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Background sources of PFAS: implication for drinking water supplies and human health risks - by Frank Ricciardi

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There has been considerable reporting in the environmental industry on per-and polyfluorinated alkyl substances, or PFAS, sometimes referred to as “forever chemicals” since they do not readily degrade and are persistent in the environment. There are thousands of individual PFAS variants found in hundreds of common consumer products. Their resilience and ability to accumulate in humans and animals make them a potential health risk at extremely low levels and removing them from environmental media/drinking water requires expensive disposal, specialized equipment, and/or new treatment technologies.

The USEPA established a Health Advisory Level of 70 parts per trillion (ppt) in drinking water based on available toxicity data. This extremely low concentration has been equated by the Michigan Department of Environmental protection as approximately four drops of water in an Olympic-sized swimming pool. The Massachusetts Department of Environmental Protection (MassDEP) recently established a total Maximum Contaminant Level (MCL) for six PFAS compounds in drinking water of 20 ppt. This level is even lower than the USEPA Health Advisory to account for evidence associating larger PFAS compounds with several potentially adverse effects to infant development and the immune system. Several other states have also used similar models and assumptions to develop their own drinking water standards which are lower than the USEPA Health Advisory. The use of PFAS in so many consumer products has resulted in its being detected around the globe, even in uninhabited areas. This so-called “background” presence can impact properties and public water supplies at levels nearly equal to the Health Advisory and Maximum Contaminant Level. In cases where known sources of PFAS exist nearby, the responsible party may be able to be held liable for addressing PFAS impacts, but if the impacts are related to background, the responsibility may lie with the owner of the impacted property/water supply.

Where is Background PFAS Coming From?

Atmospheric Deposition and Precipitation: A recent study found concentrations of PFAS in

Massachusetts precipitation at five ppt due to releases into the atmosphere from stack emissions from manufacturers who use PFAS. Once airborne, PFAS can travel miles from the source prior to deposition – one investigation showed PFAS impacts to surface and groundwater greater than 20 ppt more than five miles away from its source.

Pesticide use: The MassDEP identified concentrations of PFAS compounds at concentrations up to 1,000 ppt in the mosquito spray applied aerially in Bristol and Plymouth counties to combat eastern equine encephalitis (EEE). Given that PFAS is used as a dispersant additive, it is also possible that PFAS may be found in other similar products that are sprayed aerially. Additionally, further studies have found that PFAS may have been added as a coating in the containers of these products.

Consumer Products: Many consumer products such as food packaging, non-stick pans, water-repellent clothing, firefighting foam, and stain-resistant textiles contain PFAS, which can dissolve from these products into the environment or local water supplies.

Wastewater Treatment Plants and Residential Septic Systems: After decades of exposure to PFAS, humans have these compounds in our bloodstream which are then excreted. Since neither municipal nor residential wastewater treatment methods break down PFAS, they pass directly through treatment plants, discharge into surface water bodies and then travel miles downstream, potentially impacting environmental media and drinking water supplies. Residential septic systems can also discharge PFAS directly into soils and groundwater, potentially impacting nearby wells and surface waters.

Biosolids: Wastewater treatment facilities concentrate PFAS in biosolids, which have been applied to farmlands as a fertilizer for decades. This has resulted in residual sources of PFAS in shallow soils that can leach into groundwater or run off into surface water. Some studies of land application sites show residual PFAS impacts in shallow soils and underlying groundwater decades after sludge application ceased. In addition, incineration of biosolids occurs at temperatures well below those needed to destroy PFAS, resulting in atmospheric discharge and further transport of PFAS to surrounding areas.

Landfills: Massive quantities of consumer products that contain PFAS are disposed of in landfills every year, which, along with disposal of industrial waste and wastewater treatment plant biosolids, may result in very high concentrations of PFAS in leachate. In addition, leachate disposal at wastewater treatment facilities discharges directly to surface water bodies as these compounds pass through conventional treatment processes.

Regulatory Future

Given the thousands of PFAS variants, extremely low regulatory standards, their ubiquitous presence in our environment, and the costs to remove PFAS from water supplies, regulatory agencies should routinely evaluate their risk models to ensure they are scientifically valid and not unnecessarily conservative. As the science of PFAS matures, additional data and longer-term effects of PFAS will become more readily available. These standards should be scientifically

defensible and not overly burdensome so as to result in costly and potentially unnecessary treatment measures to address what may well simply be background PFAS concentrations.

Will My Property be Impacted by PFAS? The simple answer is most likely “yes,” given the ubiquitous nature of PFAS, background sources, and potential source producers of PFAS products. Whether or not your property has already been impacted by PFAS, the best course of action may be to consider an evaluation of potential PFAS sources and implications for your property, water supply, or wastewater treatment facility. This evaluation should identify potential source polluters, who can be pursued in the future, if necessary, for costs related to PFAS mitigation, remediation, or treatment.

This column was written as a team by Frank Ricciardi, Steve LaRosa, Marie Rudiman, Chuck Raymond of Weston & Sampson.