

Where Water Reuse Isn't a Dirty Word

By [ROB DAVIS](#)

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Centreville, Va. -- Tucked behind evergreens, down a long lane in an otherwise anonymous stretch of this Washington, D.C. suburb south of Dulles International Airport, sits a facility that provides San Diego with the best evidence that it's safe to fill drinking water reservoirs with purified sewage.

Here, a treatment plant has been purifying sewage and dumping the clean water into the Occoquan Reservoir, a source of drinking water for 1 million residents of Northern Virginia's densely populated suburbs in Fairfax and Prince William counties.

And they've been doing it 30 years.

The sewage arrives here at the Millard H. Robbins Jr. Water Reclamation Plant from the toilets of 275,000 nearby residents. A day-and-a-half later, after being disinfected and stripped of its contaminants, it washes down a wide concrete spillway into Bull Run, the Occoquan Reservoir tributary made famous by its Civil War battles.

In dry weather, that purified sewage spends three months meandering and mixing in the sprawling tree-lined reservoir, making its way 17 miles downstream to a dam, where a local water provider draws it out, treats it to be safe for human consumption -- it picks up contaminants along the way from urban runoff -- and pipes it to homes.

The facility's existence directly counters one of the talking points Mayor Jerry Sanders has frequently recited as a reason for objecting to the City Council's plan to recycle sewage as a drinking water source. Sanders has claimed that San Diego would be the first municipality anywhere to pipe purified sewage into a drinking water reservoir. He made that claim in October and again in December when articulating his opposition to the council's \$11.8 million pilot study of recycled sewage.

"I want to make it very clear," Sanders said at a Dec. 4 press conference. "No one else has done what we're being asked to do. People confuse us with Orange County, people confuse it with a lot of other places. No one else has ever talked about putting recycled water into a reservoir and then using it for drinking water. That's what we'll be doing testing on to see if that can even work."

In Northern Virginia, that conversation happened in the 1970s. And the region found that recycling sewage is effective and safe, said Charles Boepple, executive director of the Upper Occoquan Service Authority, which operates the sewage recycling facility.

"We have been doing exactly what San Diego is exploring for 30 years," Boepple said.

Bill Harris, a Sanders spokesman, said the mayor was referencing San Diego's place as the first in California to use recycled sewage to fill a drinking water reservoir.

"If you add the two words -- in California -- it becomes perfectly relevant," Harris said. "That's the background understanding of what we're up against. We've always had to talk about getting approval from [the state Department of Health Services]. We will clarify it from this point forward and make certain those two words get added."

Sanders' opposition could be softening. Bruce Reznik, executive director of San Diego Coastkeeper, a sewage recycling supporter, said he is optimistic the mayor will support the concept once the city's pilot study advances. The U.S. Environmental Protection Agency [recently urged](#) San Diego to develop a long-range plan for reusing sewage; Coastkeeper is negotiating with the city about that plan.

San Diego would be the first in California to fill a drinking water reservoir with recycled sewage. The city has frequently been contrasted with Orange County, which moved forward with the technology without being tripped up by the polarizing toilet-to-tap label that ended San Diego's 1990s recycling effort. While San Diego and Orange County would use a similar purification method, it's more appropriate to compare San Diego's concept with what Virginians decided was acceptable back in the mid-1970s.

In Orange County, which began recycling sewage last year, the purified sewage filters into the ground and winds up in an underground aquifer. It stays at least six months, mixing with the water that naturally fills the basin, before getting sucked out, treated and, ultimately, swallowed again.

In Virginia, the purified sewage goes straight from the plant into the reservoir. San Diego is studying the same idea: Pumping straight into the San Vicente Reservoir.

Virginia turned to recycled sewage in the 1970s as a way to improve water quality in the Occoquan Reservoir. In the late 1960s, gooey algae began growing in the reservoir. Too many nutrients were feeding the water, the result of 11 small sewage-treatment plants that dumped partly treated sewage there.

Officials needed a solution to the bad color and gross taste that residents got from the reservoir water. Those residents were already drinking partially treated sewage; with state approval those smaller plants were closed and an improved sewage purification plant was opened. Officials had debated other less-desirable alternatives: Limiting housing growth or pumping the treated sewage outside the area. But water is a precious resource even in Northern Virginia, which averages 41 inches of rainfall annually (San Diego averages 10 inches but imports most of its drinking water). Ultimately, they settled on purified sewage.

"Some fairly bold thinkers said: I think this resource is too valuable," Boepple said. "You can help supply the population increase with water because you're reclaiming. Otherwise this region would have a tough time."

The plant offers a double benefit. It provided needed sewer service to residents at the same time helping meet the water demands of Northern Virginia's exploding population. Since opening in 1978, the plant has expanded three times. A 2005 upgrade brought the treatment capacity to 54 million gallons a day -- just more than the planned Carlsbad desalination plant would produce.

"This has been a monumental success," said Tom Grizzard, director of the Occoquan Watershed Monitoring Laboratory, an independent agency that studies the reservoir's water quality. "When you develop a supply, the cardinal rule is to go to the water of the highest quality. It's the highest quality available. It's better than natural drainage in every respect."

While the plant's 30-year success has attracted visitors from 70 countries, no other localities in the United States dump purified sewage in their drinking water reservoirs. Boepple blames the "yuck factor" -- the visceral reaction people have to the idea of drinking sewer water.

"The focus needs to be on the science and what we've achieved," Boepple said. "If they separate the irrational fears, they'll see it's a viable alternative for water-short areas."

On a typical day, about 5 percent of the Occoquan Reservoir's flow comes from the sewage recycling facility. Boepple said the facility has provided as much as 80 percent of the reservoir's flows during prolonged drought. The rest comes from rainfall. In a watershed filled with cattle farms, homes, roads and agriculture, that rainfall is dirtier than the recycled sewage -- it washes contaminants such as cow manure, brake dust and herbicides into the reservoir. The sewage plant's water is so clean it actually gets dirtier as it mixes in.

The facility has spilled raw sewage into the reservoir during storms. Boepple said early 2003 was the most recent problematic time. Heavy spring rains and a contractor's failure to complete an expansion on time led to a sewage spill that totaled several hundred thousand gallons, he said.

Sewage recycling in San Diego wouldn't be subjected to that same problem. If heavy rains were overpowering the system, the flow could be diverted to the existing sewage plant at Point Loma. San Diego would have the luxury of filling the San Vicente Reservoir only when conditions were right. The city estimates it could create enough water to supply 52,000 homes for a year.

San Diego's recycling system would also include an additional safeguard that the Virginia facility doesn't: Reverse osmosis membranes. With that, sewage is forced through thin membranes with holes so small that water molecules are about the only things that get through. It's the same technology used to desalinate seawater and stops just about everything. (The handful of chemicals it doesn't stop is destroyed in a final disinfection stage.) The technology wasn't commonly available when the Virginia facility opened.

The Virginia plant also offers evidence that sewage could be recycled for less than Sanders has estimated. The Orange County sewage recycling facility produces water for \$850 an acre foot (enough to supply two families for a year). Grants and subsidies cut the cost to about \$550 an acre foot, close to the price of pumping in imported water from the Colorado River and Sacramento Delta, San Diego's two main sources.

The Upper Occoquan facility produces water for about \$700 an acre foot. That figure, which does not include past construction costs, is borne by sewage customers, who pay about \$40 a month.

Sanders has estimated that San Diego's cost to recycle sewage may be as high as \$1,882 per acre foot. Those figures, originally drafted in 2006, are being revised as part of the city's ongoing sewage recycling pilot study.