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Study Finds PFAS Contamination With No Known Source In Upper Cape Watersheds

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A new Harvard University study has found large quantities of previously undetectable PFAS—a family of manufactured chemicals known as “forever chemicals” because they never fully degrade—in watersheds that supply drinking water on the Upper Cape.

Use of firefighting foams at Joint Base Cape Cod has long been a known source of the contaminants, which have been linked to low infant birth weights, suppression of the immune system, and cancer; but the new study found unidentified PFAS compounds that could not be traced back to the foam.

“Our expectation was, because firefighting foams and their use is such a big point source, that any PFAS that we measure we could attribute to that activity,” said Bridger J. Ruyle, an environmental scientist at Harvard and the lead author of the study. “What we find is that when we compare the approach that we know captures all of the PFAS in the firefighting foam, that only accounts for between 30 and 60 percent of the PFAS that we actually measured in those watersheds.”

Between August 2017 and July 2019, the researchers collected water samples from surface waters in six Cape Cod watersheds. The Childs, Quashnet and Mill Creek watersheds all lie downstream of sites known to be contaminated by firefighting foam on Joint Base Cape Cod and at the Barnstable County Fire and Rescue Training Academy. The Mashpee, Santuit and Marstons Mills watersheds contain no known source of contamination from fire fighting foams and served as a control group in the study.

All three watersheds downstream of firefighting foam contamination exceeded the Environmental Protection Agency’s drinking water health advisory of 70 parts per trillion for combined PFOA and PFOS, two forms of PFAS.

Massachusetts Department of Environmental Protection drinking water regulations that go into effect next month will take a stricter stance toward PFAS, with a lower threshold of 20 parts per trillion for the sum of PFOA, PFOS and four other PFAS compounds.

But, the PFAS family contains thousands of different chemical compounds, with new compounds still being developed.

“The six compounds that we know the most about only represent a small fraction of the PFAS that are in these watersheds that we observed on Cape Cod,” Mr. Ruyle said, noting the health and environmental effects of most PFAS compounds are not known.

PFAS, or per- and polyfluoroalkyl substances, have been used since the 1950s to manufacture stain resistant, water resistant and nonstick products. The chemicals are ubiquitous in consumer products ranging from food packaging, to outdoor clothing, carpeting, cookware and more.

“The PFAS manufacturing industry today has moved away from manufacturing the compounds that are known to be toxic because those are the compounds that will get them the most in trouble,” Mr. Ruyle said. “So they have moved to other types of PFAS where the health outcomes are not known and that is what they are using right now in modern day consumer products.”

The source of the large quantities of previously undetectable PFAS in Cape Cod watersheds remains unknown, but Mr. Ruyle said that septic systems, which are abundant in Cape Cod watersheds, are a likely source.

Andrew R. Gottlieb, a Mashpee selectman and the executive director of the Association to Preserve Cape Cod, said his takeaway from the Harvard study is that whenever new analytical methods are devised to detect PFAS, “they’re going to find it.”

“We are particularly vulnerable to widespread dissemination of these ubiquitous chemicals but it’s not just a Cape Cod thing,” Mr. Gottlieb said. “We are a chemical society and we’ve put this stuff in everything.”

Red flags about PFAS chemicals date back decades. PFOA, which is also known as C8, traces its origins to the DuPont company, which for years used the chemical in Teflon products. Mr. Gottlieb noted the documentary “The Devil We Know,” which chronicles the impact of PFOA on DuPont factory workers who manufactured the chemical in Parkersburg, West Virginia. Some pregnant women in the factory birthed children with birth defects while other workers developed various forms of cancer.

“The problem with industry regulation as we do it in America is its backwards,” Mr. Gottlieb said. “So you create a chemical, use it in a process, it gets out in the world and then people say ‘I think that is a problem,’ and then there is a move to regulate or ban it.”

As opposed to testing a chemical before it goes into wide use, the United States regulates chemicals only after their harmful effects become evident, he said. In the case of PFAS, the EPA has only the health advisory. Meanwhile, industry has moved away from more notorious PFAS, like PFOA and PFOS, in favor of compounds about which less is known.

“It’s completely asinine,” Mr. Gottlieb said. “When you’re in a hole, stop digging—this certainly falls within that class—but we’re not set up as a society to respond that way.”

Because regulatory practices seem unlikely to change anytime soon, Mr. Gottlieb said, “the other possibility is you treat at the wellhead.”

“It may be that this precipitates the need to have more uniform carbon treatment on water supplies,” he said, while also noting that, because PFAS is ubiquitous in consumer products, “it’s also not safe to assume for individuals that their primary source of PFAS in their bodies is from drinking water.”

Since the Harvard PFAS study was published on March 5, Andrew G. Marks, the Mashpee water district operations manager, said the water district has been inundated with more than 100 phone calls from residents concerned about the contaminants.

“The research study by the Harvard scientists has water suppliers all over Massachusetts concerned,” said Mr. Marks said. He noted, however, that the study found elevated levels of PFAS in surface waters which does not necessarily mean that drinking waters also show the same elevated levels.

The Mashpee water district has monitored PFAS levels in the town’s drinking waters for years. Air Force engineers from Joint Base Cape Cod first notified the district of potential PFAS contamination in 2017, prompting the district to take a well at Mashpee Village offline when they found a combined reading of PFOS and PFOA at 72 parts per trillion, above the EPA health advisory of 70 parts per trillion. The Mashpee Village well has since been fitted with a carbon filter and is back in service.

In 2019, as MassDEP proposed the new drinking water regulations of 20 parts per trillion for the sum of six PFAS compounds, the water district took two municipal wells at Turner Road offline out of an abundance of caution.

“We’re cautious and we take care of our customers,” Mr. Marks said.

The water district will seek an \$8.54 million appropriation from Mashpee voters at their annual district meeting on April 27 to fit the Turner Road wells with a carbon filter.

“I don’t believe that this PFAS stuff is going away, if anything it’s going to be magnified when the tech allows us to see it at lower levels,” Mr. Marks said.

Mashpee has seven municipal wells and when the MassDEP begins requiring municipal water districts to test quarterly for the sum of six PFAS compounds next month, “if we find [PFAS] at other wells, that poses a particular problem,” Mr. Marks said.

“We’ve been fortunate to have a cushion in the past,” he said. “If we find levels in April that are above 20 parts per trillion... we will not be able to turn any more wells off because the demand would outweigh the supply.”

Mr. Marks said the water district will work as quickly as possible to fit carbon filters to any wells that show PFAS readings above the new state regulations. The water district is in constant communication with MassDEP and the Air Force about PFAS contamination, he said.