

TUCSON WATER AND THE TUCSON UNIFIED SCHOOL DISTRICT: A RECLAIMED WATER PARTNERSHIP

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Abstract

This presentation will discuss how Tucson Water and the Tucson Unified School District (TUSD) have created a successful partnership that accelerates the District's ability to connect schools to Tucson Water's Reclaimed Water System. A major impediment to connecting schools to the reclaimed system has been the District's lack of funds to renovate the irrigation systems to meet the reclaimed water requirements.

In this partnership, Tucson Water pays for the reclaimed water meters and advances the District funds to renovate existing turf irrigation systems at schools. Reclaimed water costs approximately 40% less than potable water, so the District is able to repay the City for the improvements to their irrigation systems from the savings accrued by converting to reclaimed water.

In addition to helping reduce the community's dependence on groundwater, the use of reclaimed water at schools provides a unique opportunity to educate students, their parents, and school staff about the community's water situation. Working together, Tucson Water and TUSD have developed educational materials for all grade levels.

The Tucson Unified School District is the oldest school district in Arizona and has been using reclaimed water at schools since 1992. Today 26 schools, including two high schools, 7 middle schools, and 17 elementary schools irrigate 150 acres of turf with reclaimed water. Over 17,000 students attend these schools, which also employ nearly 2,000 staff members.

The City of Tucson has operated a reclaimed water system since 1984. Currently the system provides over 10,000 acre-ft/yr of reclaimed water to more than 320 customers for irrigation.

Tucson, A Water Conscious Community

Tucson, located in the Sonoran Desert, receives only 11 inches of rain a year and has no perennial surface water supply. As a result, Tucson has always been a water-conscious community. The Tucson area is growing rapidly, at a rate of 2.5 to 3 percent annually. Today Tucson Water is delivering its customers groundwater and Colorado River water that has been recharged and recovered.

Wastewater is the only supply that will continue to grow as the population increases. Therefore, reclaimed water plays an increasingly important role in the water supply picture. The City has committed to increasing the use of effluent as part of its long-range water supply plan. This commitment anticipates that effluent reuse will be 15 percent of the total water demand by 2005 and will continue at this level through the year 2100.

Tucson's reclaimed water system is unique in several ways. Rather than a means to dispose of treated wastewater, it is an important and growing water supply for this desert community.

A Regional Overview

The City owns and operates a municipal water utility, Tucson Water, which provides potable and reclaimed water service in the Tucson metropolitan area. Tucson Water serves potable water to over 650,000 people, about 80 percent of the metropolitan population. In 2000, the utility pumped 117,400 acre-feet of groundwater. The combined annual municipal, agricultural, and mining pumpage is nearly two and a half times more water than is being replenished to the aquifer.

Pima County owns and operates the regional wastewater collection system and treatment facilities. An intergovernmental agreement between the City and the County provides the City with the right to use most of the 69,000 acre-feet (calendar year 2000) of effluent produced at the two regional treatment plants. Today, approximately 10,000 ac-ft/yr (about eight percent of Tucson Water's total water demand) is used in the reclaimed system and the remainder is used to irrigate two golf courses or is discharged into the Santa Cruz River, under an NPDES Permit, where it recharges the aquifer.

The City has committed to the increasing use of effluent as part of its long-range water resources plan and Assured Water Supply Designation. This commitment anticipates that effluent use will be 15 percent of the total water demand by 2005.

Tucson's Reclaimed Water System

Since the first customer (a golf course located at the end of a 10-mile pipeline) received reclaimed water, 75 more miles of pipe have been added to the system. There are now 15 million gallons of storage available in five reservoirs. In addition, about half of the total annual production capacity comes from a recharge and recovery facility that is operated in concert with the filtration plant.

The Sweetwater Recharge and Recovery Facility is located south of the filtration plant. It consists of eight constructed basins which are used to recharge secondary effluent produced at Pima County's wastewater treatment plant. A constructed wetlands is also part of the Sweetwater facility. The wetlands were designed to treat the backwash water from the filters and is also used as a public environmental amenity. The Sweetwater facility is operated under an aquifer protection permit that allows 6,500 acre-feet of treated wastewater to be recharged and recovered annually.

Recovered water from the Sweetwater facility is blended with water produced at the filtration plant to produce water that meets Tucson's Reuse Permit requirements. The recovered water is a very good quality, less than one NTU turbidity with nitrogen levels below the 10mg/L drinking water standard. This low nitrogen level is significant because the secondary effluent produced by Pima County is not denitrified and typically is in the 20 mg/L range.

The amount of recovered water blended with the filtered water varies daily based on total system demand and the quality of the filtered water. On an annual basis, the blend is about 56 percent filtered water and 44 percent recovered water.

Customer Characteristics

During 2000, almost 10,000 acre-feet of reclaimed water was delivered to over 260 customers. Sixty-five percent of this water was delivered to twelve golf courses. Another 20 percent was delivered to parks. The remainder was delivered to schools (6.8 percent), single family (1.7 percent), agriculture (2.6 percent), commercial (1.2 percent), multi-family (0.6 percent), and street landscape (1.2 percent). Although reclaimed water deliveries have increased 50 percent since 1995, the percentage of deliveries in each customer category has remained constant except in the single-family group which has increased significantly. This can be attributed to increased public awareness of the availability of reclaimed water and the City's goal to develop a model environmental community which includes reclaimed water service to each home.

All of the City-owned golf courses are irrigated with reclaimed water or secondary effluent. The City has a policy that all new golf courses and turf facilities over 10 acres use reclaimed water. Pima County also has a policy requiring reclaimed water use.

Tucson Unified School District

The Tucson Unified School District (TUSD) is the oldest (1887) and physically largest school district in Arizona. The District has 133 separate facilities (K-12 schools) with 9 million square feet of air conditioned space and 616 acres of irrigated turf spread over 230 square miles around the Tucson metropolitan area. TUSD is Tucson Water's largest industrial customer, using over 1,189,000 CCF (888 million gallons) of water annually at a cost to taxpayers of over \$2 million each year. Approximately 70 percent of that annual TUSD water use and expense goes to landscape irrigation.

The earliest school outdoor watering systems were installed in the 1950's for dust control, not turf irrigation. School playgrounds and ball fields often remained in poor condition because of aging, inefficient, and unmanageable irrigation systems. Health and safety concerns raised local bond funding to renovate many TUSD school sites from 1990 to 1998. Limited funding, however, prevented landscape renovations at all school sites.

Resource Economics

Rising utility costs in 1991 prompted TUSD to initiate the Resources Efficiency Awareness Program (REAP) with the belief that all children and adults can learn to save energy and water resources in TUSD. Through partnerships with Tucson Water and local energy utilities, TUSD avoided over \$3.5 million in utility costs, paid \$386,000 dividends to schools that demonstrated resource savings, and raised over \$1.8 million in outside funding for related conservation programs. Several grant projects funded by the Arizona Department of Water Resources (ADWR) helped TUSD quantify landscaping water use, irrigation system efficiency, and the potential for connecting schools to reclaimed water.

Since 1992, TUSD has connected 26 school sites with approximately 150 acres to Tucson Water's reclaimed water system. The advantages for converting to reclaimed water include:

1. Potable water conservation (saving over 150 million gallons each year for other community uses).
2. Better quality turf (higher pressure and more nutrients), and
3. Economic savings (40% less cost than potable water).

TUSD currently pays \$475/acre foot for reclaimed water compared to \$779/acre foot for potable water, and those rates are expected to increase 4.2% per year over the next 5 years (22.8% cumulative increase). Tucson Water's increasing block rate structure makes it especially expensive to grow even Bermuda grass with minimal winter landscaping water use.

Loan Program

What is the win/win solution to this dilemma of rising costs and limited funding? TUSD and Tucson Water developed a unique "loan" program in 1998 to convert 15 acres of irrigated turf at Santa Rita High School to reclaimed water. An amended Water Service Agreement allowed the City to pay for the \$150,000 retrofit required at Santa Rita High School and TUSD agreed to pay back over time with the savings accrued by converting from potable to reclaimed water. The Santa Rita pilot project was completed on schedule and under budget, providing valuable lessons for expanding the concept to other TUSD schools.

Several modifications to the Water Service Agreement in 2000 included:

- Potential schools for conversion to reclaimed water will be identified on an annual basis,
- Costs will include a 5%/year interest rate and savings must demonstrate a 5 year payback,
- A monthly surcharge from Tucson Water will simplify collecting the initial capital investment, and
- TUSD must manage monthly application rates more closely to maximize savings.

TUSD is currently finalizing plans and specifications for converting 4 additional elementary schools to reclaimed water this spring (Carrillo, Kellond, Manzo, and Menlo Park). Tucson Water's capital improvement plans for the next 5-10 years will put 27 more TUSD schools within ½ mile of the expanding reclaimed water system.

Public Acceptance

Effective change requires ongoing education. Reclaimed water has been promoted and accepted in Tucson as a valuable resource that makes our desert community more sustainable. Representatives of Tucson Water customers in all rate classes have agreed to subsidize the reclaimed water system for long-term community benefits. Students and adult taxpayers can all learn to appreciate the safe and appropriate use of reclaimed water for irrigating school grounds.

Tucson Water and TUSD jointly produced school fence signs, brochures, videos, and curriculum materials to help educate the public about reclaimed water at our schools. Stringent inspection procedures with purple dye tests prevent any potable water cross connections. The District and Tucson Water work together to assure that there is no drinking, ponding, and run off of reclaimed water.

After nearly 10 years of experience, TUSD has had no health problems or serious complaints associated with using reclaimed water at the schools. Tucson Water and TUSD have developed a successful reclaimed water partnership that is benefiting Tucson and serves as a useful model for other communities.

Lessons Learned

- Money is critical!
- The guaranteed savings and performance approach helps.
- Partnerships work well when there is a mutual benefit that is negotiated and promoted by internal champions in both organizations, and
- The whole community benefits from positive education and publicity about reclaimed water at our schools.