

DATE: January, 2017

TO: Board of Commissioners, Upper Dublin Township

FROM: Environmental Protection Advisory Board (EPAB), Upper Dublin Township, Alan Greve, Chair

SUBJECT: Informational Document Regarding Fluorinated Carbon Compounds in Township Drinking Water

We have noted the recent attention paid to the matter of perfluorinated chemicals in some Township drinking water. We provide this document in the hope of informing you and guiding your decisions and actions in this matter. The document follows a question-and-answer format. We will provide further information in response to any questions that this document might raise.

What are perfluorinated carbon compounds such as PFOA, PFOS, PFCs?

Synthetic, man-made chemicals consisting of a linear carbon chain, often 8 carbons in length, in which all hydrogens have been replaced by fluorine molecules. Generally the last carbon in the chain is a carboxylic acid (perfluorooctanoic acid, PFOA) or is attached to a sulfonic acid (perfluorooctane sulfonic acid, 'PFOS'). Other members of this family have longer or shorter carbon chains. Here we will refer to all as perfluorinated compounds, or 'PFC's.

Are they used in our society?

They have numerous and widespread uses. First developed for industrial use in the late 1940s they have since been used in large quantities to make fluoropolymer coatings and products that are oil and water repellent such as Teflon, Stainmaster carpet treatment, Scotchguard fabric treatment, and Gore Tex fabric. In some of these applications the molecules are immobilized in a coating matrix and do not constitute a human exposure risk. In others, humans are exposed to the PFCs resident in the materials.

They have also been used to produce firefighting foams and mist suppressants. These applications especially can result in their substantial release to the environment.

Due to concerns about their human health impacts, U.S. production has ceased in the past 5 years. However, overseas production and the importation of materials continues.

What is their fate in the environment and in humans?

These compounds are notably resistant to chemical and biochemical degradation. They persist in the environment without breakdown or with very slow breakdown. Upon taking them into the body via water, solids, or inhalation of particles bearing them, PFCs accumulate in humans and other living organisms. Due to their widespread use and their persistence they are now found in most environments of the world and in the blood of virtually all humans. If exposure were ended the accumulated materials would eventually be eliminated from the body, though with half-lives measured in years. This persistence and wide distribution in humans causes concern for their health effects.

What are the levels of PFCs in Upper Dublin Township water sources?

The past use of these compounds in firefighting foams at Willow Grove Naval Air Station (Horsham) and the Naval Air Development Center (Warminster) contaminated drinking water wells in the area of these bases. Aqua PA, one of three suppliers of water to Upper Dublin township residences, has reported detecting these compounds in water from some of their township supply wells. The maximum level detected was 68 parts per trillion. (For reference, one part per trillion is equal to one drop of a substance in a 10 mile length of railroad tank cars.) This is within the concentration range deemed acceptable by the U.S. Environmental Protection Agency (see below). Nonetheless, Aqua PA has removed the wells from service.

The formal statements by Aqua PA in this regard have been put on the Township website.

Are these compounds dangerous to humans?

Because they are rather chemically and biochemically inert it was at first assumed that PFCs were nontoxic to humans.

However, studies with laboratory animals and surveys of industrial workers from the late 1970s onward indicated that in sufficiently high concentrations these compounds are toxic to the immune system and are associated with increased occurrence of some types of cancer. They are now recognized as ‘likely’ or ‘probable’ carcinogens, and are especially associated with kidney and testicular cancer. There are also data suggesting associations with prostate and ovarian cancer, non-Hodgkin’s lymphoma, ulcerative colitis, thyroid disease, hypercholesterolemia (high cholesterol), and pregnancy-induced hypertension.

Should they be reclassified as ‘known’ carcinogens Federal law will mandate their complete removal from the water supply.

These compounds were already in commerce when the U. S. Toxic Substances Control Act (TSCA) went into effect in the late 1970s. As a provision of that Act substances already in commercial use were exempted from toxicity testing.

Is there a safe level in drinking water?

The diseases listed above are typically the result of high levels of exposure, as might be experienced in an industrial production facility. Through normal use and accidental spills these compounds enter the environment, including their appearance in drinking water via passage through the soil column following release to the surface. Levels in such cases are typically lower than seen in industrial production environments.

There are multiple and evolving views on the question of the toxicity associated with exposure to lower levels of these compounds. Official (U.S. Environmental Protection Agency, EPA) positions may be in transition.

Laboratory studies have shown that exposure of laboratory animals to high levels can be linked to the cancers listed above. Using accepted and standard toxicological practices, these data have been extrapolated by the EPA to estimate a maximum safe level of human exposure to PFCs via drinking water. The calculations assumed consumption of water in volumes comparable to that of a nursing mother (the thirstiest of typical humans, for these considerations) every day over the course of an entire life. That maximum safe level, published as a Health Advisory Limit (HAL), is currently 70 parts per trillion.

Local field studies: Cancer is a mandatorily reported disease in Pennsylvania. The Agency for Toxic Substances and Disease Registry (ASTDR) of the U. S. Dept. of Health and Human Services and the PA Dept. of Health jointly conducted an examination of reports of cancer for the period 1985-2013 in the Zip Code areas near the Warminster and Willow Grove Naval Sites where significant PFC contamination of ground water has been detected. (This report is available at the Horsham Township website, listed below.) This examination found some statistically significant increases in rates of bladder, prostate and testes cancers in men in some time periods and zip codes, and statistically significant reductions in bladder, myeloma, non-Hodgkin's lymphoma and testes cancers for different areas, genders and time periods. The authors concluded that the data was not indicative of any type of cancer cluster in the area.

Within recent months the New Jersey Water Quality Institute advised a 14 ppt limit for drinking water levels of one of these compounds, PFOA.

No Safe Level?: In 2015 Drs. Phillippe Grandjean (Department of Environmental Health, Harvard School of Public Health, Boston, MA) and Richard Clapp (Department of Work Environment, University of Massachusetts Lowell, MA) published a paper that overviewed the history of this subject. Studying data showing a reduction in immune system vigor among children whose mothers had been exposed to PFCs in drinking water during pregnancy, they calculated that 1 ppt in drinking water could have adverse effects. During a presentation in Warminster in Aug., 2016 Dr. Clapp stated his belief that there may be no safe level of PFCs in drinking water. In their scientific publication Drs. Grandjean and Clapp did point out that their analysis in no way represented a formal risk evaluation. It may have triggered one that will be published at some future date.

What about other avenues of exposure via water?

- Shower water – There is some data indicating that PFOA are skin-absorbed. Use of water containing PFOAs for showering is not ruled out by some authorities, but we advise a conservative approach in this regard.
- Pool water – We advise a similar approach to that described for shower water.
- Pet water – proper exposure levels of various pets are presently undetermined.
- Yard and garden watering – Though they pass down into groundwater, there is also some soil-binding of these materials. Therefore, the use of water containing PFOAs in agriculture will cause these compounds to be passed on to grass, fruits, vegetables and etc.

What do the regulators of such things say?

We consider the U.S. EPA to be the primary organization to consult in this regard. The EPA does not currently regulate the levels of perfluorinated compounds in drinking water.

However, in 2009, the EPA released provisional health advisories (PHAs) for two compounds in this family, PFOA and PFOS, in drinking water. They recommended that actions be taken to reduce exposure when concentrations exceed 0.4 µg/L (micrograms per liter = 400 parts per trillion) for PFOA and 0.2 µg/L (200 ppt) for PFOS. This advisory was recently (May, 2016) modified, as noted above, to a recommended maximum of 70 parts per trillion total concentration of all perfluorinated compounds.

We interpret this recent revision in advisory levels, coupled with recent scientific publications regarding safe levels, to suggest that further examination and reduction in recommended levels may occur.

Can these compounds be removed from water?

Yes. Commonly used chemical adsorption technologies such as Granular Activated Carbon and Ion Exchange can bind these compounds to certain solid materials, removing them from water.

Such actions would entail significant costs and infrastructure alterations. We are not familiar with the estimated costs of these.

Can I treat my house water to remove PFCs?

There are reports from citizens of lowering the levels of these compounds in their home water supply by the use of some kinds of commercially available filters that contain Granular Activated carbon (GAC) as the treatment medium. However, we are unaware of any agency or body having formally tested commercially available home-use filters for their effectiveness in removing these compounds from water. Also, we have been present at public forum meetings where representatives of such agencies have stated that they also are unaware of such tests, and that no available filters or other treatment methods have been approved by any agency for use in this application. They also indicated that tests were planned at some time in the future.

EPAB believes it to be a safe option to recommend that citizens concerned for their safety take the additional precaution of using a drinking water (if not whole house) carbon /physical filter system as these systems have shown the ability to reduce a number of contaminants. Vendors will provide certain statements regarding performance of their products. Note, however, that none are officially sanctioned in this application.

EPAB Perspective

This area is a developing one. We recommend that the Board be aware that current Health Advisory Levels may be adjusted (upward or downward) in the future as more data becomes available to regulatory agencies. These Advisory Levels are set on the basis of the best available accepted scientific data and modified as appropriate when additional data becomes available. We urge the Commissioners to adopt a reliance on ‘best available accepted scientific data’ in their deliberations and actions.

Recently (Fall, 2016) there have been reports from some state legislators that they intend to approach state government to set an enforceable level for perfluorinated compounds in drinking water, one that is below EPA advisory levels, in areas subject to long term historical contamination (such as local airbases, we presume), and provide funds for remediation. Advances on this front could be relevant to Upper Dublin Township.

It is the opinion of the EPAB that the HAL published by the EPA currently represents the best science available to the Township to assess the safety of the various drinking water supplies with respect to PFCs. At present, all supplies to the Township have PFC concentrations below the HAL and should be considered safe for use on that basis. Some actions the BOC could consider related to PFCs are:

- Continue to update the Township website with test result pages for each of the water suppliers to the Township so that residents can monitor testing results and any changes in PFC concentrations
- Monitor the activities of the EPA and the PA Dept. of Environmental Protection related to changes in the HAL and/or promulgation of regulated standards for PFCs. Inform residents of changes and what the changes might mean to the water supplies to the Township
- Continue to proactively communicate with water suppliers to ensure they have action plans that meet the current HAL and encourage them to be prepared to modify these in the event that new standards are published by regulatory agencies
- Monitor the development of testing standards for in-home point-of-use treatment and provide that information to township residents as it becomes available.

Any future developments could require a reappraisal of the situation.

Where can I learn more?

The presentations made by Federal and State health professionals experienced in this area at a public forum sponsored by Horsham Township in August, 2016 are available on the Horsham Township website at <http://www.horsham.org/pView.aspx?id=34400&catid=612>

The Horsham township website also offers numerous other sources of information on this matter.

Searches of the web can be informative, but can also give contradictory and unvalidated information. It is suggested that one rely most upon information from state or Federal sites.