ARIZONA WATER RESOURCES NEWS BULLETIN

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DEVELOPING A GROUNDWATER QUALITY MANAGEMENT PROGRAM

A design for developing a comprehensive groundwater quality management program was outlined recently in an article* by Raymond G. Giese, hydrologist with the Ground Water Protection Section of the U.S. Environmental Protection Agency (EPA). His design "represents a compilation of ideas from states that are currently developing groundwater programs."

Since 1979 the EPA has awarded nearly $10 million dollars to support prototype groundwater management projects aimed at developing a range of management approaches to groundwater pollution problems. Reviewing results of these projects can save a state time in developing particular aspects of a program (such as a contaminated site "rating" system) and allow more time for developing aspects unique to the state's water situation. The article stresses the importance of political support, such as a legislative mandate or executive order, and the creation and utilization of a task force consisting of individuals in state government involved in managing groundwater.

Factors Giese points to as necessary in establishing a successful state groundwater management program include:

- a legislative basis for program development;
- maintenance of an adequate data base;
- promotion of appropriate landuse and development practices;
- use of groundwater quality standards as a regulatory or enforcement tool;
- proper implementation of existing programs; and
- regulation of groundwater use.

Giese points out that current environmental laws and regulations do not offer a comprehensive approach to groundwater management. The Safe Drinking Water Act addresses a limited number of pollutants and does not mandate inspection of private drinking water systems. The Clean Water Act does not offer any direct protection to groundwater. The Resource Conservation and Recovery Act (RCRA) addresses wastes, but not raw materials, and regulations exclude some small waste disposers that could collectively pose a threat to a particular aquifer. Superfund legislation focuses only on the most critical contamination. For a consistent and comprehensive approach to groundwater problems, states must organize their own management programs.

Giese describes four elements necessary for a comprehensive groundwater quality management program: pollution control policies and mechanisms; an emergency and remedial capability; adequate information for determining changing conditions; and the "machinery" for implementing and managing the groundwater program.

Pollution Control

Policy, goals, and objectives should explain the need for the program and should incorporate technical data regarding the value of the resource. The policy should be drafted with the aim of being easily understood by other state officials and the public. Precise definitions of the basic state protection policy and the supporting policies (water rights, quantity vs. quality, etc.) and of goals and objectives are important.

Mechanisms for policy implementation include:

- standards for siting and design of facilities with a contamination potential;
- standards to control treatment or handling materials with potential for contamination;
- permits and licenses for drillers and dischargers;
- compliance and enforcement procedures;
- local zoning and permit systems specific to groundwater protection; and
- state legislation for program support.

* "A State Groundwater Management Program" published in the Winter 1982 issue of *Ground Water Monitoring Review*.

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Cleanup of Existing Contamination

An emergency and remedial capability requires gathering information. The first need is an inventory of all existing sources of contamination. Information can be obtained from a variety of sources: 1) those established as part of the Resource Conservation and Recovery Act, the Safe Drinking Water Act, and Superfund; 2) the Surface Impoundment Assessment; 3) regional planning agencies' land use surveys; 4) "hot-line" reporting systems; and 5) interviews with local health officials. Giese suggests that when the inventory is complete, the state should prepare and regularly update a site log which should be made available to all interested individuals.

The existence of contamination at each site should be verified and "rated" according to the severity of the problem. Giese cites the LeGrand and modified LeGrand systems and the MITRE system developed for the Superfund program as examples of useful rating methodologies. He suggests that ideally, after being rated, sites should be grouped by aquifer system and those sites with greatest pollution potential should be noted.

The entire process includes initial investigation procedures (off-site surveys, in-house briefings, etc.) prior to full field investigation. Hydrogeologic study procedures describe the circumstances when groundwater studies should be completed and incorporate proper field investigation and sampling procedures. As additional information is compiled, further actions may be determined with the help of task force members and state staff. Decisions will need to be made regarding how to implement and fund the cleanup and how to notify the public.

Information Needs

A comprehensive management program requires three types of information:

- resource definition relating to the location and extent of major aquifer systems in the state and to current and projected water use, in order to identify aquifers important to drinking water supplies;
- groundwater quality monitoring information (it is suggested that each state develop an ambient groundwater monitoring program to supplement information available from the U.S. Geological Survey, the Underground Injection Control Program, and the Safe Drinking Water Program); and
- information on current technology and research.

Program Implementation and Management

The responsibilities of the various state agencies relating to the program must be defined and an organizational chart should be prepared. Coordination procedures for agency activities and specific program activities such as permit review and public notification should also be prepared. Staff training opportunities, continuing public education, and program evaluation all require definition. Giese suggests that an evaluation system should be implemented early in the program. Necessary personnel and funding resources for program implementation must be detailed (implementation can utilize existing staff and organizational units) and a full-time program manager should be assigned to organize and coordinate the effort.

Giese notes that program implementation requires effective communication, which will depend on the quality of the final report and its suitability as a procedures handbook for frequent reference by different audiences. He stresses that state officials should take the time to prepare the document and promote its use.

YUMA DESALTING TEST FACILITY TO CLOSE

The Yuma Desalting Test Facility will discontinue operations at the end of April. The facility has been operating since 1974 developing, testing, and evaluating equipment and techniques for use in the Yuma Desalting Plant when it is completed. The testing program was necessary because of the size of the desalting plant (now planned for an initial capacity of 73 million gallons per day), and because of the unique characteristics of the Wellton-Mohawk Irrigation and Drainage District water it will treat for delivery to Mexico.

Initial testing was conducted to provide equipment manufacturers with data on how their equipment would perform. Between 1974 and 1977, 12 units were tested. Collectively, these units had an accumulated operation time of more than 120,000 hours.

Following this initial test phase, manufacturers submitted proposals to furnish equipment for the desalting plant. In October 1978, contracts were awarded to two California firms, Hydranautics, Inc., of Santa Barbara, and Fluid Systems Division, Universal Oil Products, of San Diego, to furnish proof test units.

The proof test units were representative of the actual equipment that will be used at the desalting plant. Each unit was tested hydraulically, at design condition operation, and under varying conditions of flow, salinity, water recovery, and pressure during proof testing.

Purpose of the proof tests was to permit early identification and correction of any unforeseen problems. Both of the tested units had the necessary mechanical integrity, but required additional capacity to assure design productivity during sustained operation. After the manufacturers agreed to modify their equipment to meet the specified productivity levels, both Hydranautics and Universal Oil Products were given notice to proceed with manufacture of equipment for the Yuma Desalting Plant.

(Adapted from an article in *Salt Talk*, published by the U.S. Department of the Interior Colorado River Basin Salinity Control Project.)

PIMA FARM BUREAU HELPING REGISTER WELLS

The Pima County Farm Bureau and the Arizona Department of Water Resources (DWR) have joined forces to urge local well owners to comply with the provision of the 1980 Groundwater Management Act, which requires all wells, regardless of size, to be registered with the DWR by June 14 of this year.

County Farm Bureau members have begun contacting local merchants to seek their cooperation in displaying well registration posters in their store windows. Store owners will receive a supply of brochures and well registration forms for anyone who needs to register. The brochure explains how to register, and highlights the advantages of doing so.

The groundwater law requires all existing wells – those which haven't been permanently abandoned or sealed – to be registered. Owners of small wells that pump 35 gallons per minute, or less, are not charged a registration fee; it costs $10 to register wells with larger pump capacities.

DWR planners estimate there are approximately 100,000 wells throughout Arizona. Eighty percent of these are thought to be small, domestic wells. Well owners with questions may call the Water Resources Department toll free: 800/352-5464, or contact the Tucson AMA office at 628-5858.

NEW METHOD DEVELOPED FOR ESTIMATING RARE, HIGH-VOLUME FLOODS

A sediment-analysis method for estimating when rare, high volume floods are likely to occur has been developed by two university researchers. The method involves reading the sediment record in areas that retained "slack water" during former floods. A trench must be dug near the mouth of a main tributary of the river chosen for study. When flood waters of major rivers back up, slack water deposits are likely to occur in these areas. The sediments, usually distinct from those carried by the tributaries themselves, often accumulate in sizable layers in tributary mouths. The resulting sedimentary record can reveal mineralogy and the direction of flow of the flood waters. Furthermore, by carbon dating the organic materials, scientists can calculate when large floods occurred.

The method was developed by Victor R. Baker, University of Arizona, Tucson, and R. Craig Kochel, State University College, Fredonia, New York. It works even in arid regions and where historical records are short or non-existent. Traditional flood prediction methods often fail because the last major event occurred before record-keeping began.

In their study, Kochel and Baker set up a 10,000-year paleoflood record for Texas' lower Pecos and Devils Rivers. While hydrologists using conventional methods estimated flood recurrence on the Pecos to range between 81 and 10 million years, the slack water method yielded a considerably more precise estimate of 2,000 years.

(Adapted from an article in the March 1982 issue of *Hydata – News and Views*, published by the American Water Resources Association.)

SHORT COURSE

Northern Arizona University will hold a one-week short course in Groundwater Hydrology in Flagstaff, June 21-25, 1982. The principal lecturer is Dr. Herman Bouwer, Director of the U.S. Water Conservation Laboratory and Adjunct Professor in Groundwater Hydrology at Arizona State University. The course will provide the participants with a basic understanding of the occurrence, movement, collection, contamination, and protection of groundwater, and of subsidence and fissuring of the land due to groundwater overdraft. Current problems and issues in groundwater will also be addressed. The course is intended for persons in public and private agencies that deal with groundwater but have had no formal training in groundwater hydrology, for interested citizens, and for students.

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SYMPOSIUM

The American Water Resources Association (AWRA) will be conducting an International Symposium on Hydrometeorology June 13-17, 1982 in Denver, Colorado. Co-sponsors of this symposium are the American Geophysical Union, the American Meteorological Society, the World Meteorological Organization, the Weather Modification Association, and the International Association of Hydrological Science.

For further information contact the AWRA at Mississippi River at Third Avenue S.E., Minneapolis, Minnesota 55414. Telephone (612) 376-5050.

PUBLICATIONS

Natural Salinity Removal Processes in Reservoirs by Jay J. Messer, Eugene K. Israelsen, and V. Dean Adams reviews the evidence for natural salinity removal processes in western reservoirs. Laboratory and field investigations of potentially controlling factors were conducted using Oneida Narrows Reservoir in southeastern Idaho as a model system.

A small but significant amount of salinity removal has been reported by various researchers to occur in mainstem Colorado River reservoirs. Recalculation of some of these salinity budgets, together with a review of the data used, suggests that removal has not often been conclusively demonstrated.

Laboratory microcosm experiments and field data indicate that calcium carbonate precipitation, perhaps with some coprecipitation of magnesium carbonate, is the mechanism responsible for most salinity removal in Oneida Reservoir. Coprecipitation processes, coagulation, and bioassimilation do not appear to be important natural salinity removal mechanisms. Finally, loss of calcium may decrease water quality for irrigation purposes, through increasing the sodium adsorption ratio, despite a small decrease in total dissolved solids.

The potential role of various reservoir operation options in managing natural salinity removal processes and the value of such removal are discussed in the report.

To obtain a copy, write to Utah Center for Water Resources Research, Utah Water Research Laboratory, UMC 82 Utah State University, Logan, Utah 84322. Request Water Quality Series UWRL/Q-81/03. Price is $4.00.

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

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