Challenges Facing the Cape Cod Aquifer Installment 4: Toxic Chemicals

Recently I was drafting comments on the Town of Falmouth Notice Project Change 3 Comprehensive Watershed Management Plan for reducing "Nitrogen loading" from septic systems. Since Massachusetts DEP had recently issued a drinking water maximum contaminant (mcl) level of 20 parts per trillion for the sum of 6 perfluoinrinated chemicals (PFOS, PFOA, PFNA, PFDA, PFHpA and PFHxS), I felt that it made sense to integrate town efforts to reduce nutrient and toxic chemicals in both drinking water and grey/black waste water. As part of this process I checked the Environment Working Group (EWG) website for the toxic chemicals in Slidell, La. (where I used to live) with Falmouth, Ma. I was surprised to find that Falmouth drinking water had roughly 75% more toxic chemicals in its groundwater drinking water sources than Slidell. Louisiana (in spite of oil/gas extraction and waste disposal in the latter).

Much of the focus on PFAS contamination of our public and private drinking water wells in Falmouth is from the Ashumet Valley Plume (AVP) from Joint Base Cape Cod (JBCC). The AVP has three sources: former Fire training Area where AFFF firefighting foam was utilized; former wastewater treatment plant (WWTP) & water/sediments of Ashumet Pond. This plume contaminated public and private drinking water wells in Falmouth and Mashpee. The Air Force Civil Engineering Center (AFCEC) provided Granular Activated Carbon (GAC) filters to the owners of wells contaminated by PFOA/PFOS at concentrations exceeding 70 ppt (EPA Hazard level). In more recent times, the Superfund/Safe Drinking Water Act cleanup at JBCC has adopted the State mcl of 20 parts per trillion for the sum of 6 PFAS chemicals in its list of contaminants of concern. The University of Rhode Island STEEP (Sources, Transport, Exposure and Effects of PFAS) grant monitors > 25 PFAS chemicals in private drinking water wells throughout Cape Cod. STEEP grant research has found PFAS chemicals in the ground and surface waters of Cape Cod watersheds where no AFFF (Aqueous Film Fighting Foam) have been utilized, so that septic systems, landfills, WWTP effluent discharges might be additional sources of PFAS contamination.. There are 9000 PFAS chemical variants of which surface and groundwater monitoring programs sample 45-50 types.

PFAS exposure also comes from food and articles in people' homes (i.e. stain and water resistant fabrics). I recently requested EPA's National Environmental Justice Advisory Committee (NEJAC) to request that EPA Region 1 monitor PFAS levels in finfish and shellfish in Ashumet Pond and Waquoit Bay. Ashumet Pond already has periodic food consumption alerts for sensitive populations (women of child bearing age and kids; adults. with pre-existing conditions and Mashpee Wampanoag tribal members who hunt and fish in this region) from methyl mercury. In this situation atmospheric mercury gets methylated by sulfide bacteria in anaerobic sediments and bio accumulates in the aquatic food chain (with the highest concentrations in

predacious fish species). Since PFOS and PFOA are soluble in both water and oil, their bioaccumulation pathway differs and is being explored by STEEP scientists.

Perchlorate is another toxic chemical found in Falmouth's drinking water and comes from flares and fireworks sources at JBCC and elsewhere. It can be removed by ion exchange resins from contaminated groundwater to meet the Ma. DEP mcl of 2 parts per billion. Another recent addition to the contaminants of concern at JBCC is 1,4-dioxane which has an mcl of 2 ppb in New York. You will note that toxic contaminants exert adverse health effects at part per billion or part per trillion levels, whereas nitrates are harmful at 5-10 perts per million concentrations (a million times higher).

Total Nitrogen reduction Targets in West Falmouth Harbor to avoid eutrophication effects are 0.35 ppm which is also higher than the acceptable PFAS levels in ground/surface waters used for drinking water. The US Geological Survey (USGS) found PFAS chemicals in the surface waters of 27 rivers and brooks in the state with many exceeding the mcl of 20 ppt for the sum of 6 PFAS chemicals. The Sierra Club's national Toxics Team has a number of fact sheets on PFAS challenges. On July 14, 2021 the EWG held a 4 hour summit on the PFAS challenges that we face in the US.

The ENGOs working on toxic chemicals in our local drinking water include: GreenCape; Massachusetts Breast Cancer Coalition; Protect Our Cape Cod Aquifer; Sierra Club- Cape Cod Group; etc. Many of these groups oppose Eversource spraying of herbicides along power line rights of way for vegetation management. Many homeowners use herbicides to maintain weed free lawns, since they view themselves as suburbanites and not residents of the near country like I do. We are fortunate on the Cape that Barnstable County does not conduct airborne insecticide spraying to control mosquitoes in the summer. Bourne has PFAS chemicals in its groundwater from use of AFFF foams from two traffic accidents near the Otis Rotary (this may contaminate mussels in Buzzards Bay embayments).

URI STEEP research as shown PFAS chemicals in seabirds out on the Stellwagen Bank National Marine Sanctuary which suggest that aerial Exposure is a pathway. Thus like "N" pollution of our groundwater, PFAS contamination may come from both point (end of pipe) and non-point (diffuse locales) sources. This greatly complicates regulation and cleanup of eliminating source areas and mitigating contaminated groundwater/surface drinking water sources. How do we eliminate PFAS chemicals in soil and sediment source areas given the uncertainty on how effective incineration methods are? GAC and reverse osmosis's filters in homes can reduce PFAS levels in drinking water, but how do we address

Contaminated GAC Filters or RO water concentrates? Are there any safe levels of PFAS chemicals as a class of > 9000 isomers? Effectiveness of essential use approach in eliminating PFAS chemicals as a class. Most US residents have PFAS chemicals in their tissues and blood stream which have been related to number of adverse health effects (including reduced effectiveness of the immune system). The URI STEEP grant monthly webinar series covers many of these topics. US EPA has left regulation of PFAS chemicals up to the states. EPA is still working on developing a mcl for perchlorate in drinking water, so this slow process occurred prior to the Trump/Pence Administration. A number of bills have been introduced in Congress to address PFAS challenges and litigation has occurred to make polluters pay for cleanups. This is a slow process which was featured as a topic in EWG PFAS Summit.

Resources:

1. Sierra Club Toxics Team Contaminants of Emerging Concern Fact Sheet: https:www.sierraclub.org/toxics

2. Massa. DEP Multipurpose Machine Gun Range Comment Link

Hello Mr. Dow,

Thank you for your emails regarding the proposed Multipurpose Machine Gun range.

Regarding the upcoming meetings, I wanted to let you know the Environmental Management Commission (EMC), in consultation with the Chair of the Community Advisory Council (CAC) and the Massachusetts Army National Guard, has decided to postpone the upcoming meetings of the CAC and EMC to consider the proposed Multipurpose Machine Gun Range. Recognizing the significant public interest in this proposal, including by the communities surrounding Camp Edwards, we want to ensure full participation and feedback from these communities. To that end, the EMC will be working to fill current vacancies on the CAC. The CAC and EMC meetings are expected to be rescheduled later this summer. Updates on these meetings will be posted at: https://www.massnationalguard.org/ERC/monthly_public_meetings_calendar.htm

and Public Notices will be published when they are scheduled.

Again, thank you for your input.

3. Silent Spring Institute PFAS REACH Grant PFAS Information Exchange

Through PFAS-REACH, we are advancing science on the health risks associated with exposure to PFAS in children and empowering communities to reduce their exposures and advocate for change.

In recent years, a class of toxic chemicals called PFAS have been detected in drinking water supplies across the country serving millions of Americans. Epidemiological studies have reported negative effects on children's immune systems from exposure to PFAS, and suggest that current drinking water guidelines may not be adequately protective. To address concerns about health effects from PFAS in drinking water and to develop tools and materials to support impacted communities, we launched PFAS-REACH (Research, Education, and Action for Community Health)--a five-year project funded by the National Institute of Environmental Health Sciences. The project is being led by Silent Spring in collaboration with Northeastern University and Michigan State University. The main community partner organizations are Testing for Pease, Massachusetts Breast Cancer Coalition, and Community Action Works.

PFAS-REACH has three main goals:

- To evaluate potential effects of PFAS exposures on the immune systems of young children in two communities that have had PFAS water contamination.
- To develop an innovative online resource center, called the PFAS Exchange, with data interpretation tools, tap water testing, and educational materials for affected communities and other audiences.
- To conduct a social science analysis of affected communities to assess individual, family, and community-level experiences of residents in areas impacted by PFAS-contaminated drinking water.

For the children's health study, we are focusing on two communities where public drinking water wells have been contaminated with PFAS from the use of firefighting foams for training activities. One of these communities is based at the Pease International Tradeport, formerly Pease Air Force Base, in Portsmouth, NH. The other community is in Hyannis, on Cape Cod, Massachusetts.

Through this project, we will provide new scientific evidence on the health effects associated with exposure to PFAS and inform the development of drinking water guidelines that protect children's health. We will also support communities by providing them with the tools and information needed to reduce their exposures and reduce their risk.

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4. URI STEEP Grant Monthly Webinar Series on PFAS Chemical Research

"Let's Talk About PFAS"– webinar series

The first of this series, was held on February 3rd and focused on PFAS chemicals in Cape Cod drinking water. An audience of over 500 joined STEEP scientists and town officials to learn how Cape Cod is addressing contamination, what the new state regulations mean for water utilities, and what private well owners can do to reduce their exposure. Subsequent webinars were held on March 11th and April 14th and covered topics such as PFAS effects on human health, exposure during infancy, and COVID-19 susceptibility, as well as the essential and nonessential uses of PFAS, phasing them out of consumer products, and how to reduce individual and community exposure and protect the environment. To date, over 1000 people have attended these public sessions.

The next installment in the series "Let's Talk About PFAS: The Case of the Missing Contaminants" will be held on June 23rd and will discuss recent efforts to track down harmful PFAS chemicals in the environment, including a new study in which researchers uncovered large quantities of previously undetected PFAS from fire-fighting foams and other unknown sources in six watersheds on Cape Cod. The event will feature speakers Denis LeBlanc, Research Hydrologist with the U.S.

Geological Survey, and Bridger Ruyle, STEEP Trainee and PhD candidate in Environmental Science and Engineering, Harvard John A. Paulson School of Engineering and Applied Sciences, followed by a Q&A session.

Cape Cod is far from alone in grappling with PFAS. Hundreds of communities across the country have been affected by contaminated drinking water in what has become a national public health crisis. The STEEP virtual event is part of a new monthly webinar series to support not only Cape Cod, but also affected communities nationwide, by sharing information and offering solutions so that communities can better protect themselves. Future topics include how PFAS affect human health, in particular their effects on the immune system and susceptibility to COVID-19, and tackling the source of the problem through safer chemicals and products