

STEEP

Sources, Transport, Exposure & Effects of PFASs
UNIVERSITY OF RHODE ISLAND SUPERFUND RESEARCH PROGRAM

silent chemicals LOUD SCIENCE



What is the barrier to environmental and public health?

A major source of concern is chemicals called PFASs – poly- and perfluoroalkyl substances. They may also be referred to as PFOA or PFOS, which are specific types of PFASs, but these all refer to stable compounds that linger in the environment for a long time in water, the food web, and in your body where they can have negative health impacts.

What are PFASs?

PFASs are man-made chemicals produced for over 60 years. They frequently enter the soil, water, and air near where the PFAS and products containing them are manufactured. Once in the environment, these stable compounds spread around the globe and can be found from the North Pole to the South Pole, from New England to New Delhi.

Why are we concerned about PFASs?

PFAS exposure is fairly standard for any American. More and more evidence of their negative health impacts is being found regardless of where you live. When analyzed in 2012, 98% of U.S. human blood samples contained PFASs, with a higher concentration in people who drank PFAS-contaminated water.

The health effects of PFASs on humans are not yet completely understood, but scientists are working on answers. So far, their research links these chemicals to obesity, high cholesterol, and some cancers. While still answering questions about the exact effects, scientists agree – work to avoid or reduce your PFAS exposure.

98%
Americans with
PFASs in blood

What is STEEP doing to solve this problem? ►



STEEP is dedicated to better understanding the path that toxic PFASs take as they spread from entry into the environment through groundwater, and work their way from tiny animals into larger ones.

Once in the body, PFASs pass into and accumulate in vulnerable human systems. This can occur while still in the womb through the umbilical cord and through breast milk – both vulnerable points in human development – and throughout all stages of life.

STEEP is trying to track the journey of PFASs through water by developing and deploying a type of detection tool that tests for PFASs.

The Environment

STEEP researchers work like detectives, “fingerprinting” profiles of PFASs in fish and drinking water on Cape Cod, and comparing them to “fingerprint” profiles from consumer products, for example, nonstick pans and stain-resistant clothing. In this way, they identify the “culprit,” or the source of PFAS contamination. STEEP is working with the U.S. Geological Survey to better understand how PFASs are transported away from contaminated sites and into drinking water supplies. Researchers are also figuring out how PFAS-contaminated groundwater (think underground lakes that form after water drains through the soil) mixes with surface waters (rivers, streams, and ponds) that serve as home to fish, and the impact of PFASs on the fish residents.

STEEP is developing detection tools, called passive samplers, for surface water and porewater (the water found in soil or sand) to deploy on Cape Cod. Benefits of passive samplers over current sampling methods include ease of handling, shipping, and analysis. These samplers have the capacity to identify PFASs at lower concentration levels, which is important as regulatory agencies like EPA potentially work to reduce allowed levels of PFAS exposure.



Public Health

STEEP is relying on an established research program in the Faroe Islands that has been supported by the National Institute of Environmental Health Sciences for decades. STEEP is looking at clinical information and analyses of PFAS exposures collected from Faroese children from in the womb to nine years of age. This study will focus on the possible relationships of PFAS exposure with immune dysfunction – increased susceptibility to infections and other diseases – and abnormalities in metabolisms – that regulate functions from healthy weight to

reproductive ability. Overall, this information will help scientists recommend PFAS exposure limits to avoid adverse human health impacts.

At the same time, researchers are conducting laboratory studies on rodents and human liver cells to determine which specific PFAS chemicals result in fatty liver disease and metabolic or immune system disorders. Overall, they will learn how different PFASs interact with individual cells in the human body.

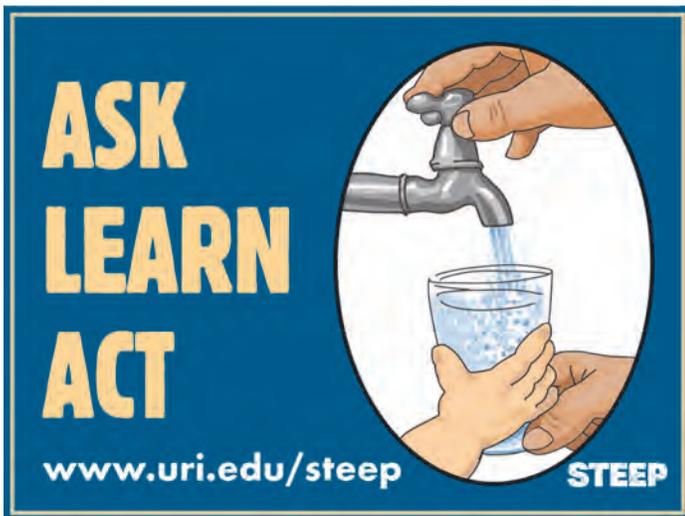
>4000
PFASs used in
commerce

STEEP Team

Director Rainer Lohmann
Co-director Philippe Grandjean
Geoffrey Bothun
Bongsup Cho
Wendy Lucht
Alyson McCann
Amber Neville
Nicole Rohr
Laurel Schaidler
Angela Slitt
John Stevenson
Elsie Sunderland
Judith Swift
Alan Vajda
Pál Weine



What actions does STEEP recommend? ▶



Filter your drinking water

Reverse osmosis systems are the most effective way to remove PFASs from your drinking water, and some models are designed to fit in the cabinet space under your sink. An activated carbon filter that attaches to your kitchen faucet is a lower cost option. But remember, any filter is only as good as your maintenance so replace the filters as recommended. Learn more about filters and overall water health in your community at www.EWG.org.

Avoid products with PFASs

The most likely source of contamination is in your own home. When figuring out which products to reduce or eliminate, just remember three words: stain-resistant, nonstick, and waterproof. Consumer products with these qualities are the most common household sources of PFAS exposure and you can choose not to use them.



Takeout containers (pizza boxes, sandwich wrappers)



Non-stick pots, pans, and utensils



Microwave popcorn bags



Outdoor clothing



Camping tents

Stain-repellent or water-repellent clothing

Stain treatments for clothing and furniture

Carpeting and carpet treatments

Certain cosmetics

Cape Cod is the primary site for STEEP's environmental research.

Groundwater on Cape Cod is contaminated by PFASs from fire training areas, airports, military bases, landfills, municipal wastewater, and septic systems. Once in groundwater, they can contaminate both public and private drinking water sources that serve 200,000 year-round and 500,000 summer residents.

The Faroe Islands are the primary site for STEEP's public health research.

The Faroes, like many other communities around the world, are primarily exposed to PFASs through consumer products. But, they have a secondary source of exposure through the tradition of consuming pilot whale meat and blubber—a practice that is culturally and economically important.

Test your Cape Cod drinking water

STEPP is providing free PFAS testing of private drinking water wells for homeowners in Barnstable County. STEPP will test 50 wells every year from 2018 through 2021. Researchers will report confidential individual well water results and interpret them for volunteers. They'll also share their general findings with Cape residents in reports and public meetings. Cape Cod residents will benefit from a better understanding of PFAS exposure and contamination.

Interested in participating? Sign up at uri.edu/stEEP/wellwater

Everybody deserves safe water.