

System Provides Customers Real Time Water Quality Info

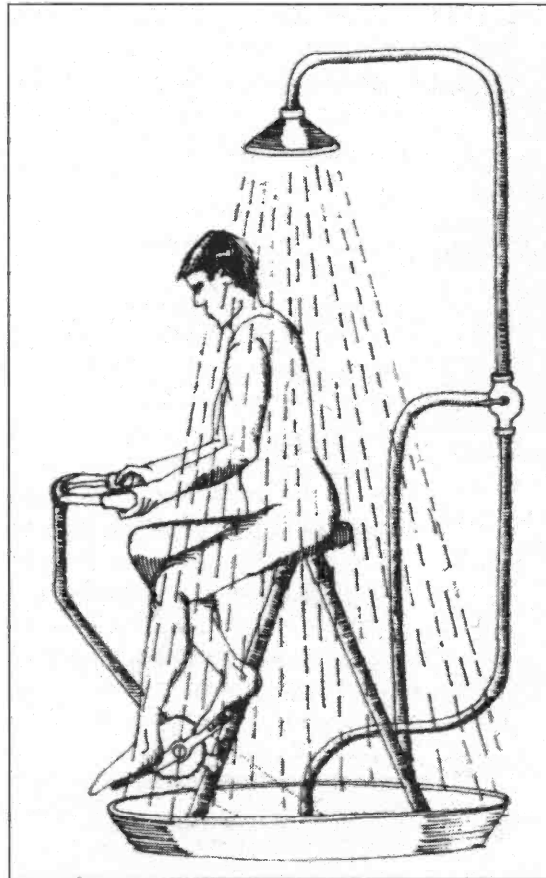
Tucson Water is breaking new ground in its efforts to provide its customers real-time water quality data, with results displayed on an interactive web site.

Since May 2001, Tucson Water has been installing a series of 22 on-line water quality monitoring stations. Located at representative points throughout the entire main distribution system, the stations continuously monitor for various water quality characteristics — pH, chlorine level, temperature and total mineral content. On Aug. 8, a milestone was reached when Tucson Water Director David Modeer ceremonially activated the last of the 22 stations.

The data derived from the continuous, second-by-second readings is automatically up-loaded to the utility's water quality database every 60 seconds. The compiled information is then published daily on Tucson Water's web site, enabling citizens access to timely water quality information no more than 24-hours old.

The monitoring stations are strategically

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Technology, in both its low-and high-tech manifestations, is often viewed as a tool in the search for new ways to conserve water. The sketch demonstrates a decidedly low-tech water saving device, the velocipede recycling shower. Its stripped-down simplicity, however, should not blind us to further possibilities. A tandem version would significantly increase its energy and water savings potential.

The illustration is found in the publication "Graywater Guidelines." Published by Water CASA (Water Conservation Alliance of Southern Arizona), the booklet describes various strategies for capturing and using household graywater. Strategies range from the low-to-middling tech. (garbage cans to electric pumps) See "Publications" on page 8 for information about the booklet and how to obtain a copy.

First Arizona Water Treatment Plant Using Ozone Now On-Line

Ozone's future use in the state is the broader issue.

Arizona got its only fully on-line ozone water treatment plant when Peoria's newly constructed facility began operating on June 10. The event raises questions about the use of ozone to treat drinking water in the state: Why at this point in time is ozone being used in Arizona? Will other Arizona municipalities follow Peoria's example? And, in the larger context, does Peoria's decision reflect a general acceptance of ozone for meeting new water quality standards?

The use of ozone is relatively new to Arizona, compared to other parts of the country. In January 2000, about 330 U.S. municipal ozone installations were known to be operating. At the same time, however, the United States lags significantly behind European countries in the adoption of ozone. While European countries mainly rely on ozone for treating drinking water, the water treatment method of general choice in the United States is chlorine.

Tucson deserves qualified recognition as the first municipality in the state to adopt ozone for water treatment. With Central Arizona Project waters on the way,

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the city spent more than \$85 million to construct the Hayden-Udall Water Treatment Plant. The city decided that using ozone as a primary disinfectant and chloramine as a residual disinfectant would ensure the highest water quality. The 150-million-gallons-per-day (mgd) plant came on-line in 1992.

Unfortunately circumstances beyond the design of the plant complicated Tucson's plans. CAP water with its high mineral content was being delivered through old steel pipes previously used only for groundwater. The situation was further aggravated when the pH level of the released water was not properly adjusted. Experts warn that releasing water with a pH level below 7 is asking for trouble, and trouble occurred. Discolored water and damaged pipes resulted, and a political debacle arose. Politics drove water policy, and the treatment plant was shut down in 1994.

The circumstances that led Peoria to choose ozone were similar to those that confronted Tucson and are familiar to other Arizona communities as well. Peoria was reducing its groundwater consumption by turning to surface water. Purchased from the Salt River Project, the new water supply raised various water quality concerns. Compared to the relatively pristine groundwater, surface water, derived from free-flowing rivers and delivered via an open canal, differs in its overall chemical, physical and aesthetic makeup. Communities changing from groundwater to surface water confront water treatment choices.

Once, chlorine would have been the obvious choice. Still the most frequently used method to treat water in the U.S., chlorine is now viewed as possibly posing health hazards. When used to treat water, chlorine can react with organic substances to produce chlorinated compounds, shown to cause cancer in laboratory animals. These include trihalomethanes (THMs), haloacetic acids (HAAs) and chlorite. EPA has established limits for these byproducts.

In adopting ozone, Peoria was mainly concerned that its customers not experience any differences in the aesthetic quality between surface water and groundwater. Along with their concern about taste and odor, officials looked to ozone to ensure that regulated byproducts were not an is-

sue when surface water was treated. The increased expense in using ozone was offset by the city's use of surface water that costs less than pumping groundwater.

Ozone is lauded for its effectiveness in destroying hazardous pathogens, including *Cryptosporidium*, but it lacks a long-lasting residual to control biological contaminants within the distribution system. In compliance with the law requiring post residual disinfection with a chlorine compound, Peoria's final step in its water treatment process after ozonation, coagulation, sedimentation and filtration is chlorination to ensure a residual disinfectant.

Gilbert is another Arizona city now using ozone. When increasing its treatment plant capacity from 15 to 30 mgd, Gilbert switched to ozone to treat its drinking water. The original plant came online in 1997, at the time the city began using SRP water. Prior to that time Gilbert relied mostly on groundwater. Concern about the need to meet future water quality standards convinced the city to adopt ozone treatment. The city had previously been using chlorine.

Along with ozonation, the Gilbert treatment process includes sedimentation and filtration, with chlorine added as a residual. The ozone component is currently not fully operating, still in its testing and debugging phase.

The City of Phoenix is looking at ozone along with other treatment strategies as part of its water quality master plan. An ongoing project, the plan involves examining various methods for meeting future water quality standards. At this point, Phoenix does not use ozone to treat drinking water.

Ozone holds promise for communities now using or planning to use surface water. Las Vegas is a recent example with its construction of two ozone treatment plants to treat Colorado River water. Scheduled for completion in 2003, the plants, one a 600 mgd plant and the other a 150 mgd plant, will be among the largest such plants in the world. Las Vegas is investing heavily in ozone for disinfection since *crypto* outbreaks have occurred in the area.

The use of ozone, however, is not without its disadvantages. It was once the up-and-coming water treatment of choice, but in the mid-1980s researchers found that hazardous by-products were also associated

with its use. When water containing bromide was treated with ozone, bromate was formed. Research linked bromate to kidney cancer in laboratory animals.

This development raised concerns, and in 1999 the EPA included bromate in its list of disinfection byproducts to be regulated. Large utilities had to comply with a 10 ppb limit by January 2002, and small systems have until January 2004 to comply.

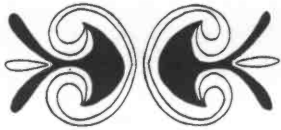
Bromide is found in raw waters throughout the world. Located within a prehistoric seabed, Arizona has highly saline soils, including high levels of bromide. Bromide can be found in groundwater as well as surface water, although it typically occurs less in surface waters.

It was the bromate issue that contributed to the City of Scottsdale's decision to go with membrane filtration rather than ozone. Ozone was considered for the city's first water treatment plant on the SRP system. The canal, however, will be delivering an increased ratio of CAP water to SRP water. CAP water has a higher concentration of bromide than SRP water, and the city determined that the ozone dosage needed to treat the water would result in a bromate problem. The 30 mgd plant, which will be the largest membrane filtration plant in the state, is scheduled to go online 2005.

Choosing an appropriate water treatment method is a balancing act, as efforts are made to take advantage of the benefits of a particular method without experiencing its limitation. Various strategies come into play, with the chosen method depending upon treatment goals. The Safe Drinking Water Act promotes this approach to ensure multiple barriers to protect public health.

For example, a utility may have a water source from a protected watershed. Treating for crypto therefore may not be a priority. Using chlorine, however, might result in an excess number of byproducts. An effective treatment method then might be to use ozone to preoxidize, thereby reducing organics, the precursors of THMs. The next steps would be coagulation and filtration, with chloramine applied for final disinfection and distribution. The various treatment stages work together synergistically.

The wave of the future in water treatment will likely be a combination of the various treatment strategies to produce the highest water quality.



Water Vapors

AZ Celebrates National Water Education Day, Sept. 27

National Water Education Day looms on the horizon, and the Arizona Project WET (Water Education for Teachers) is playing a central role in organizing a celebration in the state. Project WET is a program within the University of Arizona's Water Resources Research Center. The 3rd annual AZ Water Festival will be held Sept. 27 at WestWorld, Scottsdale, with about 1,000 4th grade students and their teachers participating.



A Journey into Water Education

This year's festival is a combined effort of WRRC's Project WET and the City of Scottsdale Water Conservation Office and is sponsored by the U.S. Bureau of Reclamation, Arizona Department of Water Resources, Arizona Department of Environmental Quality, Central Arizona Project and Salt River Project.

National Project WET, with support of the Perrier Group, is sponsoring water festivals throughout the United States on Sept. 27. More than 50,000 students, teachers and interested citizens are expected to participate in Make a Splash water festivals in all 50 states, the District of Columbia and the Northern Mariana Islands. The festival's goal is to raise awareness about the value and uses of water and to promote an ethic of stewardship towards water resources.

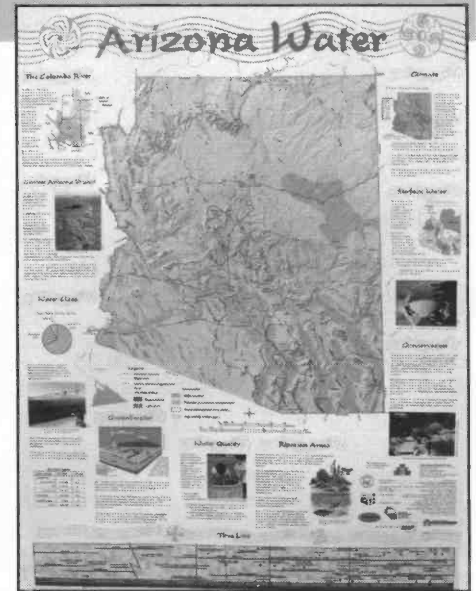
What Kind of People Store Water for Emergencies?

The International Bottled Water Association conducted a survey to determine how many people store water in the event of an emergency. The survey, conducted with 1,018 adults in June, identified that those who store water for drinking are more likely to be: a homemaker (57 percent); single parents (57 percent); Hispanic (57 percent); residents of the West (55 percent) and Outer South (48 percent); those with a total annual household income of \$15,000 or less (55 percent); females 35 to 54 years of age (49 percent); and females 25 to 34 years of age (49 percent).

Those not storing water are more likely to be: 18 to 24 years of age (67 percent); male Republicans (66 percent); residents of the Midwest (69 percent), Deep South (66 percent), and Northeast (64 percent); males over the age of 35 (65 percent); male (62 percent) and Caucasian (61 percent).

Water Treatment With a Difference

The following is a quote from British exam scripts: *The process of flirtation makes water safe to drink because it removes large pollutants like grit, sand, dead sheep and canoeists.*



Actual Size 31.5" X 41" (Photo by Matt Leake)

For Sale: Revised WRRC Water Map

A revised edition of the Water Resources Research Center's water map has been published and is available for sale. The map provides a view of water within the Arizona landscape, showing the locations of rivers, lakes, reservoirs, riparian areas, the Central Arizona Project canals and major aquifers. Shadings and coloration display Arizona's natural topography, and boundary lines mark Active Management Areas. Copies are available for \$8 and can be ordered from the WRRC web site: www.ag.arizona.edu/azwater. Proceeds from the map are earmarked to support water related educational activities and for future reprinting costs.



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News Briefs

New Glen Canyon Flood Proposed

In an effort biologists said would “clean out the system,” a week-long spike flood was arranged in 1996 to wash through the Grand Canyon, with water released from Glen Canyon Dam at the rate of 40,000 cubic-feet per second — or about five times the typical flow of the Colorado River. The goal was to restore the river’s native ecosystem.

Scientists believe that the system is in need of another cleaning, and an advisory group has recommended another flood to continue the work begun by the 1996 flood.

The 1996 flood was arranged to repair conditions affected by the dam’s operation. It was expected that released waters would carry sands downstream to be redeposited on depleted beaches, with the forceful waters replicating the flood environment in which native fish evolved. The goal: rebuild beaches and improved native fish spawning habitat.

Widely touted at the time as returning the Colorado River to its once natural conditions, scientists now say the flood was only a qualified success. Conditions have since deteriorated with sand deposits washed from river banks and the humpback chub, a fish native to the river, failing to reproduce.

In response to the current situation, the Glen Canyon Dam Adaptive Management Work Group, a committee that advises Interior Secretary Gale Norton on dam operations, is calling for another flood. With information acquired from the first flood and new data from ongoing monitoring efforts, the proposed flood is expected to score greater and more lasting gains.

AMWG, a 25-member consortium, includes federal officials, tribal representatives, members of the power and recreation industries, environmentalists and scientists.

The proposed plan calls for maintaining low dam flows through the winter when tributaries below the dam are delivering sediment from monsoon rains into the main river channel, with the result that silt

is retained in the river. The next step would be a two-day peak flood in January to wash the accumulated sediment out of the river’s channel, onto its banks. Three months of fluctuating flows would follow to create favorable conditions for the humpback chub.

The new plan would remedy a shortcoming of the 1996 flood that essentially moved sediment from beach to beach and not from the river channel onto the beaches.

The plan awaits Secretary Norton’s decision, expected by the end of the summer.

State Environmental Agencies’ Budgets Shrink

State environmental agencies throughout the United States are confronting shrinking budgets for the second year in a row, according to recent study. Seventy-five percent of states responding to a survey conducted by the Environmental Council of the States reported budget cuts in programs aimed at reducing pollution and protecting clean air and water.

Forty states responded to the ECOS survey, with 30 states looking at a funding cut in their fiscal year 2003 budget. Eight of the remaining 10 saw no increase in their budgets. Two fortunate agencies received a budget increase. (EOS gathered its information confidentially and as a result is not releasing information about individual states by name.)

“States still spend over \$13 billion per year on environment and natural resource protection,” said R. Steven Brown, acting executive director of ECOS, the nonprofit, nonpartisan national association of state environmental agencies and their directors. “These last two years end a long trend of budget increases dating back to at least 1986.”

ECOS estimates that since 2000 spending has dropped by about 3.7 percent.

The Arizona Department of Environmental Quality’s FY 2002 general fund was cut \$1,075,500 and the department lost \$10 million from its Water Quality Assurance Revolving Fund (WQARF) Program, which is tasked with the clean-up of contaminated

waters and soils of the state. The FY 2003 reduction amount is estimated at \$436,500 from the general fund and \$5 million from WQARF.

“Environmental agencies are not being singled out,” Brown added. “Nearly all state agencies are facing similar cuts,” due to a declining national economy.

The ECOS study shows that almost \$200 million was cut from the fiscal year 2003 environmental budgets of 30 states, with the average cut about \$6.8 million per state. Last year, 42 states experienced cuts of \$196 million, averaging \$6.5 million per state.

The agencies’ general, unallocated funds were the target of 74 percent of the cuts. The survey showed that states able to cite specific programs administered cuts to 32 water quality programs, eight clean air programs and seven hazardous waste programs. No states reported cuts to enforcement programs.

The agencies are experiencing the cuts at time when they face additional responsibilities for meeting new homeland security needs. With the September 11 terrorist attacks, state agencies have acquired a role in helping to protect the nation’s food and water supplies, mostly without yet acquiring additional resources for the task.

Report: Mexico’s Water Problems Severe

Arizonans are mostly aware of Mexican water issues as international affairs affecting both the United States and Mexico. A recent report, however, provides information to citizens of both countries about the serious internal, domestic water problems facing Mexico.

The report published by El Economista states that 95 percent of Mexico’s fresh water supply is contaminated. It reports that 24 percent of the country’s fresh water supply is highly polluted and contains toxic substances; 22 percent has an “acceptable” level of pollutants; and 49 percent has a low level of contamination. Only 5 percent of Mexico’s fresh water supply is pollutant-free

Candidates Vie For CAWCD Board Seats

Can voter indifference be overcome to make this a true race?

During the November election voters from Pima and Pinal counties will be choosing representatives to the Central Arizona Water Conservation District Board, and Central Arizona Project officials hope the non-partisan election will spark public debate and become a true political race.

In the past, choosing members for the CAWCD board has not been a high interest item among voters, the position generally ranking alongside the state mining inspector in voter indifference.

The CAWCD board serves staggered six-year terms without pay. Every two years, as part of the general election, the public elects one-third of the 15-member CAWCD Board. Candidates are drawn from CAP's three-county service area: Maricopa, Pinal and Pima counties. The composition of the board is based on population, with ten members from Maricopa County, four from Pima County and one from Pinal County.

Eleven candidates will be vying for the four Pima County board positions: Bob Beaudy, Mike Boyd, Diana Kai, Leo Leonhart, Mark Lewis, John T. Mawhinney, Neil McHugh, David V. Modeer, Steve Weatherspoon, Peter J. Wierenga and Carol Zimmerman.

With petitions signed and submitted, and candidates approved for the ballot, discussion and debate are now needed to differentiate the candidates and bring out their positions. But will discussion and debate occur?

In the past, candidates tended to be elected to the CAWCD board on the basis of name recognition, those elected usually known figures within the larger community, with involvement in water affairs not necessarily a prerequisite.

CAP spokesman Bob Barrett says CAP officials are hopeful this year will be different, with the upcoming board election a true race. Barrett says the importance of the board is not generally recognized.

He explains: "The CAWCD board functions within CAP in the same way a city council functions in a city. The board sets policies and oversees operations. Our general manager is the equivalent of a city manager, the person responsible for day-to-day operations, reporting directly to the board."

Barrett says the CAWCD board is involved in important

state water business. For example, the board's responsibilities include setting CAP water rates. The board also sets the property tax rate that finances CAP operations. The tax is applied to property within CAP's three-county service area. The board also must approve any changes in CAP water allocation.

Barrett adds the times may be ripe for recognizing the importance of the board election. He says, "We hope the election will be taken more seriously this time because the state is at a critical junction in its water history." For example, ongoing drought has added a sense of concern about the reliability and use of the state's water supplies.

A recent survey confirms that Arizona citizens are indeed more concerned about water issues. In the Arizona Republic's 2002 election poll water ranked high, coming in third behind the well-being of children and crime as important issues facing the state as candidates gear up for the elections.

Water issues of current importance the CAWCD board will address include the Indian water rights settlement. The board also is involved in various regional water issues relating to the use of Colorado River water. For example, it will consider actions to take if California fails in its commitment to reduce its Colorado River water use. A CAP issue of special importance to Tucson is terminal storage, if and when that project is constructed in the area.

Barrett says that voters in Pima County are more likely than other voters in the state to pay attention to the board election. For example, more candidates are vying for the four Pima County board seats than have run for the five seats in Maricopa County during each of its last two elections. Also, Tucson voters pride themselves as being water sophisticates, knowledgeable about the issues and willing to take a stand, as was demonstrated by the prolonged community controversy over use of CAP water.

Will the upcoming CAWCD board election gain political stature, with voters viewing it as an opportunity to promote good water governance within the state? Barrett says it will be up to the candidates and the media to inform and educate the public about CAP water issues and the role and responsibilities of the CAWCD board.

according to the report.

To make matters worse 25 percent of the country's water treatment plants are reported to be operating inadequately. Out of the country's 1,018 regional water treatment plants, 225 do not function properly due to a dearth of resources.

The report contains further bad news. It states that aging infrastructure results in almost half the water extracted each year from aquifers, rivers and other water

sources to be lost. About 40 percent of the 72 billion cubic meters of water taken each year from the country's water sources are lost to leaks and careless consumption according to the report.

The report also finds maintaining sustainable water supplies a problem. The pumping of 96 of Mexico's 653 aquifers exceeds recharge. These aquifers are the source of half the water consumed in the country.

The report further says that many Mexican citizens lack basic water services, with 13 million without access to potable water and another 27 million lacking proper drainage systems.

The article quotes Oscar Ramirez, advisor on water and coastal regions for the United Nations Environment Program, as warning that if the current situation is not addressed, Mexico could confront a serious water supply problem within 10 years.



Guest View

“History of Water in Arizona” is Book Awaiting an Author

Doug Kupel contributed this Guest View. Kupel is a historian involved in environmental research with the City of Phoenix. His book, “Fuel for Growth: Water and Arizona’s Urban Environment,” will be published by the University of Arizona Press in spring 2003.

In the months and years to come, expect an outpouring of new books and articles on water in the American West. The twin centennials of the U.S. Bureau of Reclamation in 2002 and the Salt River Project in 2003 provide an opportunity for reflection. This is a time to look back on the significant works of Arizona water history, and to look forward towards a new generation of water history.

Unfortunately, the list of great books on Arizona water is a short one. We have no definitive works on the history of water in Arizona. This situation is all the more appalling because the water history literature of our neighboring states is so highly developed.

No state is better represented on library bookshelves than California. Its water history is crowned with Norris Hundley Jr’s *The Great Thirst*, now in a second edition. Our neighbor to the east has Ira Clark’s encyclopedic *Water in New Mexico*.

What Arizona needs for its double centennials is a comprehensive book on its water history that will serve as a reference book for the years to come. To find a book of similar scope and breadth for Arizona we must look back more than forty years to Dean Mann’s *The Politics of Water in Arizona*, published in 1960. The only thing that comes close is Athia Hardt’s edited work *Arizona Waterline*, significant as one of the few historical sources on groundwater use.

Arizona’s rivers have been the subject of considerable study, with most work focused on the Colorado. These range from table top ornaments to political tomes. One of the best is Robert Webb’s *Century of Change*, a re-photography project on the Grand Canyon.

Despite the length of the Colorado through Arizona and along its border, most of the water and the history of the river belong to California. Phillip Fradkin’s *A River No More* represents the sense of loss that accompanied California’s use of the water and the construction of dams that facilitated it. Scholarship on the Hoover and Glen Canyon dam also reflects the dominance of California thinking and perspectives, best exemplified by Mark Reisner’s portrayal of the CAP in *Cadillac Desert*.

Arizona’s second greatest river, the Gila, received a more sympathetic treatment by Edwin Corle in *The Gila: River of the Southwest* in 1951. His work was a type of prelude to the modern environmental movement. More recently, Gregory McNamee updated the continuing sense of loss over what the Gila might have been with his *Gila: The Life and Death of an American River*.

Arizona’s other rivers have been lightly examined. Michael F. Logan recently ended the drought of scholarship on the Santa Cruz with *The Lessening Stream*. The San Pedro has only *The San Pedro River: A Discovery Guide*. Barbara Tellman is at work on a history of the San Pedro with Diana Hadley and the Arizona State Museum. The Salt River needs its own history.

Moving to cultural history and starting with the Spanish era, the best overall work is Michael C. Myers’ *Water in the Hispanic Southwest*. This work is not about Arizona alone, but naturally covers New Mexico in great detail. Given the long Spanish and Mexican eras in Tucson, scholars could find this a profitable topic for study.

The Salt River Project and agricultural water use in Central Arizona are the subject of several book length treatments. Karen Smith’s history of the project to 1917, *The Magnificent Experiment*, is the best overall source. Earl Zarbin, who has written several books about Salt River Project dams and valley canals, supplements her work. A more recent treatment is *Raising Arizona’s Dams*, significant for its examination of ethnic history. Salt River Project historians are now putting the final touches on a centennial history of the project.

Native American water rights are subject of considerable study in the West, but no work has Arizona as its sole focus. But, because of the number and significance of water rights settlements in the state Arizona is well represented in several overall summaries. These include Daniel McCool’s *Command of the Waters*, Lloyd Burton’s *American Indian Water Rights and the Limits of Law*, and *Indian Reserved Water Rights* by John Shurts. However, like works on the Colorado River, most writing on Indian water rights includes Arizona only as part of larger treatments. One with a better focus on Arizona is Bonnie Colby’s *Indian Water Rights: Negotiating a Future*.

Given the importance of the Central Arizona Project to Arizona water history, it is strange that no historian has tackled this subject. The best work on the subject is insider Rich Johnson’s *The Central Arizona Project*, but this covers only until 1968. Johnson completed a manuscript bringing the history up to 1991, but this remains unpublished after his death. Jack August has rectified the situation somewhat with the publication of his *Vision in the Desert*. For an alternative view, anyone interested in the CAP should read *How to Create a Water Crisis* by Frank Welsh.

There are a number of other significant works that cover Arizona water history that fall into the area of technical and scientific treatments. These include the research reports prepared for the Arizona Town Halls (1964, 1977, 1985, and 1998). Staff at the University of Arizona’s Water Resources Research Center has produced a number of important examinations of water history. These include: *Arizona’s Changing Rivers*, *Instream Flow Rights*, and the *Arizona Water Information Directory*. Even effluent has not escaped the attention of the WRRC, a subject that will be increasingly important in the years to come. Another area that needs additional attention in the future is water quality, a topic now entirely lacking in historical study.

The next hundred years of Arizona water history will bring new challenges and opportunities. But before we embark on that new journey, Arizona’s water historians must redouble their efforts to document the significant events of the last century. A key element will be to make research materials available to scholars, a goal met with different degrees of success in the past.



Legislation and Law

Are Laws Adequate for Protecting Sensitive Water Information?

Water security has taken its place along with water quality and quantity as a priority concern of water utilities. In addressing water security concerns, utilities are raising a sensitive issue about the public's right to certain kinds of information. The critical question is: How can water utilities deny open access to information that might be useful to domestic or foreign terrorists in a plot to wreak havoc to water supplies?

Some federal agencies have set an example by already having taken steps to restrict information they deemed potentially dangerous if falling into the wrong hands. In response to the terrorist threat, the U.S. Geological Survey removed reports on water resources from its web sites and asked libraries to destroy all copies of a CD-ROM that described characteristics of the nation's reservoirs.

Information access is also at issue as utilities respond to federal security rules requiring they take action to safeguard their water supplies. Congress passed the Public Health Security and Bioterrorism Response Act in May that requires water systems that serve more than 3,000 people to conduct vulnerability assessments and develop emergency response plans. The bill provides more than \$100 million in federal funds to beef up water system security, much of the funding to go as grants to large drinking water utilities.

EPA recently announced that ten of Arizona's largest cities will be receiving federal funds to assess the vulnerability of their systems. Phoenix, Mesa, Tempe, Chandler, Gilbert, Glendale, Peoria, Scottsdale, Tucson and Yuma have until March to complete their assessments. The assessments will help policymakers estimate how much to budget for protection.

Utilities are aware that when assessing their vulnerabilities they will be reviewing information they would prefer not be released to the public. In passing its anti-bioterrorism bill, Congress recognized this concern and provided a Freedom of Information Act (FOIA) exemption for drinking water vulnerability assessments. Further, the act designates fines, imprisonment and loss of federal employment for individuals who disclosed information contained in the assessments.

Passed by Congress in 1966 and amended in 1974, the FOIA establishes procedures enabling any member of the public to obtain the records of federal agencies.

Sensitive information may be protected at the federal level but state FOIA/Right-to-know laws, however, may provide loopholes to terrorists. All states have laws on their books addressing disclosure of public information, with the intent to establish some degree of governmental transparency. These laws reflect each state's unique legal and policy traditions for granting access to public records. The Association of Metropolitan Water Agencies recently published a guide reviewing states' open records and freedom of information policies to determine if they provide sufficient protection of information that could expose a water systems' vulnerabilities. (See

Publications and On-Line Resources, page 8, for information about the guide.) How does Arizona measure up in being able to restrict access to sensitive information?

Compared to other states, Arizona has few statutory disclosure exemptions to exclude specific kinds of information from public access. Whatever exemptions do exist derive from case law and opinions from the Attorney General's office. Chris Avery of the Tucson City Attorney's Office says a three-pronged test determines if information is to be exempt from the state's right-to-know law. Information may be exempt if it is deemed confidential, private or in the best interest of the state to restrict access. Avery believes that the last criteria, whether disclosure is in the best interest of the state, would exempt information about Arizona water utilities from public access laws.

He says, "Certainly it would be difficult to make a case that it would be in the best interest of the state to disclose an assessment of your vulnerabilities, much like it would not be in the best interest of the state to disclose the security details of state prison.

"That is certainly the argument I would make if someone were to file a public records requests for Tucson's Water vulnerability assessment."

Water utilities' concerns about the availability of information are not just confined to vulnerability assessments. National water organizations have put the Senate Government Affairs Committee on notice that information about critical infrastructure protection should also be FOIA exempt. The committee is considering legislation for the Department of Homeland Security, a Cabinet-level agency that will house a director of critical infrastructure, with responsibilities relating to water and wastewater facilities among others.

In a group letter, the Association of Metropolitan Water Agencies, American Water Works Association, National Association of Water Companies, National Rural Water Association, Water Environment Federation, National Water Resources Association and the Association of Metropolitan Sewerage Agencies wrote, "The water sector has significant concerns about sharing sensitive information with agencies of departments that do not have the necessary tools to ensure that it would be protected." The group claims to service at least 80 percent of the U.S. population.

The letter further states, "There must be, at minimum, a FOIA exemption for voluntarily shared information related to critical infrastructure protection."

The unsettling attitude change settling throughout the nation might be exemplified by a statement recently quoted in an Arizona Republic story. The town of Gilbert's Water Superintendent Bill Taylor said in reference to a town water treatment plant, "When we built our treatment plant in 1997, we wanted a neighbor-friendly, tour-friendly facility. Now we'd just as soon hide it and make sure people don't know it's here."



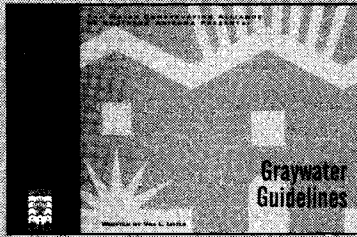
Publications & On-Line Resources

Use Graywater and Give Household Water a Second Chance

Graywater Guidelines

Val L. Little

In recent years, with growing populations, water conservation has assumed a much greater importance in our lives. Graywater use is the next step for those committed water conservationists

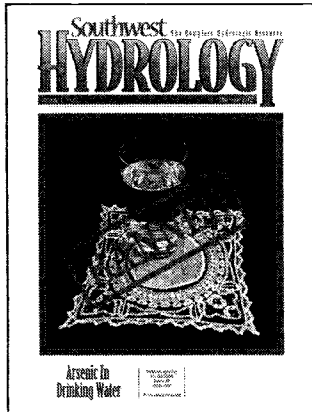


who are already practicing good water-saving behavior. Some people, however, are reluctant to take that step, put off by the thought that a graywater system involves the installation of equipment and

possible physical alterations. This booklet will provide a boost to those reluctant, well-meaning individuals.

Written for the novice or layperson, the publication clarifies graywater issues in a simple and straightforward manner and includes helpful illustrations. The text will help readers decide if graywater is suitable for them and provides guidelines on a variety of appropriate materials and methods of system installation. The booklet also contains a copy of the common-sense rules issued by the Arizona Department of Environmental Quality for the use of residential graywater. (Yes, graywater use is legal.) The booklet is a publication of Water CASA (Water Conservation Alliance of Southern Arizona). Check the Water CASA web site for information about obtaining a copy. (www.watercasa.org)

New Publication Reports on State and Regional Water Affairs



With the publication of "Southwest Hydrology," people wanting to be kept informed of state and regional water issues now have an additional resource to assist them.

Its statement of purpose was included the premier, May-June edition: "This magazine evolved from our hypothesis that water professionals in the Southwest are interested in, and would benefit from, a forum for sharing information. We are providing the 'clearing house' for receiving and distribut-

ing information about projects, research, technologies, regulations, and innovations that are unique to our semi-arid region, and you, the water community, provide that news."

Subscriptions are available free of charge. Send subscription requests to Southwest Hydrology, P.O. Box 65690, Tucson, AZ 85728; email: mail@swhydro.com Subscriptions can also be requested via the web site at www.swhydro.com

Tribal Environmental and Natural Resources Assistance Handbook

This handbook was developed by the domestic Policy Council Working Group on American Indians and Alaska Natives. It is a compilation of the federal sources of financial and/or technical assistance programs available for tribal environmental management. The handbook benefits tribal environmental staff and informs federal, regional, state and local government employees about the sources of environmental assistance available to improve services to the tribes. The document is available at www.epa.gov/indian/

tribband.html or contact the EPA American Indians Environmental Office, 401 M. St. SW, Washington, D.C. 20460 or call Tonya Fish, phone: 202-260-0769; email: fish.tonya@epa.gov

Water Resources Data Arizona, Water Year 2001

This U.S. Geological Survey report is a compilation of surface-water, chemical-quality, and groundwater data. USGS prepared the report in cooperation with the State of Arizona and with various agencies. The Arizona District water data report includes records on both surface water and groundwater in the state for water year 2001. The report is identified as "U.S. Geological Survey Water-Data Report AZ-01-1" and is for sale to the public from the National Technical Information Service, U.S. Department of Commerce, Springfield, Virginia 22161. Copies of the report are available at U.S. Geological Survey offices in Tucson, Tempe, Flagstaff and Yuma.

Additional information about USGS water-resources studies in Arizona can be obtained via email to GS-W-AZ_Webmaster@usgs.gov or by visiting the Arizona District home page at <http://az.water.usgs.gov>.

State FOIA Laws: A Guide To Protecting Water Security Information

The Association of Metropolitan Water Agencies published this document in response to efforts by utilities to secure their systems by conducting vulnerability and risk assessments, preparing emergency responses to terrorism and complying with government mandates. This document offers information that public utilities may use to address open records and freedom of information policies. It is to assist them in assessing the relevance of their state laws to their particular situations. The document also outlines possible strategies for amending state statutes (if appropriate) and provides legislative language targeting state disclosure exemptions. The guide was written for those with some level of experience with state disclosure laws. A copy can downloaded at <http://www.amwa.net/isac>



Special Projects

ADEQ Instructs Community Volunteers to Monitor Water Quality

Marking the 30th anniversary of the Clean Water Act, the year 2002 has been designated as the Year of Clean Water. The Arizona Department of Environmental Quality is commemorating the occasion by conducting workshops in various areas of the state to promote an understanding of river monitoring, with the goal of increasing citizen awareness of the importance of water quality.

ADEQ identified areas in the state where local interest in river conditions would likely encourage community members and organizations to work with the agency to monitor and promote water quality. Areas focused on during this initial effort are the Upper Agua Fria in Cordes Junction; Oak Creek in Sedona; Bonita Creek in the Safford area; and Nutrioso Creek near Springerville.

That some river preservation activities already were underway in these areas boded well for their cooperation with ADEQ. For example, Friends of the Forest had been involved with water quality monitoring of Oak Creek in the Sedona area before joining ADEQ efforts. They had been doing weekly sampling at six different Oak Creek sites to test for e coli. Members of the Upper Agua Fria Watershed Partnership participated in ADEQ's activities in their area.

ADEQ developed a manual to be used at workshops conducted in each of the areas. The manual explains basic watershed terms and discusses the importance of monitoring for different parameters. Workshop instruction covered six water quality parameters: water temperature, pH levels, turbidity, electrical conductivity, dissolved oxygen and stream flow measurement.

Workshops were divided into classroom sessions and river-side instruction. A field sample data form guided the group in its river-side activities. General information was first recorded, such as time of day and current and recent weather conditions. Site observations were then made, with the group noting whether any off-road vehicle use occurred in the area, the existence of trails and roads near the sampling site, the presence of trash and debris and any other conditions that might affect river monitoring.

The group then focused on the appearance of the stream system, noting the color and condition of the water, whether, for example, it was clear, oily or turbid. Water odor also was noted. Water level was recorded, whether high, medium or low. The condition of the streambed also was examined, with the percentage of vegetative cover and large rocks estimated. The river banks at the monitoring site were checked to determine if they were stable or unstable.

Also, participants took stream measurements of each water quality parameter using specialized equipment. With the values of each parameter determined, participants then discussed the meaning of the measurements. For example, most streams have a pH level of between 6.5 and 8.5, with readings beyond this range representing a possible problem. Participants were instructed about variables that could affect pH levels, including natural and synthetic causes. Wastewater discharges and non-point source pollution can skew a normal pH balance, as can the geology of the sampling point, including the surrounding rock.

Other workshops will be conducted later in the year in the same areas. Comparisons can then be made of river data taken at the same time of day at the same site, but during different times of the years.

Bryan Gangwisch of ADEQ's Watershed Management Unit says this commitment represents the first step in encouraging volunteer interest in monitoring. He explains, "It is not actually a program yet. This is the first part, and it is mainly education and outreach. We hope that down the line the participants may actually be taking samples." He says ADEQ can provide the basic equipment.

Oct. 18 is National Monitoring Day

Oct. 18 is a key date during this year's Year of Clean Water celebrations. Volunteer monitoring organizations, water quality agencies, students and the general public are invited to test waters across the United States. For more information about National Water Monitoring Day and other YOCW events check the web site: <http://yearofcleanwater.org>

ADEQ also has a web site for its version of the National Water Monitoring Day which the agency is calling "The Big Dip In." (<http://www.adeq.state.az.us/environ/water/assess/year.html>)

ADEQ also has prepared pie charts for both rivers and lakes in Arizona depicting the total number of acres of lakes and rivers monitored and the water quality of those tested surface waters. (<http://www.adeq.state.az.us/environ/water/assess/download/chart.pdf>)

He says training volunteers to monitor streams would provide a valuable and useful service to ADEQ's watershed management unit. "We do not have enough staff to monitor every stream."

Participants also gain from the volunteer experience. Their involvement is equivalent to taking a course on watersheds, their workings and terminology. By getting to know the characteristics of a healthy watershed and the activities that threaten them, participants become more watershed aware.

Also, locals are particularly well qualified for water quality monitoring chores since the river is likely to be a familiar resource to them. As a result, they take on the task with a personal interest in the health of the river. Residing near a river, they also are likely to be knowledgeable about certain physical characteristics of the river and what activities can and do take place along the river.

State agencies throughout the country have been increasingly relying on the services of volunteers, especially for assistance with programs concerned with natural resources. In Arizona, the Game and Fish Department has been especially active in recruiting volunteers to assist the agency with various activities.



Announcements

Water CASA Hosts ConFab



The Water Conservation Alliance of Southern Arizona (Water CASA) will host ConFab on Oct. 29th. A confabulation of current and pressing water conservation issues and ideas and a fabulous conference, ConFab will also serve to celebrate Water CASA's 5th anniversary. ConFab topics include the future directions of water conservation, related research needs and regulation of water usage. Featured guest and keynote speaker at the event will be Amy Vickers, author of the "Handbook of Water Use and Conservation." Program exhibitors include Project WET (Water Education for Teachers), Water Use it Wisely and the University of Arizona's Water Resources Research Center. Billed as the premier water conservation event of the year, ConFab will be held at the Inn Suites in downtown Tucson. Check for registration information and further program updates on Water CASA's website: www.watercasa.org.

other field trip to visit locations of historical, current and proposed water supplies for the City of Flagstaff. For more information about the symposium and to register for the event check the web site: <http://www.azhydrosoc.org/Symposium.html>

EPA to Support Watershed Initiatives

The Environmental Protection Agency is launching a new grant program to encourage the protection and restoration of water bodies through the use of watershed approaches. Fiscal year 2003 budget includes a request for \$21 million for this Watershed Initiative. Subject to the availability of appropriations, EPA plans to select through a competitive process up to 20 watersheds throughout the country for grants to support promising watershed-based approaches to clean water. Nominations from governors and tribal leaders must be postmarked and received electronically by EPA on or before November 21, 2002. For further information contact: Carol Peterson; phone: 202-566-1304; email: peterson.carol@epa.gov or check the Watershed Initiative's web site for updated information at <http://www.epa.gov/owow/watershed/>

Colorado River Moving Waters Conference



Moving Waters: The Colorado River and the West, a chautauqua-fashioned project involving seven western states over the last year and a half, is winding down. The project's goal was to explore the history and meaning of the Colorado River and generate a regional river consciousness. The program's finale will be a Moving Waters Culminating Conference September 25-28 at Northern Arizona University, Flagstaff.

The project has presented hundreds of programs in more than twenty-two communities within the seven states sharing the waters of the Colorado (Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming).

The overall theme of the conference is the post-settlement history of the Colorado River watershed. Topics include John Wesley Powell and the reality of aridity; the construction of the hydraulic empire and the apparent escape from aridity; the big buildup and its consequences for indigenous people and the environment; and the challenges westerners face today as stewards of the precious resource. The conference will explore opportunities as well as challenges as we confront the new science, new politics, new vulnerabilities, and new ethics that accompany us into the twenty-first century.

For a complete program, fees and registration information go to the Moving Waters website at <http://www.movingwaters.org/> and select Culminating Conference. For questions about the conference call 928-523-0494 or email community.culture@nau.edu.

Call for Papers on Emerging Water Issues

The conference, Water Security in the 21st Century, scheduled July 30- Aug. 1, 2003 in Washington D.C., is a response to the need for new and innovative strategies to cope with water demand, water quality management, and emerging problems as discussed in the 2001 report of the National Research Council, "Envisioning the Agenda for Water Resources Research in the Twenty-First Century." Abstracts are solicited on the following: emerging issues related to water security; innovative water resources research and curriculum development; research applications to water policy and management; infrastructure rehabilitation strategies; and sustainable development of water resources. Abstracts (300-500 words) should be submitted by October 15 to: Margaret Skerly, Universities Council on Water Resources; 4543 Faner Hall, Southern Illinois University, Carbondale, IL 62901-4526; email: mskerly@sui.edu

AHS Symposium Discusses Water Transfers

The Arizona Hydrological Society's 15th Annual Symposium will be conducted Sept. 18-21 in Flagstaff. The theme of this year's symposium is "Water Transfers, Past, Present and Future." Topics include: groundwater-surface water interaction; remote sensing; groundwater recharge; groundwater sources and supply; sampling and analysis; wastewater management; and regulatory issues and programs. On Sept. 21, two field trips will be conducted, one to the riparian corridor at Walnut Canyon National Monument, with an



Public Policy Review

by Sharon Megdal

Interesting Times for the Arizona Water Banking Authority



In 1996 the Arizona Legislature created the Arizona Water Banking Authority (Authority) to assist with dealing with potential shortages of Colorado River water, water management, Indian settlements, and interstate water banking.

Since 1997, the Authority has been storing excess Central Arizona Project water at sites in the three-county Central Arizona Project service area (Maricopa, Pinal and Pima counties). Property tax revenues levied by the CAP Board and then transferred to the Authority, as well as General Fund revenues, have been funding this water storage. According to the Authority's most recent Annual Report, through December 2001 the Authority expended \$10.6 million General Fund revenues and \$29 million ad valorem tax revenues. Groundwater withdrawal fees levied annually by ADWR on groundwater withdrawals in the Phoenix, Pinal and Tucson Active Management Areas have been available to the Authority to fund storage primarily for water management and Indian settlement purposes. However, to date no withdrawal fees revenues have been expended for the benefit of the Phoenix and Tucson AMAs. Almost \$10 million and \$2.8 million remained in the withdrawal fee accounts for the Phoenix and Tucson AMAs, respectively. Most of the withdrawal fee revenues collected in Pinal AMA, on the other hand, have been expended. As of the end of 2001, the Authority has spent almost \$44 million of the \$76 million available to it since its inception. The Authority's expenditures have resulted in the accumulation of almost 1.3 million acre feet of long-term storage credits.

The Authority's role is not well known to the public. At a recent workshop on its interstate banking function, the Authority's genesis was reviewed by Herb Dishlip of the Arizona Department of Water Resources. He noted that, although the bill creating the Authority was an outgrowth of discussions regarding interstate water banking, interstate banking was not the primary focus of the authorizing legislation. He commented that the Authority gained legislative approval without much difficulty, because potentially controversial elements were omitted from the bill. In the end, an entity was created that has authority – you could say responsibility – to store Colorado River water for multiple, important purposes but has no legal authority to own and operate storage facilities.

The long-term storage credits funded by ad valorem tax revenues levied by the board operating the CAP are accumulated by the Authority but then are transferred to the CAWCD when there is shortage of CAP water. The Authority is not empowered to recover water for any purpose. Safeguards were written into the authorizing legislation to protect Arizona interests when storage is done on behalf of other states, but how credits accrued through an interstate agreement are "recovered" is still being worked on.

The Authority has some very important responsibilities, but it

faces significant limitations on what it can do. The Authority is last in line as a purchaser of excess CAP water. It is also last in line for the use of storage facilities. These constraints can become particularly important in times when the Legislature is dealing with sizable budget shortfalls and in times of drought. The recent announcement of proposed cuts in water allocations by the Salt River Project is a case in point.

In mid-August, SRP announced that its board will be asked to implement a reduction in water deliveries for only the second time in 51 years. To keep the allocation reduction as small as possible, SRP expects to acquire excess CAP water through purchase or exchange. SRP's announcement triggered announcements by many of its municipal customers that they too expect to offset some of the shortfall in SRP water deliveries with increased usage of CAP water. Increased orders for CAP water by municipal subcontractors and SRP will reduce the amount of excess CAP water available to the Water Banking Authority. Whereas the Authority has accrued on average approximately 255,000 acre feet of credits annually over the past five years, it is possible that well under 100,000 acre feet of CAP water will be available to the Authority for purchase and storage in 2003.

The finalization and implementation of interstate banking agreements are a difficult enough task for the Authority. However, a sizable reduction in excess CAP water affects the Authority's ability to store water for any of its statutory purposes. In the short run at least, there will be less water in storage to firm up CAP water supplies for municipal and industrial subcontractors, which is the Authority's primary objective. Limited water availability will likely result in even more accumulation of groundwater withdrawal fees and postponement of use of these revenues for water management and/or Indian water rights settlements. At a time when Nevada is interested in gearing up its interstate storage activities and finalization of the necessary agreements is pending, there may be precious little water available for interstate storage. This may not affect plans for interstate storage in 2002, however.

Earlier this year, the Authority recognized that Arizona's general fund problems were likely to continue and decided to carry over certain General Fund monies for storage activities in early 2003. In order to avoid interfering with implementing its 2002 Plan of Operation and wishing to satisfy additional demands for irrigation water by farmers, the Authority authorized the storage of approximately 40,000 acre feet of water during 2002 in Pinal County on behalf of Nevada. Will the General Fund dollars intended for carry-forward be tapped by the Legislature to help balance the budget? Will sufficient water be available in the future so that the important functions of the Authority can be achieved?

These are interesting and challenging times for all working on water resource matters. The Arizona Water Banking Authority is no exception.

Water info...continued from page 1

installed at representative points throughout the water system to measure and characterize water quality as water flows through the system. The first monitoring station (EP1) is located at the Hayden-Udall Water Treatment Plant where recharged Colorado River water blended with aquifer groundwater, produced at Tucson Water's Clearwater Facility, is chlorinated and pH adjusted before entering the main distribution system. This is the only station that measures 100 percent Clearwater blend before it enters the main distribution system and is mixed with other well water before delivery to customers.

As the water flows from west to east and north, in response to pressure requirements and demand, it mixes with groundwater from wellfields along the way, with the on-line stations monitoring the distributed water as it flows from one point to another. Along with providing information to utility customers, the monitoring stations enable utility officials to examine the influence of blended water in the system over time, to determine changes in the system as various groundwaters are added.

At the monitoring stations, water is diverted from the distribution system mains through a one-inch pipe at about 10-15 PSI into the instrument panels. As the water passes through the instrument panels it passes over a conductivity and temperature interpreter probe. Simultaneously, a portion of the water stream is diverted through half-inch plastic tubing into a flow assembly. Within the flow assembly, water flows over two probes that measure pH and chlorine. This stream of water is returned to the one-inch pipe within the panel before flowing back into the distribution system.

A signal is then sent by each probe to instruments that collect the measurements and sends them to a circuitry board for relay to a remote terminal unit that converts the signals into a data stream. This data stream is sent via radio from a tower located at the monitoring site to a microwave relay tower located on Tumamoc Hill for

transmission to Tucson Water's Operations control room. The data is then processed for publication on the utility's web site.

Daniel Quintanar of Tucson Water says, "It is a matter of seeing what actually happens dynamically through the system at different points. We are able to measure water quality characteristics from one side of town compared to the other, as the water moves through the system."

It was in response to community input that the utility determined which water quality characteristics its stations would monitor for quick and timely distribution. A survey of citizens indicated that they were most concerned about standards relating to sodium, nitrate, fluoride, mineral content, hardness, pH, coliform bacteria and chlorine averages.

The technology was not available to provide accurate real-time measurement of sodium, nitrate, and fluoride. Tucson Water therefore decided to rely on the services of their Water Quality lab to test and measure these parameters. To ensure a quicker lab return time, an accelerated sampling program was established to obtain a more timely response. Information on sodium, nitrate and fluoride is posted on the web site once or twice a month.

Quintanar says, "That is not to say we cannot upgrade the system to include other probes. One of the goals is to eventually look at parameters we can add in the future."

The instrument panels are designed to be expandable in response to improved or changing technology as probes become available to monitor other water quality characteristics. Expansion may also take place if customers later request information about additional contaminants, and the technology is available to continuously detect and measure them on-line.

The purchase and installation of the 22 monitoring stations was funded by a \$400,000 grant from the U.S. Environmental Protection Agency's EMPACT Program (Environmental Monitoring for Public Access and Community Tracking).



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