

Testimony of R. Thomas Zoeller, Emeritus Professor of Biology, University of Massachusetts Amherst.

Good morning, and thank you, Chairman Vitali, Chairman Causer and members of the House Environmental Resources and Energy Committee, for giving me the opportunity to speak today. My name is Robert Thomas Zoeller (I go by “Tom”). I am an Emeritus Professor of Biology at the University of Massachusetts Amherst and a Visiting Professor in the School of Science and Technology at the University of Örebro in Sweden.

I trained in the field of Neuroendocrinology – the study of how the brain controls our hormone systems – with a specific focus on the role of thyroid hormone on brain development. In the mid 1990s, I was a member of the US EPA’s Endocrine Disruptor Screening and Testing Advisory Committee where I became interested in the way manufactured chemicals can interfere with hormone systems and how regulatory agencies go about assembling and interpreting scientific evidence to determine what is safe for the human population.

Since then, I have been very actively involved in this field of toxicology. I have served as a member of the Science Advisory Board of EPA, have served on several other advisory committees for EPA, including risk assessments for individual PFAS. I have worked with European agencies such as the European Food Safety Authority, and for the UN and WHO on issues of chemical toxicity. I was also a co-chair of the Endocrine Disruptor task force for the Endocrine Society – a society of over 18,000 members in 120 countries who care for people with endocrine diseases and acquire new knowledge about how hormones work and what they do.

Given my experiences over the last 25 years, I fully support passage of House Bill 2238. There are several reasons for this.

- 1. PFAS are toxic.** There are an estimated 12,000 PFAS chemicals that have been produced and only a relative few have been studied well. PFOS and PFOA are two of the most familiar, but data are accumulating for several others. These chemicals are known to affect immune function, the thyroid hormone system including thyroid cancer, liver disease, lipid and insulin dysregulation, kidney disease, adverse reproductive and developmental outcomes, and cancers.
 - a.** Various PFAS have been shown to reduce antibody levels in response to specific vaccines, making those vaccines less effective. Imagine the impact of this for Covid vaccines or for the next epidemic or pandemic threat.
 - b.** PFAS have also been shown to affect the thyroid hormone system in a complex way that is not fully understood. Thyroid hormone is critical for brain development in the human fetus and in newborn babies. Interfering with thyroid hormone action during this time robs the individual – and society – of human potential by reducing IQ as well as increasing the risk of autism and ADHD.
 - c.** Chronic diseases of the liver and kidney diminish the quality of life and exact huge costs on the individual and society.
 - d.** Assisted reproductive technologies are being used increasingly to support couples that are infertile or sub fertile, and chemical exposures – including of PFAS chemicals – are a likely contributing factor.

- e. PFAS chemicals are linked to a number of cancers including liver and kidney.

2. PFAS are “forever”.

- a. It is well-known now that these chemicals do not degrade in the environment. This has two important implications for public health.
 - i. First, it means that the only way to reduce human exposure – or even to reduce the rate of increase in exposure – is to reduce production. Prohibiting the use of PFAS in certain consumer products in the Commonwealth is the equivalent of reducing “production”.
 - ii. PFAS also remain in the human body for long periods, meaning that they build up in the human body. Therefore, it is important to act now.

3. PFAS are not alone.

- a. We humans are not exposed to single chemicals. We are exposed to a mixture of many chemicals every day. But hazard and risk calculations are traditionally based on an approach that considers the exposure to each chemical in isolation, which is simply not how people are exposed.
- b. Experimental studies in animals go to great pains to perform toxicological experiments on a single chemical without incidental contamination by other chemicals. Epidemiological studies -- studies of how often diseases occur in different groups of people and why -- similarly go to great pains to factor out the contribution to adverse health effects by the mixture of other chemicals that people are in contact with on a regular basis in daily life.
- c. But a recent study by the Dutch risk assessment agency in collaboration with scientists at Brunel University in London, showed that the mixture of chemicals to which Europeans are exposed is much more potent on reducing IQ in children than what would be expected based on individual chemical estimates of risk.

4. We must turn off the Tap

- a. The intersection of these issues means clearly that the only way to protect Americans from the harm of PFAS is to reduce exposure. Because the Federal government is slow to act in this regard, it is right and just that the Commonwealth take action.
 - i. An ancillary issue is whether it is reasonable to view the hazard of PFAS chemicals as a class based on data obtained from a relative few. My answer to this question is “absolutely yes”. PFAS chemicals have been around since the 1950s, and yet we still have only limited data on a relative few. Moreover, as a ProPublica article recently revealed, the 3M company knew of the toxicity of PFAS and concealed it. If we wait for scientific studies to approach this class in a one-by-one manner, it will be too late to do anything about it.
 - ii. As a result, it is important to turn off the tap of PFAS – a chemical class that is toxic to the human population, which won’t go away and will only continue to build up.