From the Toilet to Your Tap

The city of Tucson is looking for water in strange places

By Dave Devine and Molly McKasson
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The overpowering stench of something rotting often wafts across Interstate 10 between Prince and Ina roads. If it weren't for smells like this that we occasionally encounter, most of us would never think about the constant stream of underground slime, chemicals and human waste slowly oozing its way toward two sewage-treatment plants along the Santa Cruz River.

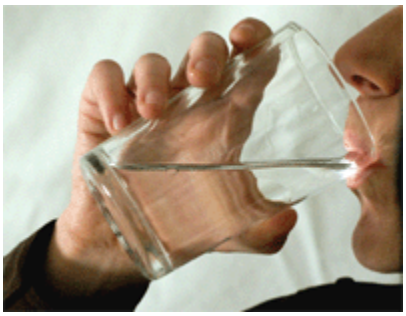
Many of us are aware that some of this disgusting material is eventually treated to become reclaimed water, which is piped to parks and golf courses for irrigation, while more of it is discharged into the dry riverbed.

Courtesy of City of Tucson

Tucson Water Director David Modeer: "The issue is not revenue, but water supply for the future. ... We could build in lower numbers (for water demand), and what if that doesn't happen?"

What few people know is that in the future, the Tucson City Council will be asking the community an important question: Under what scenario would you be willing to drink this wastewater?

There's nothing like a potential water shortage to remind us that we live in a booming desert community--and treated effluent is a major sustainable source of additional drinking water.



Tricia McInroy

While believing Tucson should at least have a conversation about restricting the number of future building permits, for now, City Councilmember Carol West sides with those who think we're facing a very finite water future. "Effluent is our one growing water supply at this time," West says.

Historically, local politicians and business leaders have fought any attempt to control population growth, which has left Tucson Water Director David Modeer little recourse. "Growth projections outstrip our access to water," he says, "and effluent is the only other (new) resource we have control over."

Faced with similar shortages, communities all over the West are turning to their wastewater streams to sustain population growth. Released more than a year ago, Tucson Water's draft 50-year water plan fits perfectly into that category. The plan assumes there will be no future increase in per capita conservation nor the percentage use of reclaimed water for irrigation. Instead, the report concludes that drinking treated wastewater is probably the way to go.

Expected to be acted upon by the City Council in the spring of 2006, the draft plan concludes: "The choice to reuse effluent for indirect potable supply provides Tucson Water with the highest potential to meet projected demand through 2050 and offers the greatest opportunity for long-term sustainability."

Dr. Daniel Okun, environmental engineering professor emeritus at the University of North Carolina, thinks that too many cities may be deciding to use effluent in the future.

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"It's not necessary for most cities to go to 'toilet-to-tap' programs," he insists. "In every case, I would prefer to use poor-quality water for the non-potable uses."

Okun strongly encourages policy makers to consider other options. "Why should we use drinking water for toilets?" he asks.

Roy Emrick, treasurer of the local Rincon Group of the Sierra Club, believes the idea of drinking treated effluent is being driven by special interests. "I never cease to be amazed that Tucson Water goes to great lengths to accommodate developers' greed," he states.

Former Pima County supervisor and longtime environmental advocate David Yetman agrees that drinking treated effluent is unnecessary. "What needs to happen is a drastic reduction in per capita gallons used by Tucson Water customers," Yetman emphasizes. "We need to hear Tucson Water say: 'Use less water. Period!'"

But Yetman has observed local government practices and believes he knows what they portend for the future. "Unfortunately, Tucson Water has never promoted real conservation," he observes. "They're a revenue-producing agency, and reduction in use reduces their revenues."

Even though a number of Western cities, such as Santa Fe, N.M., have drastically cut their water consumption through both voluntary and mandatory regulation, Tucson Water's draft plan includes no increase in conservation. According to Modeer, this has nothing to do with money.

"The issue is not revenue," he declares, "but water supply for the future. ... We could build in lower numbers (for water demand), and what if that doesn't happen? ... The plan is not about revenue, but about finding water resources."

Despite that viewpoint, a Tucson Water's Community Conservation Task Force should complete its water-saving recommendations by the end of the year. These might include such requirements as an owner having to retrofit a house with low-flow toilets before it can be sold.

Courtesy of KUAT

Environmental advocate David Yetman: "All that's needed to stop it is to fill beakers with water that has come out of the wastewater treatment plant, and show it to people at public presentations. You can be sure that no one will want to drink it."

Modeer, though, is somewhat skeptical of Tucson's willingness to conserve more water. "It's a tough thing," he says. "People have to alter their lifestyle and be willing to do that. Builders must accept the changes also. It's got to be done either by consensus, or our

elected officials must adopt measures that aren't popular."

Councilmember West adds another cautionary note about additional conservation: She stresses, in frustration, that even if strict water-saving measures were to be adopted by the city, nearly 40 percent of Tucson Water's customers live outside the city limits, meaning they wouldn't be subject to these regulations.

At the present time, Tucson has a fairly low gallons-per-capita water-usage figure compared to other Western cities. Because of that, Tucson Water's long-range plan is not based on controlling demand through additional conservation, but on supplying more water to an ever-increasing number of people.

Driven by population projections that predict the utility will be serving 1.2 million people by 2030--about twice what it does today--the plan assumes the company will need to double its current annual supply of 128,500 acre-feet of water.

Potential sources for this new water are limited. The Tohono O'odham nation might agree to sell some of its Central Arizona Project allotment, or Tucson Water could pump more groundwater. The plan argues against this latter alternative, however, in order to avoid future land subsidence.

The plan proposes two other options for meeting future water needs. These are: "A more aggressive demand management program, (and/or) full utilization of effluent." This second suggestion opens the door for a toilet-to-tap program here in Tucson.

Dr. Okun, whose testimony helped to shut down a similar proposal in Los Angeles, believes there are other possibilities which should be explored first.

"You could wash your clothes, irrigate and, of course, flush your toilet all with reclaimed water," Okun says. He also sites the use of dual water systems in all new San Francisco high-rise buildings as an example of what can be done.

Over the past 20 years, Tucson Water has built a successful reclaimed water system, which now includes 100 miles of pipe that annually carry 13,100 acre-feet of treated effluent to dozens of golf courses, parks and schools. The remainder of its effluent allotment, 17,600 acre-feet, is discharged into the Santa Cruz River.

The draft water plan assumes future total demand for reclaimed water will stay at the current 8 percent level. But should Tucson Water put more effort and money into increasing the nonpotable usage of this water?

Modeer defends the planning document's failure to assume an increase in the percentage use of treated effluent for nonpotable uses. "There are few facilities out there left to use reclaimed water," he says. "The only way to use more would be to start taking it to every residence, but look at the cost (of doing that). It may have applications in new areas, but for existing residences, the cost is phenomenal."

While West supports increasing the use of reclaimed projects in residential areas, she also notes a potential downside. "We need to make reclaimed water for neighborhoods easier to obtain," she says, "but if those people get dependent upon it, what happens if Tucson Water says, 'We need it for drinking purposes'?"

Emrick, of the Sierra Club, notes that toilet-to-tap is hardly the only future option left for Tucson.

"We should really look into water harvesting (capturing rainfall)," he suggests. "We should also stop issuing (so many) building permits. Let's have a referendum on that. People could rank what they want--drinking treated wastewater, water harvesting or stopping building permits."

Without exploring such alternatives, the possibility of Tucson Water customers drinking treated effluent becomes more and more likely. Modeer suggests the community must make a decision on this issue within the next few years in order to be almost ready to implement the idea by 2014.

Single Family Residential Gallons Per Capita Daily	
Albuquerque	95
El Paso	114
Tucson	120
Phoenix	165
Las Vegas	230
Oro Valley	236

Source: Water Plan: 2000-2050, City of Tucson Water Department, Final Draft

Tucson Water spokesman Mitch Basefsky urges a slower approach. "2014 is the deadline for a decision," he states. "Without an alternate source of water by 2020, we'll have to go back to mining groundwater." But Basefsky adds that this deadline could be pushed back if efforts to acquire more CAP water or increased conservation are successful.

On the other hand, West suggests making the decision by 2008. She has already broached the idea of drinking treated effluent at town hall meetings, where reactions were mixed. "Some were against it and said they wouldn't drink it," she remembers, "while others said they would. But drinking effluent should be a last alternative."

If the assumptions in the draft water plan are accepted, the community will not have many options. Retired water researcher Barbara Tellman, who opposes the prevailing philosophy of doing anything to accommodate additional population growth, believes that before there is any decision to drink treated effluent, Tucson residents must be given a whole range of choices.

"There needs to be a massive education program," Tellman observes, "and some way to judge the public's reaction."

Assuming that is done, Yetman is confident of the outcome. "If there is public understanding of what the issues are, the public will turn it (potable effluent) down. ... All that's needed to stop it is to fill beakers with water that has come out of the wastewater treatment plant, and show it to people at public presentations. You can be sure that no one will want to drink it."

That is precisely what happened in Los Angeles a few years ago after it became publicly known that a $55 million project for the treatment and indirect delivery of effluent was in the works.

"Our program to treat and recharge reclaimed water was derailed by politics," says Mark Adams, director of L.A. Water and Power. "These plans were in the works for many years, and all the politicians knew about it and supported it. Then all of them pulled their support when there was a public outcry against what opponents called a 'toilet to tap' program, even though it was never about direct use."

A very different outcome occurred around the same time in nearby Orange County. Ron Wildermuth, director of communications for the Orange County Water District, believes their public process made all the difference. "We started an effective outreach program 10 years ago," he says, and as a result, his agency is currently completing a $487 million effluent treatment facility.

Wildermuth believes that Orange County's decision will be beneficial in multiple ways to 140,000 households served by the district. "It gives a drought-proof supply of water," he says, "cuts our energy costs in half and is

$25 less per acre-foot than imported surface water." Plus, Wildermuth adds, "It reduces the high mineral content of our water."

Using one of the most costly wastewater purification regiments in the world--including reverse osmosis, micro-filtration, ultraviolet light, hydrogen peroxide and the natural filtration of basin recharge--the final product in Orange County exceeds all state standards. The water is so pure, in fact, it will have minerals added back into it before it is distributed to customers.

While Okun praises the Orange County process, and agrees their final product is perfectly safe, he points out it comes at a very steep cost. "Not many places in the United States could afford to do what they have done with some of their reclaimed water," he says of Orange County. But he warns that anything less "is absolutely wrong".

If the local decision is to treat effluent water to potable standards, Tucson Water proposes a process similar to the one used in Orange County. Super-treated water would be recharged into the aquifer, then blended with CAP and groundwater before being delivered to users. As Modeer emphasizes: "We're not talking about direct delivery of effluent, but indirect use."

To implement this idea, a small plant, capable of treating 18 million gallons of water daily, would cost ratepayers a projected $76 million. Another $4 million would be needed to cover annual operating expenses. The need to treat 41 million gallons of effluent is projected to require $147 million in capital funds and close to $9 million for yearly operating costs.

To finance either of these facilities, Tucson Water estimates it would mean substantial annual rate increases for years to come. For his part, Modeer does not try to sidestep the financial impact of this decision. "To produce a product which is safe and of high quality is not cheap," he observes.

Despite the high costs, a growing number of Southwestern communities are considering the potable use of treated effluent, while residents of El Paso have been drinking it for 40 years. Okun is critical of the way the Texas city injects treated wastewater into its aquifer, then draws it out for potable use. He believes this treatment is insufficient to kill all trace organics and could contaminate the entire aquifer.

But at the same time, El Paso has been much more aggressive about its nonpotable use of reclaimed water than Tucson, and even has stricter conservation measures in place. Residents there have limited hours and days when they can water outdoors.

Similar restrictions are found in water-strapped Las Vegas, as well as Santa Fe. During a severe drought a few years ago, elected officials in New Mexico's capital city approved an ordinance that requires a builder to install low-flow toilets in existing homes in order to obtain a permit to construct a new one.

Rick Carpenter of the Santa Fe water utility reports of the process: "The result was no new net demand for water. It was a very successful program but finite (in its application)." As a result, the community is now considering drinking treated effluent, but public acceptance of the idea appears low.

Farther west, support for a "toilet to tap" program has fluctuated in San Diego. A few years ago, public outcry temporarily derailed one proposal. Despite that, the city's water utility is now involved in a major "Water Reuse Study".

Pressure to find new water for San Diego grows more intense every year, as 90 percent of its supply must now be imported. In early 2006, the City Council will be presented with a series of options to meet future water needs, including some which include "Indirect Portable Reuse" of treated effluent.

While a 2004 telephone survey showed little initial public support for this idea, water department officials believe an extensive outreach program can bring people around.

One of the biggest concerns from citizens about drinking treated sewage is the potential health risk. Not only does the water initially contain human and industrial waste along with everything else that can be flushed down a toilet or sewer; it also has trace amounts of pharmaceuticals and chemicals.

In an e-mail message, Lesley Robin, of San Diego's Water Department, stated that with proper treatment: "There should not be any negative health effects."

Chuck Gerba, a professor of environmental biology at the University of Arizona, is also confident that today's technology can create a product that meets all drinking water standards. "Reclaimed water is of better quality than most so-called 'natural' water which we treat and deliver now," Gerba says. "It has to be."

Former water researcher Tellman indicates that the treatment process seems safe to her, but she has reservations when it comes to removing

pharmaceuticals from the water. Emrick, a retired physicist, adds: "It seems like heavy metals would be hard to get out of the water along with toxic organics. All that crap goes down the sewer."

This is also a worry for Okun, who has worked on wastewater treatment plants all over the world. "So many organic chemicals are being invented all the time," he says, "and we have no idea what effect they'll have on people, or what sort of interaction they'll have with other chemicals."

Many scientists agree it's nearly impossible to do longitudinal public-health studies related to the safety of treated reclaimed water. Americans move around too much to make results reliable.

At the same time, there is no telling how this water could affect the elderly or the newborn. Recently, the American Red Cross did a random national sampling of 10 umbilical cords, and "found an average of 287 contaminants in the blood, including mercury, fire retardants, pesticides and the Teflon chemical PFOA." This information has convinced some that if anything, we should be more cautious than ever when it comes to chemicals and public health.

Even though he respects the effectiveness of the reverse osmosis and micro-filtration treatment process, Okun is a realist. "Things can and do break down with technology," he declares. "Unless you have exhausted all other avenues, why take a risk? And it is a risk to human beings short of the most costly treatment program. In almost every case I have seen, it is an unnecessary risk. It should not be done."

Next year, Tucson Water will conduct a series of public meetings called "Decision 2006," aimed at discussing the issue of water quality. Basefsky says that while Tucson's future water supply will be mentioned at these gatherings, it will not be the primary point of discussion. "We're not going to a level of detail on effluent in 2006, but will focus our efforts on (the quality of) CAP water," he says.

Even if it isn't talked about much next year, the prospects of drinking treated effluent will not go away. It's yet another supply-side solution to the pressures caused by rapid population growth.

That fact is reflected in Tucson Water's long-range plan. As Modeer states: "The premise behind the plan is: How (can we) close the gap with population growth? It is driven by population projections."

The process of finding more water for more people has been a part of Tucson Water's history for more than 100 years. But even if every recommendation in the current draft water plan were implemented, including the potable use of treated effluent, that would just delay an eventual day of reckoning. "In order to support any growth beyond 2050," the plan concludes, "... additional renewable water resources will have to be acquired."

In a few months, Tucson Water customers will have opportunities at public meetings and before the City Council to express their opinions on drinking treated effluent. They will have the chance to say whether quality of life, or quantity of people, should be the community's top priority.

From Okun's perspective, the idea of drinking treated effluent is a no-brainer.

"There's simply no reason for it," he says. "Just because you can is no reason to drink wastewater."