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By JEFF MONTGOMERY • The News Journal • April 27, 2010

Tiny traces of medical hormones, antidepressants, antibiotics and other drugs are trickling into the drinking water of homes and businesses across Delaware, a new Division of Public Health study has found.

The drug residues turned up in more than half the Delaware water samples taken from 20 public water sources and 95 farm irrigation wells last year. Among the most common contaminants in Delaware's public taps: caffeine, the antibiotic sulfamethoxazole, the painkiller ibuprofen, a medical-imaging aid called iopromide and estrogens.

Also found: antidepressants, cholesterol drugs, nicotine and triclosan, an ingredient widely used in soaps and antibacterial hand cleaners, but now under investigation as a potential disruptor of human endocrine systems.

The release of the information was prompted by a formal request by The News Journal.

"At these extremely low levels, it's not expected that there would be a health impact, but then, nobody's sure of that," said Edward G. Hallock, program administrator for Delaware's Office of Drinking Water. "When you add three or four compounds, even at extremely low levels, we're not sure whether there's an effect."

Those questions already are circulating in Congress, where some lawmakers recently pressed the Environmental Protection Agency to look closer at the cumulative effect of low-level but long-term exposure to toxic compounds, and frequent exposure to cocktails of pharmaceuticals at trace levels. Recent studies have tied antidepressant levels in fish brains to water pollutants, Kolpin said. Others have found that chemicals from human activities may be disrupting fish responses to predators, making them more vulnerable. Last year, the U.S. Fish and Wildlife Service reported that up to 82 percent of male bass in the Potomac River had "intersex" symptoms, or female cells in their male reproductive organs. Scientists said the symptoms were "an indicator of exposure to estrogens or chemicals that mimic the activity of natural hormones."

In the Delaware study, the Wilmington, United Water Delaware and Newark systems, supplied from local creeks, had the highest concentrations, but pharmaceuticals and personal care product residues were detected in all three counties. Pharmaceuticals and hormones are believed to pass into the environment because sewage treatment plants were never designed to capture or break down the chemicals.

List getting long

Windybush resident Theresa Cody said Monday the news adds another reason for her uneasiness about our drinking water.

"It does slightly concern me -- that's why we have filtered water, and that's why we drink a lot of bottled water," Cody said. "I'm more concerned about industrial contaminants and things like that. The list is getting too long. Antibiotics in our meat, all kinds of things."

Delaware officials are worried enough that plans call for a stepped-up campaign to discourage flushing of medications and other medicinal chemicals in toilets. Development of disposal alternatives or drop-off programs also are under consideration.

"From what I've seen from other states, I don't think that we're any different than what's being found across the country, as far as surface water and shallow groundwater," Hallock said.

Although results from individual wells and water intakes have not been released, a summary of findings noted that 17 different drugs were found in 101 samples of treated and untreated water from public systems. Tests of 95 shallow farm irrigation wells detected 14 compounds. Some samples had as many as nine different substances.

Researchers have pointed to discharges from sewage-treatment plants and septic systems, sewage sludges, wastewater-fed irrigation systems and landfills as likely sources. Concentrations were in the parts-per-billion and parts-per-trillion range, however, far below levels in prescription doses. Delaware's study, which cost \$200,000, tested for 23 compounds, but many others not on the list are viewed as potentially harmful to humans, including flame retardants, plasticizers used in bottles, insect repellents and other medications and hormones. Officials are preparing a report on the sampling and analysis commissioned by Delaware's Cancer Consortium.

Dana W. Kolpin, a researcher with the U.S. Geological Survey's Iowa Water Science Center, said scientists are concerned about the human and environmental consequences. In addition to flushed-away medications, human wastes carry away medicines not used by the body, Kolpin said.

Although some may be trapped in sewage sludge, they can be released to groundwater as sludges are reused as farm fertilizers. Even landfilled drugs can eventually find their way into drinking water, since liquids emerging from modern dumps are often captured and sent through sewage plants.

"It's not because of any negligence by treatment plants," Kolpin said. "These compounds haven't been a part of the [treatment] equation, and they're still not regulated."

The USGS and the EPA are preparing new studies of contamination levels before and after treatment, Kolpin said, with a goal of helping to develop new ways to reduce releases of the chemicals.

Filter claims unverified

While some home tap-filter producers claim their systems can capture antibiotics and other contaminants, Kolpin said he was unaware of any that have undergone comprehensive, independent testing.

"They may or may not do something out of the box, depending on how well they've been maintained," Kolpin said. "But we've never done studies. There's a lot we don't know, just because we're trying to catch up on the products that are getting through."

The Brandywine is likely the largest carrier of pharmaceutical contaminants, because it receives treated wastewater from multiple sources as it courses through Pennsylvania, past Downingtown, Coatesville and West Chester.

University of Delaware professor and state Water Supply Coordinator Gerald Kauffman said that about 60 wastewater-treatment plants of varying sizes discharge into tributaries of the Brandywine, Wilmington's sole regular source of water. During past droughts, treated sewage and the trace contaminants it carries accounted for as much as 15 percent of all water reaching the city's treatment plant.

"Until we know more about it, in terms of developing methods of treatment, it's best to limit the amount of pharmaceuticals that get into the water supply by the very simple method of not flushing it, and making sure it's packaged for disposal."

"The other thing that's being talked about is getting pharmaceutical companies involved in disposal of their products, just as other industries are," Kauffman said.