

Poly- and perfluoroalkyl substances (PFASs) in raw and drinking water – current situation in Sweden, Denmark and Germany

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Poly- and perfluoroalkyl substances (PFASs) are a group of anthropogenic environmental pollutants which have been used and produced for more than 60 years. PFASs are used for multiple industrial purposes, e.g. as water repellent on clothing, leather, and paper and as firefighting foam. The most well studied PFASs subgroup are perfluoroalkyl acids (PFAA). Two PFAAs of particular interest are perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA). These are the most studied homologues which are ubiquitously detected in the aquatic environment, wildlife and humans. Some PFASs are recognized as being potentially toxic for both animals and humans (e.g. PFOS), whereas the majority has not been thoroughly studied yet regarding their toxicity. PFAAs are highly mobile once present in the aquatic environment. Currently, they are not eliminated during conventional wastewater or drinking water treatment and therefore pose a severe threat for drinking water supply.

We reviewed the current occurrence of PFAAs in the surface and groundwater and legal situation of PFAAs in Sweden, Denmark and Germany. Although first detections of PFAAs were reported in the early 2000s, PFASs only recently attracted huge media attention raising public concern. In Sweden, for instance, several public waterworks needed to cease operation due to high PFASs concentrations in drinking water. Moreover, threshold values for drinking water are under discussion and a first preliminary guiding value for PFOS was recently presented as a first step (Pettersson et al., 2015). Germany only defined a guiding value for the sum of PFOS and PFOA in drinking water so far (Dieter, 2011). Limits of 0.3 $\mu\text{g/L}$ PFOA and 0.1 $\mu\text{g/L}$ PFOS and PFOSA each have been suggested in Denmark (MST, 2015).

In summary, none of the three countries has defined a clear threshold value for any PFAS compound in drinking water so far. This is of huge concern as PFASs are detected at increasing rates while it remains unclear when measures have to be taken to secure the drinking water quality for millions of people. Here, we present the first comprehensive comparison of PFASs contaminations in Sweden, Germany, and Denmark and how they are dealt with.

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