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PharmaWater I-ABRIDGED

EDITOR'S NOTE -- The nation's **drinking water** supplies are not as pristine as might be expected -- traces of **pharmaceuticals** are all too common, an Associated Press investigation finds. First of a three-part series. By JEFF DONN, MARTHA MENDOZA and JUSTIN PRITCHARD Associated Press Writers

A vast array of **pharmaceuticals** -- including antibiotics, anti-convulsants, mood stabilizers and sex hormones -- have been found in the **drinking water** supplies of at least 41 million Americans, an Associated Press investigation shows.

To be sure, the concentrations of these **pharmaceuticals** are tiny, measured in quantities of parts per billion or trillion, far below the levels of a medical dose. Also, utilities insist their **water** is safe.

But the presence of so many prescription drugs -- and over-the-counter medicines like acetaminophen and ibuprofen -- in so much of our **drinking water** is heightening worries among scientists of long-term consequences to human health.

In the course of a five-month inquiry, the AP discovered that drugs have been detected in the **drinking water** supplies of 24 major metropolitan areas -- from Southern California to Northern New Jersey, from Detroit to Louisville, Ky.

Water providers rarely disclose results of **pharmaceutical** screenings, unless pressed, the AP found. For example, the head of a group representing major California suppliers said the public "doesn't know how to interpret the information" and might be unduly alarmed.

How do the drugs get into the **water**?

People take pills. Their bodies absorb some of the medication, but the rest of it passes through and is flushed down the toilet. The wastewater is treated before it is discharged into reservoirs, rivers or lakes. Then, some of the **water** is cleansed again at **drinking water** treatment plants and piped to consumers. But most treatments do not remove all drug residue.

And while researchers do not yet understand the exact risks from decades of persistent exposure to random combinations of low levels of **pharmaceuticals**, recent studies -- which have gone virtually unnoticed by the general public -- have found alarming effects on human cells and wildlife.

"We recognize it is a growing concern and we're taking it very seriously," said Benjamin H. Grumbles, assistant administrator for **water** at the U.S. Environmental Protection Agency.

Members of the AP National Investigative Team reviewed hundreds of scientific reports, analyzed federal **drinking water** databases, visited environmental study sites and treatment plants and interviewed more than 230 officials, academics and scientists. They also surveyed the nation's 50 largest cities and a dozen other major **water** providers, as well as smaller community **water** providers in all 50 states.

Here are some of the key test results obtained by the AP:

--Officials in Philadelphia said testing there discovered 56 **pharmaceuticals** or byproducts in treated **drinking water**, including medicines for pain, infection, high cholesterol, asthma, epilepsy, mental illness and heart problems. Sixty-three **pharmaceuticals** or byproducts were found in the city's watersheds.

--Anti-epileptic and anti-anxiety medications were detected in a portion of the treated **drinking water** for 18.5 million people in Southern California.

--Researchers at the U.S. Geological Survey analyzed a Passaic Valley **Water** Commission **drinking water** treatment plant, which serves 850,000 people in Northern New Jersey, and found a metabolized angina medicine and the mood-stabilizing carbamazepine in **drinking water**.

--A sex hormone was detected in San Francisco's **drinking water**.

--The **drinking water** for Washington, D.C., and surrounding areas tested positive for six **pharmaceuticals**.

The situation is undoubtedly worse than suggested by the positive test results in the major population centers documented by the AP.

The federal government doesn't require any testing and hasn't set safety limits for drugs in **water**. Of the 62 major **water** providers contacted, the **drinking water** for only 28 was tested. Among the 34 that haven't: Houston, Chicago, Miami, Baltimore, Phoenix, Boston and New York City's Department of Environmental Protection, which delivers **water** to 9 million people.

Some providers screen only for one or two **pharmaceuticals**, leaving open the possibility that others are present.

The AP's investigation also indicates that watersheds, the natural sources of most of the nation's **water** supply, also are contaminated. Tests were conducted in the watersheds of 35 of the 62 major providers surveyed by the AP, and **pharmaceuticals** were detected in 28.

Yet officials in six of those 28 metropolitan areas said they did not go on to test their **drinking water** -- Fairfax, Va.; Montgomery County in Maryland; Omaha, Neb.; Oklahoma City; Santa Clara, Calif., and New York City.

The New York state health department and the USGS tested the source of the city's **water**, upstate. They found trace concentrations of heart medicine, infection fighters, estrogen, anti-convulsants, a mood stabilizer and a tranquilizer.

City **water** officials declined repeated requests for an interview. In a statement, they insisted that "New York City's **drinking water** continues to meet all federal and state regulations regarding **drinking water** quality in the watershed and the distribution system" -- regulations that do not address trace **pharmaceuticals**.

In several cases, officials at municipal or regional **water** providers told the AP that **pharmaceuticals** had not been detected, but the AP obtained the results of tests conducted by independent researchers that showed otherwise.

Of the 28 major metropolitan areas where tests were performed on **drinking water** supplies, only Albuquerque; Austin, Texas; and Virginia Beach, Va.; said tests were negative. The **drinking water** in Dallas has been tested, but officials are awaiting results. Arlington, Texas, acknowledged that traces of a **pharmaceutical** were detected in its **drinking water** but cited post-9/11 security concerns in refusing to identify the drug.

The AP also contacted 52 small **water** providers -- one in each state, and two each in Missouri and Texas -- that serve communities with populations around 25,000. All but one said their **drinking water** had not been screened for **pharmaceuticals**; officials in Emporia, Kan., refused to answer AP's questions, also citing post-9/11 issues.

Rural consumers who draw **water** from their own wells aren't in the clear either, experts say.

Even users of bottled **water** and home filtration systems don't necessarily avoid exposure. Bottlers, some of which simply repackage tap **water**, do not typically treat or test for **pharmaceuticals**, according to the industry's main trade group. The same goes for the makers of home filtration systems.

Contamination is not confined to the United States. More than 100 different **pharmaceuticals** have been detected in lakes, rivers, reservoirs and streams throughout the world. Studies have detected **pharmaceuticals** in **waters** throughout Asia, Australia, Canada and Europe -- even in Swiss lakes and the North Sea.

In the United States, the problem isn't confined to surface **waters**. **Pharmaceuticals** also permeate aquifers deep underground, source of 40 percent of the nation's **water** supply. Federal scientists who drew **water** in 24 states from aquifers near contaminant sources such as landfills and animal feed lots found minuscule levels of hormones, antibiotics and other drugs.

Perhaps it's because Americans have been taking drugs -- and flushing them unmetabolized or unused -- in growing amounts. Over the past five years, the number of U.S. prescriptions rose 12 percent to a record 3.7 billion, while nonprescription drug purchases held steady around 3.3 billion, according to IMS Health and The Nielsen Co.

"People think that if they take a medication, their body absorbs it and it disappears, but of course that's not the case," said EPA scientist Christian Daughton, one of the first to draw attention to the issue of **pharmaceuticals in water** in the United States.

Some drugs, including widely used cholesterol fighters, tranquilizers and anti-epileptic medications, resist modern **drinking water** and wastewater treatment processes. Plus, the EPA says there are no sewage treatment systems specifically engineered to remove **pharmaceuticals**.

Veterinary drugs also play a role. Pets are now treated for a wide range of ailments-- sometimes with the same drugs as humans. The inflation-adjusted value of veterinary drugs rose by 8 percent, to \$5.2 billion, over the past five years, according to an analysis of data from the Animal Health Institute.

Ask the **pharmaceutical** industry whether the contamination of **water** supplies is a problem, and officials will tell you no. "Based on what we now know, I would say we find there's little or no risk from **pharmaceuticals** in the environment to human health," said microbiologist Thomas White, a consultant for the **Pharmaceutical** Research and Manufacturers of America.

But at a conference last summer, Mary Buzby -- director of environmental technology for drug maker Merck & Co. Inc. -- said: "There's no doubt about it, **pharmaceuticals** are being detected in the environment and there is genuine concern that these compounds, in the small concentrations that they're at, could be causing impacts to human health or to aquatic organisms."

Recent laboratory research has found that small amounts of medication have affected human embryonic kidney cells, human blood cells and human breast cancer cells. The cancer cells proliferated too quickly; the kidney cells grew too slowly; and the blood cells showed biological activity associated with inflammation.

Also, **pharmaceuticals** in waterways are damaging wildlife across the nation and around the globe, research shows. Notably, male fish are being feminized, creating egg yolk proteins, a process usually restricted to females. **Pharmaceuticals** also are affecting sentinel species at the foundation of the pyramid of life -- such as earth worms in the wild and zooplankton in the laboratory, studies show.

Some scientists stress that the research is extremely limited, and there are too many unknowns. They say, though, that the documented health problems in wildlife are disconcerting.

To the degree that the EPA is focused on the issue, it appears to be looking at detection. Grumbles acknowledged that just late last year the agency developed three new methods to "detect and quantify **pharmaceuticals**" in wastewater. "We realize that we have a limited amount of data on the concentrations," he said. "We're going to be able to learn a lot more."

So much is unknown. Many independent scientists are skeptical that trace concentrations will ultimately prove to be harmful to humans. There's growing concern in the scientific community, though, that certain drugs -- or combinations of drugs -- may harm humans over decades because **water**, unlike most specific foods, is consumed in sizable amounts every day.

Our bodies may shrug off a relatively big one-time dose, yet suffer from a smaller amount delivered continuously over a half century, perhaps subtly stirring allergies or nerve damage. Pregnant women, the elderly and the very ill might be more sensitive.

"We know we are being exposed to other people's drugs through our **drinking water**, and that can't be good," says Dr. David Carpenter, who directs the Institute for Health and the Environment of the State University of New York at Albany.

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