletin 232, *Groundwater in Avra and Altar Valleys, Arizona,* is published by the Agricultural Experiment Station at the University of Arizona. It contains numerous informative tables and graphs as well as maps. Copies of the bulletin are available from the Agricultural Communications Office, College of Agriculture, University of Arizona, Tucson 85721.



KEY TO WEATHER STATIONS

1. Eloy
2. Red Rock, 6SW
3. Red Rock, 6SSW
4. Silver Bell
5. Arizona-Sonora Desert Museum
6. Tucson Mountain Park
7. Cortaro, 3SW
8. Anvil Ranch
9. Sasabe, 7NW
10. Sasabe
11. Ruby, 4NW
12. Arivaca, 1E
13. Kitt Peak

GROUNDWATER RESEARCH GRANT

The U.S. Department of the Interior Office of Water Research and Technology recently funded a $45,500 research project, "Aquifer Modeling by Numerical Methods Applied to an Arizona Groundwater Basin," developed by Profs. S.P. Neuman and E.S. Simpson of the University of Arizona College of Earth Sciences, Department of Hydrology and Water Resources.

Designed to compare the performance between two currently accepted methods of modeling aquifer hydraulic properties–finite-difference and finite-element–and two newly proposed methods, the 18-month project will terminate Dec. 31, 1977. The comparisons will be made in terms of accuracy as measured by material balance, computational efficiency as measured by cost, and flexibility as applied to management needs.

Neuman and other researchers developed one of the new methods to be evaluated. It is a mixed explicit-implicit iterative Galerkin finite-element method. The other system was developed by Simpson and other researchers. It is described as being a finite-state mixing cell method.

All models will be tested against conditions in a portion of the Tucson Basin aquifer with respect to changes in water levels and quality.

AWRA 1976 CONFERENCE NEWS

The Arizona State Section of the American Water Resources Association (AWRA) received the Most Distinguished State Section Award during the 12th Annual AWRA Conference held Sept. 20-23 in Chicago.

"The award was based on the several activities of the section including its annual meetings, publications of proceedings of those meetings, increase in membership and the formation of a student chapter at the University of Arizona," said Daniel D. Evans, UA professor of hydrology and water resources, who was elected AWRA vice president at the conference.

Conference theme was **Water: Center of Crises–Past, Present and Future**. Proceedings will be published either in the Water Resources Bulletin or as a separate publication. Coupled with the conferences was a specialized symposium on advances in groundwater hydrology.

AWRA's 13th annual meeting will be held Oct. 31-Nov. 3, 1977, in Tucson. A first call for papers has been issued. Persons interested in presenting a paper may contact Stanley N. Davis, Head, UA Department of Hydrology and Water Resources, or David B. Thorud, Director, UA School of Renewable Natural Resources.

RIGHTS TO GEOTHERMAL RESOURCES RULING

Geothermal steam belongs to the mineral rights owners and not to owners of surface rights, according to a recent judgment by the Sonoma County (California) Superior Court.

The court found geothermal steam to be essentially a mineral resource because its hot, highly toxic,corrosive nature makes it unsuitable for agricultural use without special processing.

The court made its finding following a dispute between surface rights owners of a 408-acre area adjacent to the Geyser geothermal field and the mineral rights owner, Geothermal Kinetics, Inc., Phoenix, AZ.

ANNUAL WATER RESOURCES REPORT FOR ARIZONA RELEASED

The annual report on Arizona's surface water, groundwater and the chemical quality of water in the state has been published and is available. The compilation was prepared by the U.S. Geological Survey (USGS) in cooperation with the State of Arizona and other agencies.

Containing data for the state's 1975 water year, the report includes discharge records for 221 gauging stations, 185 crest stage, partial record stations and discharge measurements at 61 miscellaneous sites.

Also included in the report are stage records at three gauging stations; stage and contents records for 10 lakes and reservoirs; 17 supplementary records along with gauging station records consisting of month end or monthly stage, contents and evaporation of lakes and reservoirs, diversions and return flows.

Water quality records for 58 continuous record stations are included as well as four partial record stations and 30 miscellaneous sites. Water levels for 95 observation wells are reported.

Beginning with the 1975 water year, the reports will constitute a series which will carry identification numbers with this year's identified as *U.S. Geological Survey Water-Data Report AZ-75-1.* This report is titled *Water Resources Data for Arizona, Water Year 1975* and is for sale to the public for a small fee from the National Technical Information Service, U.S. Department of Commerce, Springfield, VA 22151.

Copies of the report are available for perusal at USGS offices in Room 5A Federal Building, 301 W. Congress St., Tucson; Suite 1880 Valley Center, Phoenix; Building 3, 601 E. Cedar Ave., Flagstaff; 1940 S. 3rd Ave., Yuma; and Room 5312 National Center, 12201 Sunrise Valley Drive, Reston, VA.

POLLUTION ABATEMENT AND JOBS

Federal pollution abatement expenditures during 1970 created 66.9 jobs for each $1 million spent in cleansing the environment. According to a recent U.S. Department of Labor report the figure topped 1972 defense spending for generating civilian jobs. Defense jobs created numbered 49.8 per $1 million spent.

Approximately $500 million was spent for air and water pollution control. Some 2,600 engineers--mostly civil--and 3,800 scientists and 3,100 technicians were employed in the clean-up.

Copies of the report, No. 029-001-01361, are available for $1.25 each from the Superintendent of Documents, US GPO, Washington, DC 20402.

PUBLICATIONS

Desertification

Desertification: A World Bibliography, compiled and edited by Office of Arid Lands Studies (OALS) Assistant Director Patricia Paylore for the International Geographical Union's 23rd Congress held in Moscow this summer, consists of 1,750 citations, most with abstracts, produced from the OALS computerized Arid Lands Information System.

Introductions by desertification experts from around the world precede each regional topic subdivision. The regions presented are the Sahara-Sahel, East Africa, southern Africa, the Middle East, Russia, Pakistan, India, China, Australia, and South and North America. Maps illustrate each region.

The 644-page, paperbound book is copyrighted by OALS and is for sale for $20 plus $1 postage and handling for orders from within the United States. Foreign orders cost $25 and will be shipped air parcel post.

Orders should be sent to Office of Arid Lands Studies, University of Arizona, 845 N. Park Ave., Tucson, AZ 85719.

Harquahala Groundwater Study

Maps showing groundwater conditions in the Harquahala Plains area, Maricopa and Yuma Counties, Arizona–1975 (sic) has been published by the U.S. Geological Survey (USGS) in cooperation with the Arizona Water Commission.

Part of a map series that eventually will describe the state, this report depicts changes in the area's water levels, December 1966-January 1975; irrigation for 1974; pumpage for the 1940 to 1974 period; 1975 well depth and depth to water data; and specific conductance and fluoride concentration for 1974.

Computer printouts of hydrologic data upon which the maps are based are available for perusal at the Arizona Water Commission, 222 N. Central Ave., Suite 800, Phoenix and USGS offices in Room 5-A Federal Building, 301 W. Congress St., Tucson and Suite 1880 Valley Center, Phoenix. Copies can be made at your own expense in USGS offices in Tucson and Phoenix.

A limited number of maps are available from the Arizona Water Commission, 222 N. Central Ave., Suite 800, Phoenix, AZ 85004.

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The U.S. Geological Survey Hydrologic Unit Map (1974) for Arizona has been released recently by the Water Resources Council, which suggests that the maps be used in Arizona water resources planning efforts.

Produced at a 1:500,000 scale, the maps describe the regions, subregions, accounting, and cataloging units being used by the council for comprehensive planning and national assessment activities. Several federal agencies have adopted the maps for use in water accounting in water resources planning programs.

A limited number of maps are available at the Arizona Water Commission, 222 N. Central Ave., Suite 800, Phoenix, AZ 85004. A larger supply is available from the U.S. Geological Survey, Reston, VA 22092, for $1 each.

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Proceedings of a workshop on energy development impacts on western water resources held Nov. 2-5, 1975 in Albuquerque, NM, have been published as *Energy, Water, and the West.*

Composed of papers and discussion summaries, the report is available for $5 from the National Conference of State Legislatures, Office of Science and Technology, Executive Tower Inn, 1405 Curtis St., Denver, CO 80202.

CALL FOR PAPERS

Papers are being solicited for presentation at the "Drinking Water Quality Enhancement Through Source Protection Symposium" scheduled for March 20-25, 1977 in New Orleans, LA. Further information is available from Dr. Robert B. Pojaske, JBF Scientific Corp., 2 Jewel Drive., Wilmington, MA. 01887.

CONFERENCES

Oct. 21, 1976. **Space Technology Applications to Water Problems**, Houston, TX. Sponsored by Texas Section of AWRA. CONTACT: Jerry R. Rogers, President, Department of Civil Engineering, Cullen College of Engineering, University of Houston, Houston, TX 77004.

Nov. 4-5, 1976. **Rural Water Problems**, Lincoln, NB. Sponsored by Nebraska Water Resources Research Institute. CONTACT: Millard W. Hall, Director, Nebraska Water Resources Research Institute, 310 Agriculture Hall, University of Nebraska, Lincoln, NB 68583.

Dec. 9, 1976. **Symposium on Use of Aquifer Systems for Cyclic Storage of Water**, at the annual meeting of the American Geophysical Union, San Francisco, CA. CONTACT: J.S. Rosenshein, U.S. Geological Survey, WRD, 1950 Avenue A, Campus West, University of Kansas, Lawrence, KS 66045.

Dec. 6-10, 1976. **Symposium on Soil Water Parameters in the Unsaturated Zone**, at the annual meeting of the American Geophysical Union, San Francisco, CA. CONTACT: A.W. Warrick, Department of Land, Air and Water Resources, University of California, Davis, GA 95616.

Dec. 6-10, 1976. **Symposium on Water-Quality Impacts of Energy Development**, at the annual meeting of the American Geophysical Union, San Francisco, CA. CONTACT: Robert C. Ward, Department of Agricultural Engineering, Colorado State University, Fort Collins, CO 80521.

Dec. 13-17, 1976. **International Symposium on Land Subsidence**, Anaheim, CA. CONTACT: A. Ivan Johnson, President, International Commission on Subsurface Water, U.S. Geological Survey, National Center, MS 417, Reston, VA 22092.

1974 ARIZONA GROUNDWATER PUMPAGE

Groundwater pumpage in Arizona during 1974 was slightly above 5.7 million acre-feet, the largest figure reported in more than 30 years of U.S. Geological Survey (USGS) statewide groundwater pumpage record-keeping.

The information is contained in the annual summary of groundwater conditions in Arizona recently prepared by the USGS in cooperation with the Arizona Water Commission. Principal investigator in the project was H.M. Babcock of the USGS.

Slightly more than 154 million acre-feet of groundwater have been pumped from reservoirs throughout the state since the data collection began.

The report's maps described potential well production, depth to water in selected wells during Spring 1975, and change in water level in selected wells from 1970 to 1975. Groundwater pumpage for 1974 and accumulated pumpage over the last 30-odd years are delineated for the state's developed areas.

Copies of the report, *Annual summary of ground-water conditions in Arizona–spring 1974 to spring 1974 (sic)*, are available for distribution at the Arizona Water Commission, 222 N. Central Ave., Suite 800, Phoenix and USGS offices in Room 5-A Federal Building, 301 W. Congress St., Tucson; Suite 1880 Valley Center, Phoenix; 601 E. Cedar Ave., Building 3, Flagstaff; and 1940 S. 3rd Ave., Yuma. Reports are available for perusal at USGS, Room 5312 National Center, 12201 Sunrise Valley Drive, Reston, VA.

Please address your news items or comments on the News Bulletin to any of the three editors:

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