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Recycled tap water's 'unsettled question'

Waterborne drugs a growing concern

By Mike Lee
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JOHN GIBBINS / Union-Tribune
Water samples from Otay are prepared for analysis at the San Diego Water Department's water quality laboratory.

At homes across San Diego, thousands of residents take medications each day for everything from Alzheimer's disease to sexual dysfunction.

But their bodies don't absorb 100 percent of each drug. The unused portion is excreted and – literally – flushed down the toilet along with whatever outdated pills that people might dump into the bowl for disposal.

From there, the medicine mixes with cleaning agents, hormones, plasticizers and a plethora of other compounds in the city's wastewater.

Under a controversial proposal to be considered by a City Council committee tomorrow, some of the water treated at San Diego's North City Water Reclamation Plant would be purified enough to become drinking water. The effort is designed to reduce the region's reliance on imported water.

But what about drugs and other possibly dangerous substances that might remain in the recycled water?

Water providers don't routinely check for pharmaceuticals, personal-care products or numerous other substances that scientists call “emerging contaminants.” Sewage plants aren't designed to remove them. Neither federal nor state agencies regulate

them in water supplies. And California hasn't taken some of the most basic steps to keep them out of the state's waters.

Public health officials, water-quality experts and policymakers have been worried for years about the potential effects of these compounds, which show up widely in the nation's lakes and streams. The prospect of recycling wastewater into drinking water has amplified those fears.

The environmental and human health consequences of such pollutants are not well known. However, two common concerns are that even trace amounts may hasten the growth of more antibiotic-resistant bacteria and disrupt animals' endocrine systems, which regulate hormones.

“We know that many of these things can have biological effects at very low concentrations . . . but there is a paucity of data suggesting that there is any real adverse (human) health effect,” said William Cooper, director of the Urban Water Research Center at the University of California Irvine. “It's an unsettled question.”

Historically, the U.S. Environmental Protection Agency has focused on a relatively small suite of industrial pollutants such as chemicals from manufacturing plants. Now, the EPA is trying to standardize detection methods for emerging contaminants, figure out how the compounds work biologically and help sewage plants remove them more effectively.

The uncertainty leaves the public and pollution watchdogs uneasy, particularly in the wake of numerous reports about waterborne drugs altering the sexual characteristics of fish in Europe and the United States.

DETAILS

PUBLIC WORKSHOP

What: **Fact-finding session about San Diego’s wastewater recycling options.**

Who: **San Diego City Council’s Natural Resources and Culture Committee will listen to water and public-health experts.**

When: **6 p.m. tomorrow**

Where: **City Hall, 12th floor, 202 C St., San Diego**

Broadcast: **Live on Channel 24.**

Online: **Information on issues related to water quality can be found at:**

www.sandiego.gov/water/waterreusestudy

http://pubs.acs.org/hotartcl/est/es011055j_rev.html

www.nodrugsdownthedrain.org

www.epa.gov/esd/chemistry/pharma/faq.htm

“You don't want to see a mirror image of that showing up in human life 20, 30, 40 years down the line,” said William L. Rukeyser, spokesman for California's State Water Resources Control Board.

Widespread pollutants

When San Diego first tried – and famously failed politically – to turn wastewater into drinking water seven years ago, skeptics expressed deep reservations about what unknown and untested pollutants might still lurk in purified sewage.

Scientists have since detected a dizzying array of previously ignored chemicals in rivers and lakes worldwide, including waterways that are the source of drinking water for San Diego County.

Common contaminants include detergents, fragrances, caffeine, estrogen and painkillers. Basically anything that people consume or lather on their bodies eventually ends up in the water.

“Drugs that are flushed down the toilet or are thrown in our landfills are coming back to haunt us,” said Virginia Herold, interim executive officer of the California Board of Pharmacy, which oversees the state's pharmacies. “We are not sure what the effect is.”

Four years ago, federal researchers found that 80 percent of U.S. streams contain traces of medications and other emerging contaminants. Since then, the number of pharmaceuticals has continued to rise. Nationwide, some 3.4 billion prescriptions were filled last year, an increase of 59 percent since 1995, according to the National Association of Chain Drug Stores Foundation.

JOHN GIBBINS / Union-Tribune
Chemist Manuel Romero checked for iron in water samples at the San Diego Water Department's water quality laboratory.

A recent analysis done for San Diego found a handful of emerging contaminants in the city's source water, which mostly comes from the Colorado River and Northern

California. The detected substances included minute amounts of ibuprofen, the bug repellent DEET and the anti-anxiety drug meprobamate.

That study likely understated the water's average chemical content because samples were taken in the spring, when huge volumes of snowmelt dilute the effluent from 227 wastewater treatment plants that are allowed to discharge into the Colorado River.

A much larger group of emerging contaminants – about 20 – can be found at comparatively high levels in the treated wastewater that comes out of the North City Water Reclamation Plant, the same report showed. Some North City water is reused by irrigation and industrial customers.

Technological catch-up

San Diego's water-recycling options include super-purifying wastewater at the North City plant through a process known as advanced treatment, which uses ultraviolet light and peroxide disinfection. The resulting water would replenish the San Vicente Reservoir near Lakeside and be treated again on its way to filling drinking-water pipes.

San Diego has tested advanced treatment at a research-scale facility. Recent studies conducted there showed that the process reduced all 29 emerging contaminants that were tested to undetectable levels.

"This data indicates that (advanced-treated) water is superior to San Diego's current raw water supply," said Ronald Coss, technical manager for the city's Water Reuse Study.

Most water industry scientists echo Coss' confidence in recycled water, but they are careful not to oversell their conclusions, given the unsettled nature of the research.

Part of the difficulty is that detection methods are outpacing scientists' efforts to determine the implications of what they are finding. Current tests commonly show results down to 1 part per trillion, which is comparable to one square inch for every 250 square miles.

Some of the biggest concerns about emerging contaminants center on how they affect aquatic life.

For example, fish caught near ocean sewage outfalls in Southern California were found to have abnormal hormone levels, and some had both male and female sexual tissue, according to a recent analysis by the Southern California Coastal Water Research Project.

The office, which does field research for public sewer agencies, is expanding its study to include fish caught off San Diego County's coast.

“We see some potential effects off Los Angeles, so the next question to answer is, 'Is it just here or is it more widespread?'▪ ” said Ken Schiff, deputy director for the research agency.

Little research

There are some 80,000 chemicals commercially available in the United States, most of which lack independent research about their environmental effects.

Based on the law of averages, “you could speculate that some (emerging contaminants) could end up being regulated, but . . . we can't make that conclusion until we have the science to back it up,” said Luisa Valiela at the EPA's San Francisco office.

California, which often has stricter standards than the federal government, requires monitoring for several emerging contaminants in recycled water that is used to replenish aquifers in Los Angeles and Orange counties. Otherwise, the Department of Health Services does not track or require reporting of any of these compounds in water supplies, an agency spokeswoman said.

Nonetheless, wastewater agencies are starting to take precautions against waterborne drugs. One main goal is to persuade people to stop flushing medications down the toilet. Doing so has been standard advice for years as a way to keep outdated or unneeded pills away from children.

“There is just this sense that when you flush your toilet, everything disappears. People haven't really thought about where those waste pharmaceuticals go,” said Ann Heil, supervising engineer for the Sanitation Districts of Los Angeles County.

San Diego's Metropolitan Wastewater Department already works with local hospitals to keep drugs out of the drain and it is considering a flushing-prevention program for the public. However, previous efforts by agencies in the region to collect unused medicines have generated little public interest.

California also lacks a coordinated program for the disposal of drugs from residences, said Herold, of the pharmacy board.

“We don't have an answer right now,” she said.

Emerging contaminants will remain a concern even if drug flushing wanes, said Alan Langworthy, deputy director of San Diego Metropolitan Wastewater. That's because the use of chemicals continues to grow and seemingly countless medications enter the water through excretion.

“The way I look at it, we're at the tip of the iceberg on this issue,” Langworthy said.

Union-Tribune library researcher Denise Davidson contributed to this report.

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