

Fluoride Removal Puts Twentynine Palms Water District on National Stage

DISTRICT FACTS

Location

Twentynine Palms, San Bernardino County

Population Served

18,000

Area Served

87 square miles with 8,000 connections

Water Sources

Groundwater extraction from four sub-basins

Storage

10 reservoirs containing 17 million gallons distributed through 200 miles of pipeline

Website

www.29palmswater.com



EPA contract workers perform testing on TPWD's arsenic removal system. The EPA has partnered with the district to find innovations in arsenic removal that can be shared with districts throughout the nation.

Among California water agencies, Twentynine Palms Water District stands out for making do with what they have, which isn't a lot in terms of revenue or a large enough customer base to generate it. Remarkably, TPWD is debt-free despite the fact that 100% of its customers are classified as financially disadvantaged, while 75% rank as "severely" financially disadvantaged.

Its raw groundwater requires extensive treatment within a system that includes 200 miles of pipelines, eight booster stations, and 10 wells and storage reservoirs. All this feeds 8,000 service connections in and around the City of Twentynine Palms, a disadvantaged community of 18,000 living within TPWD's 87-square-mile territory in San Bernardino County.

"We have a lot of infrastructure without a lot of customers to spread out our costs," said TPWD General Manager Ray Kolisz.

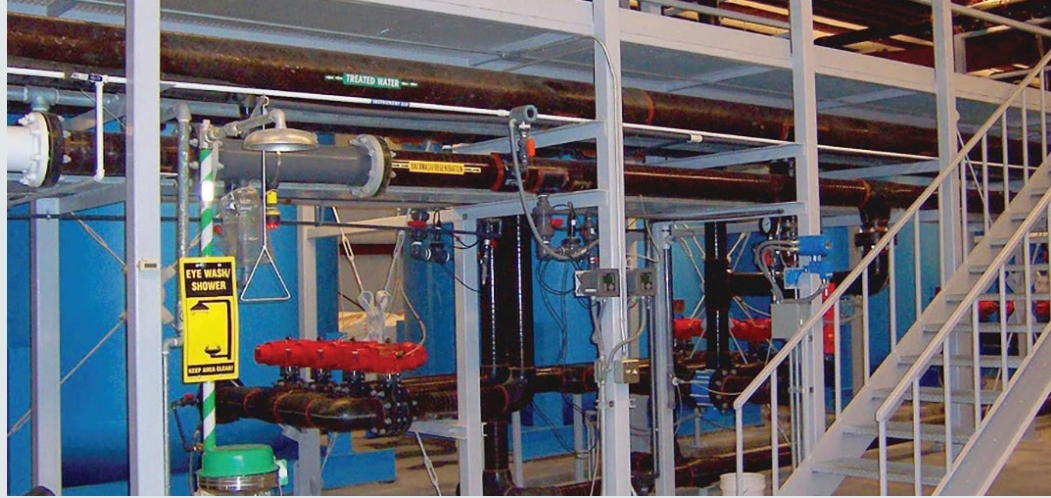
What TPWD does have in abundance is naturally occurring fluoride in its water, triple the amount allowed under the state's

maximum contaminant level (MCL) of 2.0 parts per million. So while some agencies fluoridate their water supply, TPWD is among the relatively few faced with the opposite task. But with access to the right engineering expertise and \$1.7 million in Environmental Protection Agency grants, the district has achieved national fame for pioneering a treatment process that relies on adsorption to reduce fluoride levels to meet state standards. Now the EPA is working with TPWD to see if this process can more effectively remove a far more common contaminant and at less expense: arsenic.

The EPA money helped build TPWD's Fluoride Removal Water Treatment Plant, which cost a total of \$3.2 million. The plant went online in 2003 and now produces 3 million gallons of water a day. In the plant's adsorption process, fluoride ions stick to a filtration media, and it's a question of what type of media does the best job. In TPWD's case, the answer is activated alumina with pH control, a granular material used as a bed within a filtration tank.

Right: TPWD's 3 million-gallon-a-day Fluoride Removal Plant relies on activated aluminum with pH control as a media, which can be regenerated onsite. The district relies on groundwater containing 6.0 parts-per-million of naturally occurring fluoride. The federal maximum contaminant level is 4.0 ppm, and California's MCL is 2.0.

Below: A lot of the innovative treatment work coming out of TPWD employs a pilot plant, a miniature 1.5 gallons-a-minute version of a water treatment plant where operators can try out new treatment methods.



“Roughly speaking, one tablespoon of activated aluminum has the surface area of a football field. It’s that porous, which makes it really effective as a media,” Kolisz said.

One challenge districts often face is how to avoid the high cost of replacing media when it’s exhausted. Onsite regeneration can strip toxins from the media and allow it to be reused, instead of districts having to pay for disposal and buying new media. TPWD has mastered this regeneration process through constant innovation, experimenting with a system of backwashing, caustic regeneration and acid neutralization.

A big part of TPWD’s ability to relentlessly innovate is a miniature 1.5 gallons-a-minute pilot plant within the main plant. This gives TPWD the freedom to train plant operators, test the performance of new media, find ways to reduce chemical consumption and analyze different treatment approaches at zero risk. It also saves money. TPWD

workers once used the pilot plant to compare costs between manufacturers of activated alumina media, allowing the district to switch to a less expensive product based on the results.

Overall, TPWD’s approach has earned the district a national reputation as the go-to experts in cost-effective fluoride removal. TPWD’s plant was the largest in the nation for years, until a facility in Texas took that distinction a couple years ago.

Today, TPWD is partnering with the EPA on a pilot project to find effective and affordable ways for water districts to remove arsenic. Districts across the country have struggled with this challenge since 2006, when the EPA lowered the MCL for arsenic from 50 parts per billion to 10 ppb. TPWD has pioneered a process that uses an iron-based media that can be regenerated. By not having to dispose and replace the media, TPWD saves \$40,000 a year in operating costs.

“It’s not a lot of money in the big picture, but this pilot project shows a path forward for significant O&M cost savings for larger systems,” Kolisz said.

In August, State Water Resources Control Board member Joaquin Esquivel and Executive Officer of the Colorado River Regional Water Quality Control Board Paula Rasmussen toured the fluoride removal plant. Kolisz said someone still calls about once a month asking for advice on fluoride treatment, but it’s one part of a bigger picture that makes TPWD staff proud.

“We’re a district that feels like we’re getting everything right. We’re debt-free, and we have overcome unique challenges in treating water for a disadvantaged community,” Kolisz said. “Constantly changing and tightening regulations can make life tough for small districts like us. We’re honored to have a role in finding innovative ways to deliver high quality water in the most cost-effective way possible.” ♦



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