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Abstract

Per- and polyfluoroalkyl substances (PFASs) is a group of persistent, bioaccumulative and toxic pollutants. PFASs are widely used in industrial processes and products such as water- and fat repelling surfaces in clothes, paints and paper. They are also used in certain types of firefighting foams and have been found in ski waxes. PFASs are organic compounds with a fully or partly fluorinated chain which makes them very stable to heat and degradation. They are globally spread and found in high concentrations in e.g. water and biota.

The goal of this study was to analyze the results from a screening campaign of PFASs in Swedish waters. The aims were to identify the most polluted types of waters and identify the main emission sources. Further, the measured concentrations were compared with guideline values. This study also investigated the possibility of tracing PFAS sources from a water sample.

In total 528 samples (including 30 triplicates and 26 blanks) were collected across Sweden and analyzed for 26 different PFASs. The types of water sampled were groundwater, surface water, landfill leachate and sewage treatment plant (STP) effluent. Also 10 reference lakes located in remote areas were sampled. The samples were analyzed by using a method including filtration, SPE (solid phase extraction) and LC-MS/MS (liquid chromatography- tandem mass spectrometry).

The result showed PFAS concentrations ranging from zero to thousands of ng L^{-1}. The highest average concentration was measured in landfill leachate. The maximum concentrations were detected in samples collected from surface water and groundwater.

The impact from different sources was investigated for surface- and groundwater. The results showed that fire training sites are causing the highest concentrations followed by landfills/waste disposal areas. An analysis of the concentration in drinking water showed that 5 of the sampled sites contained concentrations above the recommended guidelines from the Swedish National Food Agency (90 ng L^{-1} for the sum of 11 PFASs). The conclusion drawn from this was that it is important to continue monitoring PFAS concentrations in drinking water sources, especially those potentially impacted by fire training sites or landfills.

The possibility of source tracing PFASs from surface- and groundwater samples was investigated through PCA (Principal Component Analysis), cluster analysis and analysis of branched isomers. The results did not show any correlations between the sources and specific PFAS profiles, except for PFOS, PFBS, PFHxS and PFPeA in groundwater which showed some correlation with fire training sites. The conclusion was that source tracing needs to be investigated further, and the possibility of finding correlations might increase if more specific source categories are used.

Keywords: Per- and polyfluoroalkyl substances, PFAS, Sweden, fire fighting foam, landfills, groundwater, surface water, landfill leachate, effluent, drinking water

Popular science summary

Lately, firefighting foam has been pointed out as a source of harmful pollutants to drinking water. The substances that have been found in high concentrations in the water are called PFASs, short for per- and polyfluoroalkyl substances. PFASs are man-made and have been produced since the 1950's for usage in many different products such as firefighting foams, rain clothes, ski waxes, paint, cosmetics, non-stick frying pans and food packages etc. All PFAS-containing products can cause emissions to the environment during the whole life cycle, from production to use and disposal.

PFASs are problematic since they can cause health problems for humans and animals, for example cause cancer and damage the offspring. The PFAS molecules are very stable and cannot be degraded. As long as we keep producing and using them the amount of PFASs in nature will increase. Most PFASs end up in water, sediment or in humans and wildlife.

Humans get PFASs into our bodies mainly through drinking water and food. In some places in Sweden the drinking water has been found to be polluted by PFASs. This is the background of this screening study of PFASs in Swedish waters. Over 500 water samples taken from all over Sweden were analyzed for PFASs to answer the questions of where the concentrations are highest, where the PFASs come from and if the concentrations are dangerously high for humans and nature. This study also tried to investigate if it is possible to identify where the PFASs come from only by looking at the pattern of PFASs in a water sample. In other words, it was investigated if e.g. fire training sites or industries leave "fingerprints" of PFASs in water.

The results showed that leachate water from landfills generally have very high concentrations of PFASs. The study also showed that these PFASs can reach outside the landfill area and pollute surrounding groundwater and surface water. Extremely high values were also measured in surface water and groundwater next to sites where a lot of firefighting foam have been used. In 5 places where the water is used for drinking water the PFAS concentrations were higher than the recommended guidelines. The conclusions of this study is therefore that it is important to measure PFASs in drinking water, especially close to fire training sites and landfills, to lower the risk of drinking polluted water.

No "fingerprints" of PFASs could be identified in the studied samples and the study could not find a way to trace the emission source by analyzing the water sample. However, if this is studied further and another method is used it might be possible.

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Abbreviations

6:2 FTSA	6:2 fluortelomer sulfonate
AA-EQS	Annual average environmental quality standard
AFFF	Aqueous film forming foam
CAB	County administration board
FOSA	Perfluorooctanesulfonamide
FOSAA	Perfluorooctanesulfonamidoacetic acid
FOSE	Perfluorooctanesulfonamido-ethanol
FTAS	Fluorotelomer sulfonate
IS	Internal standard
LC-MS/MS	Liquid chromatography- tandem mass spectrometry
MAC-EQS	Maximum acceptable concentration environmental quality standard
MDL	Method detection limit
MeOH	Methanol
N-EtFOSA	N-ethylperfluorooctanesulfonamide
N-EtFOSAA	N-ethylperfluorooctanesulfonamidoacetic acid
N-EtFOSE	N-ethylperfluorooctanesulfonamido-ethanol
N-MeFOSA	N-methylperfluorooctansulfonamide
N-MeFOSAA	N-methylperfluorooctanesulfonamidoacetic acid
N-MeFOSE	N-methylperfluorooctanesulfonamido-ethanol
PCA	Principal component analysis
PFAS	Per- and polyfluoroalkyl substance
PFBA	Perfluorobutanoic acid

PFBS	Perfluorobutane sulfonic acid
PFCA	Perfluoroalkyl carboxylic acid
PFDA	Perfluorodecanoic acid
PFDoDA	Perfluorododecanoic acid
PFDS	Perfluorodecane sulfonic acid
PFHxA	Perfluorohexanoic acid
PFHxDA	Perfluorohexadecanoic acid
PFHxS	Perfluorohexane sulfonic acid
PFNA	Perfluorononanoic acid
PFOA	Perfluorooctanoic acid
PFOcDA	Perfluorooctadecanoic acid
PFOS	Perfluorooctane sulfonic acid
PFPeA	Perfluoropentanoic acid
PFSA	Perfluoroalkyl sulfonic acid
PFTeDA	Perfluorotetradecanoic acid
PFTriDA	Perfluorotridecanoic acid
PFUnDA	Perfluoroundecanoic acid
PP	Polypropylene
SPE	Solid phase extraction
STP	Sewage treatment plant
$\sum_{11}$ PFASs	Sum of PFBS, PFHxS, PFOS, 6:2 FTSA, PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFNA and PFDA
$\sum_{26}$ PFASs	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFNA, PFDA, PFUnDA, PFDoDA, PFTriDA, PFTeDA, PFHxDA, PFOcDA, PFBS, PFHxS, PFOS, PFDS, 6:2 FTSA, FOSA, N-MeFOSA, N-EtFOSA, N-MeFOSE, N-EtFOSE, FOSAA, N-MeFOSAA and N-EtFOSAA

1 Introduction

Per- and polyfluoroalkyl substances (PFASs) have received a lot of attention the recent years as they have been found widely spread in the environment and noted as a potential threat to humans and wildlife (Prevedouros *et al.*, 2006). These pollutants have been discovered in several medias such as water, sediment, soil, air, sludge, humans and wildlife. The PFASs have been detected in both urban areas and in remote places (Giesy & Kannan, 2001).

PFASs and precursor compounds that can degrade to PFASs are highly fluorinated organic compounds with unique properties. They are suitable for a broad range of applications and have been used in industrial processes and products for decades (Kissa, 2001). PFASs are often used to obtain water- and fat repelling surfaces, e.g. in rain clothes, carpets and food packages. Certain types of firefighting foams are also containing PFASs, which has been identified as one of the main sources of PFASs to aquatic environments (Ahrens *et al.*, 2015). PFASs can be released into the environment during production, product use and disposal of PFAS containing products (Prevedouros *et al.*, 2006).

PFASs are of concern since they are persistent in nature, have potential to bioaccumulate and be toxic (Fromme *et al.*, 2009). Attempts have been made on global, EU and national level to reduce PFAS concentrations in water due to health and ecological aspects. Most focus have been to reduce the emissions of perfluorooctane sulfonic acid (PFOS) and perfluorooctanoic acid (PFOA), which are the most discussed PFASs in literature (Buck *et al.*, 2011).

Humans are exposed to PFASs mainly via food and drinking water (Fromme *et al.*, 2009). To reduce the health risk of the Swedish National Food Agency are recommending a guideline limit for PFASs in drinking water. Their guideline of 90 ng L^{-1} (sum of 11 PFASs) (Livsmedelsverket, 2016) has been exceeded at several sites in Sweden (Kemikalieinspektionen, 2013).

This study focuses on analyzing the result from a screening campaign of PFASs in groundwater, surface water, sewage treatment plant (STP) effluent and landfill leachate across Sweden. The goal was to establish a better understanding of the PFAS concentrations in these types of water, and control compliance of the limit values for surface water and drinking water. The aim was also to identify the main sources of PFASs to surface- and groundwater and investigate the potential of source tracing emissions in water.

1.1 Objectives

The aim of this study was to analyze and evaluate the state of PFASs in groundwater, surface water, STP effluent and landfill leachate in Sweden. This study focused on answering the following research questions:

- What are the concentrations of PFASs in the Swedish aquatic environment?
- Are PFASs a threat to the health of the population and to the aquatic ecosystems? Are the results exceeding current guideline values?
- Which are the most important emission sources? Is it possible to identify the emission sources directly by the PFAS profile in the water samples?

1.2 Delimitations and contribution

The sampling and the lab analyses were already done before I was introduced to the project. My contribution has been handling and evaluating the data and writing the thesis. Parallel with this thesis I took part in the writing of the report Ahrens *et al.* (2016). That report contains similarities with this thesis. They are based on the same set of data and include some identical or similar figures. In both this thesis and in Ahrens *et al.* (2016), the calculations, tables and figures were done by me. Helpful advices were received from my supervisor Lutz Ahrens and co-supervisors Wiebke Dürig and Karin Wiberg.

2 Background

PFASs are a broad group of different compounds with varying properties and are used in numerous types of products and industries (e.g. AFFF, rain clothes, frying pan coatings and ski waxes). PFASs are released into the environment from different sources and their fate in the environment as well as their toxicity varies between the different chemical structures. This section will give an overview of the properties, sources, regulations, fate and toxicity of PFASs.

2.1 Physical properties of per- and polyfluoroalkyl substances

The group of PFASs consists of a large number of different compounds with varying chemical structure and physical properties. All PFASs are aliphatic organic compounds built up by a head and a tail. The head consists of a functional group and the tail of a carbon chain with at least one of the hydrogens replaced by a fluor atom (Buck *et al.*, 2011). The PFASs can either be perfluorinated or polyfluorinated. In a perfluoroalkyl molecule all hydrogens in the carbon backbone are substituted by fluorine (C_nF_{2n+1}), while a polyfluoroalkyl substance have both fluorine and hydrogen in the carbon chain (Buck *et al.*, 2011). The C-F bond in the tail is one of the strongest chemical bonds possible, which makes PFASs very stable towards degradation in nature. PFASs are also resistant to heat, acids, bases, oxidation and reduction (Kissa, 2001).

PFASs belong to the group of fluorinated surfactants, meaning that they have the properties of surfactants with both a hydrophilic and a hydrophobic part. The fluorines in their carbon tail also make them lipophobic, meaning they repel fat and oils (Kissa, 2001). The lipophobic properties are not shared by PFASs non-fluorinated analogues, which make PFASs attractive to use in manufacturing processes and products, such as rain coats and stain repellant coatings on carpets (Kissa, 2001).

Depending on the type of functional group the PFASs can be categorized into different classes. One of the most well described group in literature is the perfluoroalkyl acids (PFAAs) which includes perfluoroalkyl carboxylic acids (PFCAs) and perfluoroalkyl sulfonic acids (PFSAs). These acids can be present both in protonated and ionic form, which is determined by their individual pK_a value. In nature, PFCAs and PFSAs are often in their ionic form which implies a high water solubility compared to their non-ionic forms (Kissa, 2001). PFOA and PFOS both belong to the group of PFAAs (Buck *et al.*, 2011).

The chain length of the PFASs varies between the compounds and has a large impact on the properties of the substance. Buck *et al.* (2011) propose that PFCAs with 7 or more carbons, and PFSAs with 6 or more carbons should be defined as long chained. A PFAS with a short chain length has a higher solubility in water and are more volatile, while a long chained PFAS has a higher potential of accumulating in biota. Due to the risk of bioaccumulation most focus has been on the long chained PFASs, e.g. PFOS and PFOA (Buck *et al.*, 2011).

Other compounds of importance are the PFAS precursors which are more commercially used than PFASs. The precursors are fluorinated compounds which can undergo non-fully degradation and transform into stable PFASs. Classes of PFAS precursors discussed in this thesis are perfluorooctanesulfonamides (FOSAs), perfluorooctanesulfonamidoacetic acids (FOSAAs), perfluorooctane- sulfonamidoethanols (FOSEs), and fluorotelomer sulfonates (FTSAs) (Buck *et al.*, 2011).

Several of the PFASs have isomers due to branching, meaning that they can have either a linear or branched tail (Buck *et al.*, 2011). According to Butt *et al.* (2010) and Prevedouros *et al.* (2006) the ratio of branched to linear molecules in a sample can give information about the emission source. This is because different manufacturing processes give rise to either only linear molecules or a mix of branched and linear molecules (Prevedouros *et al.*, 2006).

2.2 Use and emission sources

Properties like stable, heat resistant, water- and fat repelling have made PFASs popular to use in numerous industries and consumer products (Kissa, 2001). The industrial use of PFASs started in the 1950's and have since then been used in water- and stain repellant coatings in textiles, carpets and paper, in food packaging, metal plating, paint, aqueous firefighting foams (AFFFs), cosmetics, varnishes, lubricants, ski waxes and other products (Kissa, 2001). PFASs are either integrated in the product itself or used in the manufacturing process. Emissions of PFASs into the environment occur during the production process, during product use and at disposal. The emissions can originate from direct sources, i.e. from production and products that intentionally contains PFASs, or from indirect sources, such as emissions from sources with PFASs as impurities or byproducts (Prevedouros *et al.*, 2006). Indirect sources can also be the release of PFAS precursors that can degrade into PFCAs and PFSAs (Buck *et al.*, 2011). The degree of pollution and composition of PFASs varies in the landscape with distance to and type of emission source.

Several studies have shown that the use of aqueous film forming foams (AFFFs) at fire training facilities is a potential source of large releases of PFASs to the environment. These foams are often used at airports and military sites (Ahrens *et al.*, 2015; Baduel *et al.*, 2015; Moody *et al.*, 2002) as they are designed to extinguish hydrocarbon fuel fires. Due to their resistance to heat, oil and water together with their film forming properties, PFASs have been used in this type of fire-fighting foams since the 1960's (Ahrens *et al.*, 2015). The risk of high concentrations from use of AFFFs is relatively high because of the large amounts used. Training with AFFFs takes place with a rather high frequency (weekly to monthly basis) at fire training sites (Moody & Field, 2000). There have also been cases of accidents where extremely large volumes of AFFF have been released at one time and caused high PFAS concentrations in nearby water (Moody *et al.*, 2002).

A study by Baduel *et al.* (2015) came to the conclusion that AFFFs usage at fire training sites can be a long term source even after the sites have been closed for fire training. PFAS concentrations have been measured to be the highest close to the fire training site and drop with increasing distance from the source, probably due to dilution and partitioning in different medias (Ahrens *et al.*, 2015). The PFAS concentrations in the studied samples were therefore expected to vary with the distance to the source.

Another group of PFAS containing products, which have been observed to cause elevated concentrations in the surrounding environment, are ski waxes (Plassmann & Berger, 2013). PFASs are present in some types of ski waxes probably as a result of unintentional residues from the production processes. The result of a study with samples taken at a major skiing track in Sweden, Vasaloppet, showed elevated concentrations of PFCAs in both snow and soil close to the track. The highest concentrations in the snow samples were of PFASs with chain length of 8 and 14-20 carbons (Plassmann & Berger, 2013).

High concentrations have been found in leachate from landfills (with PFASs up to thousands of ng L^{-1}) due to degradation of waste containing PFASs or PFAS precursors (Busch *et al.*, 2010). Studies show that the PFAS concentration if the leachate water depends on the amount and content of the waste in the landfill (Benskin *et al.*, 2012). The composition of PFASs in landfill leachates varies from site to site, but short chained PFCAs have been reported to be the most abundant components (Benskin *et al.*, 2012). Although the landfill leachates can have very high concentrations of PFASs, the impact from landfills on the surrounding aquatic environment is often small in comparison to emissions from waste water treatment plants (Busch *et al.*, 2010; Bossi *et al.*, 2008). However, the high content of PFASs implies a risk of local pollution and should be considered a point source of PFASs to aquatic environments.

PFASs are usually not removed effectively from waste water treatment plants (Alder & van der Voet, 2015). Therefore they are released in a high amount to the environment via effluent water, volatilization during treatment processes and through use of sludge in agriculture (Benskin *et al.*, 2012). The impact of the waste water as a point source is highly dependent on the origin of the water, e.g. if it is influenced by industries or other activities using PFASs (Ahrens *et al.*, 2009b). The impact from a treatment plant is not only dependent on the concentration in the effluent, but also the volume discharged water.

Other sources of PFASs are non-point sources, for example street run-off from urban areas where PFAS containing products are used, e.g. clothes and paints. The emissions from non-point sources are often higher in areas with larger population (Ahrens, 2011; Zushi & Masunaga, 2009). Atmospheric deposition is also a source of PFASs to water (Butt *et al.*, 2010; Prevedouros *et al.*, 2006). The impact from atmospheric deposition will not be discussed in this thesis.

2.3 Regulations and guidelines

Efforts have been made to reduce the emissions of PFASs as they are persistent, potentially bioaccumulative and toxic. Legal regulations and other initiatives have been formed with PFOS and PFOA as main target compounds (Buck *et al.*, 2011). In 2002, the major manufacturer (3M Company) voluntarily phased out their production of PFOS, PFHxS, PFDS and their precursors (Butt *et al.*, 2010). In 2006, the European Union took measures against PFOS and formed a directive prohibiting the general use of the substance from June 2008 onwards (2006/122/ECOF). The same year the United States Environmental Protection Agency (USEPA) (2006) initiated the PFOA stewardship program in which the eight leading manufacturing companies aimed for a 95% reduction of emissions of PFOA and its precursors by 2010. A complete phase out by 2015 was aimed. In 2009, PFOS was added to Annex B in the Stockholm Convention list of persistent organic pollutants after being classified as persistent, bioaccumulative and toxic (UNEP, 2001). The addition of PFOS to Annex B has led to restrictions of use and large-scale productions in the countries agreeing to the convention. Despite the regulations formed over the last decades many PFASs and PFAS precursors with potential to be toxic and bioaccumulative are still being produced. Even PFOS is continued to be manufactured in Asia (Buck *et al.*, 2011). Since most long-chained PFASs have been phased out, shorter PFASs have been used as replacement due to their lower bioaccumulation potential (Buck *et al.*, 2011).

Studies over temporal trends of PFASs in sewage sludge showed a decrease of PFOS since the phase out and an increase of the shorter chained compounds that have been used as replacement (Alder & van der Voet, 2015). Also a temporal trend of PFASs in blood serum from primiparous women in Uppsala, Sweden, showed a decrease of PFOS. This was concluded to be a result of the phase out of the compound (Gebbink *et al.*, 2015a; Glynn *et al.*, 2012). A similar decline in PFOS and its precursors was observed in different types of food in Sweden between 1999-2010 (Gebbink *et al.*, 2015b).

To protect the aquatic ecosystems the European Union has decided on environmental quality standards (EQS) for PFOS in surface waters and biota (2013/39/EU) under the Water Framework Directive (2000/60/EC). In inland surface water the Annual Average Environmental Quality Standard (AA-EQS) for PFOS is 0.65 ng L^{-1} and the Maximum Acceptable Concentration (MAC-EQS) is 36 000 ng L^{-1}.

In Sweden there are no legally binding limits for PFASs in drinking water (Livsmedelsverket, 2016). However, to secure the health of the people the National Food Agency has recommended limits based on the presence of 11 PFASs (PFBS, PFHxS, PFOS, 6:2 FTSA, PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFNA and PFDA). If the sum of these 11 PFASs occurs at concentrations greater than 90 ng L^{-1}, the agency recommends measures to be taken as soon as possible to reduce the pollution. If the health based TDI (tolerable daily intake) for PFOS of 900 ng L^{-1} is exceeded, sensitive citizens such as pregnant women and babies should avoid intake of the water (Livsmedelsverket, 2016). The TDI is expected to be lowered in the future when there is more research on PFASs and their toxicity (Glynn, 2014).

2.4 Occurrence, transport and fate

The widely usage of PFASs has led to large emissions into the environment. Giesy and Kannan (2001) were the first to discover the global distribution of PFOS in wildlife. Their study showed that PFOS is bioaccumulative and that higher concentrations are found in highly populated areas compared to remote places. PFASs are thought to be transported to the Artic and other remote parts of the world mainly via ocean currents and atmospheric deposition (Butt *et al.*, 2010). PFCAs and PFSAs have high water solubility and are often transported via the water pathway, while PFAS precursors are more volatile and are more likely to be transported via air (Butt *et al.*, 2010).

PFASs have been detected in many different media, such as water, sediment, soil, sludge, snow, air, blood and tissues from humans and wildlife (Buck *et al.*, 2011). The partitioning of the compounds depend on their physicochemical properties and their probability to be formed in the medium by degradation of their precursor compounds (Buck *et al.*, 2011). Long chained PFASs (PFCAs 7 C atoms or more, PFSAs 6 C atoms or more) have a higher distribution in biota, soil, sediment and sludge while shorter chained compounds are more detected in water. POFA is more dominating in water than other PFASs. PFOS is the PFASs found in highest concentrations in biota (Butt *et al.*, 2010).

2.5 Exposure and toxicity

Humans are mainly exposed to PFASs via drinking water and food. Exposure may also occur via inhalation of PFASs in air or via intake of dust and soil (Fromme *et al.*, 2009). Several studies have been conducted to assess the toxicity of PFASs (Lau *et al.*, 2007). No metabolism of PFASs occurs in the body, except for precursor compounds that can degrade to stable PFASs. Studies have shown that PFASs bind to proteins and that the liver is the main target organ. They have been observed to cause increased liver weight, enlargement of the liver cells and tumors (Borg & Håkansson, 2012). The highest concentrations of PFASs are therefore found in the liver and serum.

PFASs are classified as reproductive toxins within the EU and effects such as reduced body weight, reduced viability and malfunctions in the offspring have been observed among the studied animals (Borg & Håkansson, 2012). Other toxicity studies have shown a steep dose-response curve for mortality (Lau *et al.*, 2007) as well as kidney and testicular cancer (Rahman *et al.*, 2014).

3 Methods

This section describes the sampling, analytical methods and the statistical analyses that were used to evaluate the results.

3.1 Target analytes

This study focuses on 26 PFASs, which can be classified as PFCAs, PFSAs or their precursors. Their names, molecular formulas and classes are presented in Table 1.

Table 1. *Name, molecular formula and structure of the investigated PFASs in this study.*

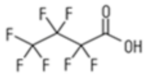
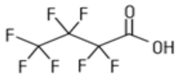
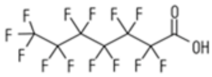
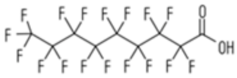
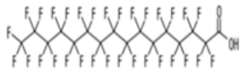
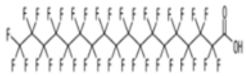
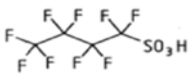
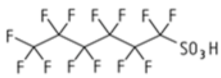
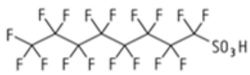
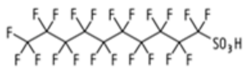
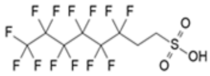
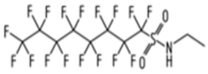
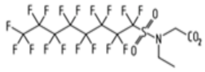
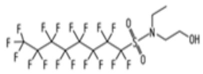
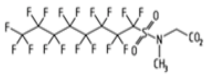
Acronyms	Compond names	Molecular formula	Structure
PFCAs			
PFBA	Perfluorobutanoic acid	$C_3F_7CO_2H$	
PFPeA	Perfluoropentanoic acid	$C_4F_9CO_2H$	
PFHxA	Perfluorohexanoic acid	$C_5F_{11}CO_2H$	
PFHpA	Perfluoroheptanoic acid	$C_6F_{13}CO_2H$	
PFOA	Perfluorooctanoic acid	$C_7F_{15}CO_2H$	
PFNA	Perfluorononanoic acid	$C_8F_{17}CO_2H$	
PFDA	Perfluorodecanoic acid	$C_9F_{19}CO_2H$	
PFUnDA	Perfluoroundecanoic acid	$C_{10}F_{21}CO_2H$	
PFDoDA	Perfluorododecanoic acid	$C_{11}F_{23}CO_2H$	
PFTrDA	Perfluorotridecanoic acid	$C_{12}F_{25}CO_2H$	
PFTeDA	Perfluorotetradecanoic acid	$C_{13}F_{27}CO_2H$	
PFHxDA	Perfluorohexadecanoic acid	$C_{15}F_{31}CO_2H$	
PFOcDA	Perfluorooctadecanoic acid	$C_{17}F_{35}CO_2H$	
PFSAs			
PFBS	Perfluorobutane sulfonic acid	$C_4F_9SO_3H$	
PFHxS	Perfluorohexane sulfonic acid	$C_6F_{13}SO_3H$	
PFOS	Perfluorooctane sulfonic acid	$C_8F_{17}SO_3H$	
PFDS	Perfluorodecane sulfonic acid	$C_{10}F_{21}SO_3H$	

Table 1. *Continued*

Acronyms	Compond names	Molecular formula	Structure
FTSAs, FOSAs, FOSEs and FOSAAs			
6:2 FTSA	6:2 fluorotelomer sulfonate	$C_6F_{13}CH_2CH_2SO_3H$	
FOSA	Perfluorooctane sulfonamide	$C_8F_{17}SO_2NH_2$	
FOSAA	Perfluorooctane sulfonamidoacetic acid	$C_8F_{17}SO_2NHCH_2CO_2$	
EtFOSA	N-ethylperfluoro-1-octanesulfonamide	$C_8F_{17}SO_2NHCH_2CH_3$	
EtFOSAA	N-ethylperfluoro-1-octanesulfonamidoacetic acid	$C_8F_{17}SO_2N(CH_2)_2CH_3CO_2$	
EtFOSE	2-(*N*-ethylperfluoro-1-octanesulfonamido)-ethanol	$C_8F_{17}SO_2N(CH_2)_3CH_3OH$	
MeFOSA	N-methylperfluoro-1-octansulfonamide	$C_8F_{17}SO_2NHCH_3$	
MeFOSAA	N-methylperfluoro-1-octanesulfonamidoacetic acid	$C_8F_{17}SO_2NCH_3CH_2CO_2$	
MeFOSE	2-(*N*-methylperfluoro-1-octanesulfonamido)-ethanol	$C_8F_{17}SO_2N(CH_2)_2CH_3OH$	

3.2 Sampling

This study was based on the results from a large sampling campaign of water across whole Sweden with the purpose to screen for PFASs in the aquatic environments (Ahrens *et al.*, 2016). The measured concentrations from the PFASs analysis and information about the sampling sites were compiled into a database by the Department of Aquatic Sciences and Assessment at SLU. A total of 528 samples were analyzed (of which 30 were triplicates and 26 were blanks). The triplicates were collected as three separate samples from the same sample location. 492 samples (blanks not included) were taken by 21 County administration boards (CABs, Swedish: Länsstyrelser) in Sweden and samples from 10 selected reference lakes were taken by SLU.

The sampling was performed according to the protocol in the Appendix (A1). During the sampling 1 L polypropylene (PP)-bottles were filled with water and sent to the Department of Aquatic Sciences and Assessment at the Swedish University of Agricultural Sciences (SLU), Uppsala, for analysis. Sampling protocols with information about the sites were also attached (see Table A2 in the Appendix). The samples were collected using a grab sampling method, which show the concentrations at one specific time. This should be considered when interpreting the results (Ahrens, 2011).

The CABs decided which waters to analyze based on knowledge of hotspots or importance for the drinking water source areas in the county. Information about which sites that were selected based on the knowledge that they were hotspots was not given by the CABs in the sampling protocols. The distribution of samples over the country was uneven since the numbers of samples per county also were decided by the CABs. Västra Götaland had the highest sampling frequency (60 samples including triplicates), while Västerbotten only collected 3 samples. Västra Götaland is a smaller region compared to Västerbotten but has a much higher population density which could explain the higher sampling frequency. Since the sampling was so unevenly spread over the country, no conclusions could be drawn from this study about the geographical distribution of PFASs.

Different types of water were sampled. Most of the samples were collected from surface water (*n*=285) and groundwater (*n*=164) and few samples from landfill leachate (*n*=10) and STP effluent (*n*=13) (total = 472 samples, excluding blanks and triplicates). 172 of the samples were from drinking water sources. One of the objectives with this thesis was to investigate the correlation between the source and the PFASs in the sample. This correlation was decided to be studied only for surface water and groundwater. The reason for this was the low numbers of samples from leachate and STP effluent.

To investigate the link between the water (surface- and groundwater) and the sources all samples had to be categorized into which source most likely had caused the PFAS pollution. The samples were categorized into the following sources: Fire training sites (including air fields and military areas) (*n* = 183), unspecific industries (including all types of industries) (*n* = 106), sewage treatment plants (STPs) (*n* = 14), landfill (also including waste disposal areas) (*n* = 24), skiing (including sites close to skiing facilities) (*n* = 9) and urban influence (sites close to densely populated areas) (*n* = 24). The source classes were decided based on current knowledge about PFAS sources and the knowledge about the specific sampling sites. For a majority of the sites information about the main emission sources was given by Karl Lilja at the Swedish Environmental Protection Agency (EPA). The other potential sources were identified via maps (Eniro; VISS) and though research about the sites. If one site was located close to more than one source the sample was excluded from the source tracing analysis. This was also done for the samples where the potential sources remained to be unknown. It should be noted that there is a potential risk of misclassification of some of the sites, or that mistakes were done when deciding which sites to exclude from the evaluation.

3.3 Analysis of water samples

PFAS concentrations in the samples were determined through solid-phase extraction (SPE) and liquid chromatography- tandem mass spectrometry (LC-MS/MS) analysis (Ahrens *et al.*, 2009a). Firstly, the 1 L PP-bottles containing the water samples were shaken and sonicated for 5 min to homogenously distribute particles within the sample. Subsequently, the samples were filtered through several glass fiber filters (Whatman™ Glass Microfiber Filters GF/C™, 47 mm diameter, 1.2 μm) using vacuum. Depending on the clearance of the sample multiple filters needed to be used. 500 mL of the filtered water was then poured into empty, previous methanol (MeOH) rinsed 500 mL PP-bottles. The rest of the sample was poured back into the sample bottle and kept for re-analysis purposes. After filtration the filtration equipment was rinsed thoroughly with MeOH to avoid contamination between samples.

SPE was carried out using Oasis® WAX 6 cc cartridges (6 cm^3, 500 mg, 60 μm, Waters, Massachusetts, USA) which were preconditioned with a solution of 4 mL 0.1% ammonium hydroxide in methanol, 4 mL methanol and 4 mL Millipore water. Before running the water samples through the cartridges the water was spiked with 100 μL internal standard (IS) mixture (c = 20 pg μL^{-1}). About 500 mL of the filtered water was loaded on top of the cartridges and passed through with about one drop per second avoiding using vacuum to regulate the flow. The cartridges were then washed by adding 4 mL 25 mM ammonium acetate buffer in Millipore water to remove possible interferences for later analytical analysis. The cartridges were dried by centrifuging at 3000 rpm for 2 min. The PFASs were eluted from the cartridges into previously MeOH-rinsed 15 mL PP-tubes with 4 mL methanol and 8 mL 0.1% ammonium hydroxide in methanol.

The extracts were gently concentrated via a nitrogen stream (N-EVAP™ 112) to about 1 mL and transferred into a 1 mL glass-vial. The PP-tubes were then rinsed with methanol and concentrated to about 1 mL again before transferring the sample into a 1 mL glass-vial. Finally the extracts were concentrated to exactly 0.5

mL. 10 µL of injection standard ($^{13}C_8$-PFOA) were added to the samples before LC-MS/MS analysis.

3.4 Quality control and quality assurance

Since PFASs are ubiquitously spread pollutants, there is a risk of contamination during sampling and analysis. Sampling and analysis blanks as well as triplicates were used to quantify and control for contamination from surrounding environments. At 10 randomly selected sites, triplicates were collected, i.e. three bottles filled at the same site. This was done to study the variation between samples taken at the same site at the same time. 26 blank samples were collected and analyzed, i.e. the bottle was not filled with any water. In the lab these bottles were rinsed with MeOH and loaded on the preconditioned SPE cartridges as described in section 3.3. The purpose behind these blanks was to quantify background noise and contamination from equipment in the field, etc. In addition to these quality assurance measures, a recovery analysis was performed to investigate the losses during sample preparation. The recovery was calculated for the 16 mass-labelled PFASs in the IS ($^{13}C_8$-FOSA, d_3- MeFOSAA, d_5- EtFOSAA, d_3- MeFOSA, d_5- EtFOSA, d_7- MeFOSE, d_9- EtFOSE, $^{13}C_4$-PFBA, $^{13}C_2$-PFHxA, $^{13}C_4$-PFOA, $^{13}C_5$-PFNA, $^{13}C_2$-PFDA, $^{13}C_2$-PFUnDA, $^{13}C_2$-PFDoDA, $^{18}O_2$-PFHxS and $^{13}C_4$-PFOS).

3.5 Statistics and data evaluation

Descriptive statistics were performed in Microsoft Excel on different subgroups of the data, such as the types of water. The data was also analyzed by multivariate statistical methods which are described in the following sections. For all statistical analyses triplicates are represented as an average value. PFAS concentrations measured below method detection limit (MDL) were replaced by half the MDL, which were individual for each compound (see Table A3 in the Appendix). To reduce the uncertainty in the data evaluation only the substances which were detected in 10% or more of the samples were included in the PCA, Cluster analysis and Pearson correlation calculations.

3.5.1 Principal Component Analysis

Principal Component Analysis (PCA) is a multivariate statistical method used to project the systematic variation in a dataset. The basis of PCA is to find planes and lines in a K-dimensional space that approximate the data as well as possible (Eriksson *et al.*, 2013).

In this study, a data matrix with N observations (number of samples) and K variables (PFASs and sources) were run in a PCA (using software SIMCA© 14.0). Before the analysis the data was log-transformed to reduce the variance within the data and scaled to unit variance. In a PCA, the data points are plotted in a coordinate system with K-dimensions. A line (Principal Component) is then drawn through the coordinate system that best approximates the data in a least square sense. To better describe the variation in the dataset more Principal Components can be calculated, which are represented as lines orthogonal to the other Principal Components. However, when adding too many PC (principle components) a lot of noise is added. Therefore a balance needs to be found. The Principal Components in the coordinate system can define a plane onto which all points in the datasets can be projected, which is called a score plot. The score plot is a representation of how the samples (observations) are related to each other (Eriksson *et al.*, 2013).

A PCA also results in a loading plot which is a projection of how the variables are related to each other. Variables, e.g. PFAS compounds and sources, that are correlated are grouped together (Eriksson *et al.*, 2013). The center of the plot represent the average point (Eriksson *et al.*, 2013).

3.5.2 Cluster analysis

Cluster analysis is a multivariate method used to find structures of the objects in large sets of data, e.g. arrange objects with large similarities into homogenous groups (Johnson, 1967). The technique identifies rows in the dataset with similar values across the variables and groups them together. For tables of the sizes in this study, a few hundred observations, hierarchical clustering is used. The clustering results in a tree shaped graph, a dendrogram, which portray the samples with most similarities together in a cluster. The dendrogram also show the distance between different clusters. The statistical software PAST was used for the cluster analysis (PAST 3.11).

3.5.3 Pearson correlation

The Pearson correlation is a measure of the strength and direction of the linear relationship between two variables. The correlation is given as a value from 0 to 1, with a value of 1 implying a perfect linear correlation (Bolboaca & Jäntschi, 2006). 0 or a low value implies a weak or no correlation between the two variables. In this study the correlations between the PFAS compounds were investigated (Benesty *et al.*, 2009). The Pearson correlation was calculating using software JMP Pro 12.

4 Results and discussion

The following section presents the results from the chemical analyses and statistical evaluations. The results are discussed and compared with results from previous studies with the aim to get a full understanding of the results.

4.1 Quality control and quality assurance

In 16% (*n*=5) of the blanks at least one PFAS was detected at a concentration above or equal to MDL. The average concentration in the blank samples was <0.4% of the average concentration in the other samples (94 ng L^{-1}). Highest average blank concentrations were found for blanks LB15 (2.8 ng L^{-1}) and LB05 (2.7 ng L^{-1}) (for details see Table A3 in the Appendix).

The MDLs were calculated based on the average blank concentration plus three times the standard deviation of the blanks. If no PFASs were detected in the blank, the lowest calibration curve point was used as the MDL. The MDL ranged between 0.030 ng L^{-1} (PFPeA) and 1.8 ng L^{-1} (6:2 FTSA) (Table A3 in the Appendix).

The triplicates had a relative standard deviation ranging from 0.00% (sample ID= 111-1,2,3) to 173% (sample ID=1-1,2,3 and sample ID= 450-1,2,3) (for details see Table A4 in the Appendix). In average the relative standard deviation among the triplicates was 57%. This variation is caused by natural variations in the sampled waters and due to analytical errors. More samples at each site could be taken to get a more accurate picture of the PFAS concentrations in the waters.

The recovery analysis showed an average recovery varying from 25% for $^{13}C_4$-PFBA and d5-N-EtFOSA to 128% for d5-N-EtFOSAA (for details see Table A5 in the Appendix) with an average of 80%. This reveals that losses occurred during the lab process. The results from the water samples were corrected for the recovery rate.

4.2 PFAS in groundwater, surface water, STP effluent and landfill leachate

4.2.1 PFAS concentrations in groundwater, surface water, STP effluent and landfill leachate

The concentrations in the samples show that PFASs are found in all types of water across whole Sweden (see lab analysis result in Table A6 in Appendix). 90% of the samples (n=472, average value used for triplicates) contained PFAS concentrations above MDL. This agrees with the knowledge that PFASs are ubiquitously distributed (Giesy & Kannan, 2001).

The measured PFAS concentrations in the samples varied from <MDL to several thousands of ng L^{-1}. The wide range of concentrations is likely a result of the impact by different types of sources (Prevedouros *et al.*, 2006) and varying distances from the sites to the sources (Ahrens *et al.*, 2015). The large variation in measured concentrations was also an expected result from this type of screening campaign. As mentioned in Section 3.2, some of the samples were collected at known hotspots and others from areas with suspected low concentrations, such as drinking water sources. It would have been interesting to separate the hotspots from the other sites for comparison and interpretation of the results. Unfortunately this could not be done due to lack of information about the sampled sites.

Other possible explanations for the large variation of PFAS concentrations is varying sampling depth between the sites and sampling of still or running water. For many sites this type of information was not available. Since only one water sample was taken at most of the sites (all sites except where triplicates were taken), the results does not give any information about temporal trends. Temporal variation of the PFAS concentrations could potentially also explain some of the variation seen in the results.

The average concentration of $\sum_{26}$ PFASs in all samples was 94 ng L^{-1} and the median 2.4 ng L^{-1}. The large gap between the average and median concentrations can be explained by some samples with very high PFAS concentrations, which contribute to a high average.

A comparison of the PFAS concentrations in the different types of waters shows that the landfill leachate was the most polluted (Figure 1). The average $\sum_{26}$ PFAS concentration in the leachate was 487 ng L^{-1} (median= 435 ng L^{-1}, *n*=10). Waste containing PFASs or PFAS precursors can cause high concentrations in the leachate water (Busch *et al.*, 2010). As mentioned in literature (Benskin *et al.*, 2012), the composition and concentration of PFASs in leachate depends on the amount and composition of the waste. The result of this study showed highly polluted leachate at almost all studied sites, with most of the samples having PFAS concentrations of hundreds of ng L^{-1}. However, the number of samples from landfill leachate was relatively low and caution should therefore be taken when drawing conclusions from this about other landfills in Sweden.

The result show that STP effluent had the second highest median concentration with 26 ng L^{-1} (average=35 ng L^{-1}, *n*=13) (Figure 1). However, the maximum concentration was relatively low and only one sample exceeded one hundred ng L^{-1} for $\sum_{26}$ PFASs. The average of 35 ng L^{-1} (*n*=13) was lower than the average for landfill leachate, surface water and groundwater. PFASs in STP effluents along the river Elbe in Germany were investigated in Ahrens *et al.* (2009b). In those samples, the total concentration of the measured 39 PFASs ranged from 30-266 ng L^{-1}, which is higher than in this study (0-112 ng L^{-1}, *n*=13). The treatment plants without industrial influent had an average of 36 ng L^{-1} Ahrens *et al.* (2009b) which is very similar to the average concentration in STP effluent in this study. In Houtz *et al.* (2016), 20 PFASs were measured in STP effluent from treatment plants in San Fransisco, USA. The results from that study showed concentrations of 80-160 ng L^{-1} for the municipal treatment plants, while the concentration measured in an industrial treatment plant was 2900 ng L^{-1} for $\sum_{20}$ PFASs. As mentioned in Bossi *et al.* (2008), the PFAS concentration in effluent water from waste water treatment plants is dependent on the inflow to the treatment plant. Bossi *et al.* (2008) found higher PFAS concentrations in industrial waste water compared to municipal STP effluent. Potential impact of industrial waste water in the STP effluent in this study is unknown; however the concentrations were lower compared to the results in Houtz *et al.* (2016) and similar to the concentrations of the non-industrial STP effluents in Ahrens *et al.* (2009b). Information about the origin of the wastewater would have been interesting for interpretation of the results.

The surface water samples had a relatively low median (4.1 ng L^{-1}) but high average (112 ng L^{-1}, *n*=285) due to a very large spread of PFAS concentrations, ranging from <MDL to 12 900 ng L^{-1} (Figure 1). This indicates that PFAS pollution of surface water is very site specific and depends on factors such as nearby point sources, distance to source and soil type (Ahrens, 2011; Skutlarek *et al.*, 2006). Comparing these results with other studies, Ahrens *et al.* (2009b) found much lower concentrations in the surface water of river Elbe, Germany (7.6-26.4 ng L^{-1}, *n*=15). In Loos *et al.* (2009) the occurrence of 35 types of persistent organic pollutants was investigated in over one hundred European rivers. The results from that study showed that among the analyzed PFASs, the highest average and median concentrations were found for PFOS (average=39 ng L^{-1}, median= 6 ng L^{-1}) and PFOA (average=12 ng L^{-1}, median=3 ng L^{-1}). The average and median concentrations of PFOS and PFOA in the European surface waters were higher (Loos *et al.*, 2009) than the surface water in this study (PFOS: average=24 ng L^{-1}, median=0.4 ng L^{-1} and PFOA: average=6.2 ng L^{-1}, median=0.8 ng L^{-1}). However, the concentrations of PFHxA (average=4 ng L^{-1}, median <MDL) and PFHpA (average=1 ng L^{-1}, median=1 ng L^{-1}) were lower in the European rivers (Loos *et al.*, 2009) compared to the surface water in this study (PFHxA: average=13 ng L^{-1}, median=0.7 ng L^{-1} and PFHpA: average=2.9 ng L^{-1}, median=0.3 ng L^{-1}).

The average concentration of PFASs in groundwater was 49 ng L^{-1} (*n*=164). The high average concentration in this study is a result of one heavily polluted site (6 420 ng L^{-1}). Very high PFAS concentrations similar to this have been detected in groundwater at sites impacted by fire training areas and landfills (Eschauzier *et al.*, 2013; Moody & Field, 2000). Although the average concentration was relatively high the median concentration of 0.40 ng L^{-1} shows that many of the groundwater samples are not impacted by PFASs. Loos *et al.* (2010) analyzed groundwater from 23 European Countries for several organic compounds, e.g. PFOA, PFOS, PFHxS and PFHpA. The samples (*n*=164) in that European screening study measured median concentrations of 1 ng L^{-1} (PFOA), <MDL (PFOS), <MDL (PFHxS) and <MDL (PFHpA). The median concentrations from this study and Loos *et al.* (2010) are similar and both indicate that most groundwater have low concentrations of PFASs.

The lowest levels of PFASs were detected in the reference lakes (average=3.4 ng L^{-1}, median=1.4 ng L^{-1}, *n*=10). The low concentrations of PFASs in the remote areas compared to the other sites indicate that spatial closeness to point sources correlates with elevated concentrations of PFASs in water. This is in agreement with the findings in Giesy and Kannan (2001) that PFAS concentrations are higher in more urbanized locations.

The maximum detected concentrations among the samples were 12 900 ng L^{-1} and 6 420 ng L^{-1}, determined in surface water and groundwater, respectively. Among the five most polluted samples, 4 were surface water samples and one was collected from groundwater. All of these sampled sites were located close to fire training facilities (see Section 4.4.1), which have shown to be a main source of PFASs to the environment (Ahrens *et al.*, 2015; Kemikalieinspektionen, 2013).

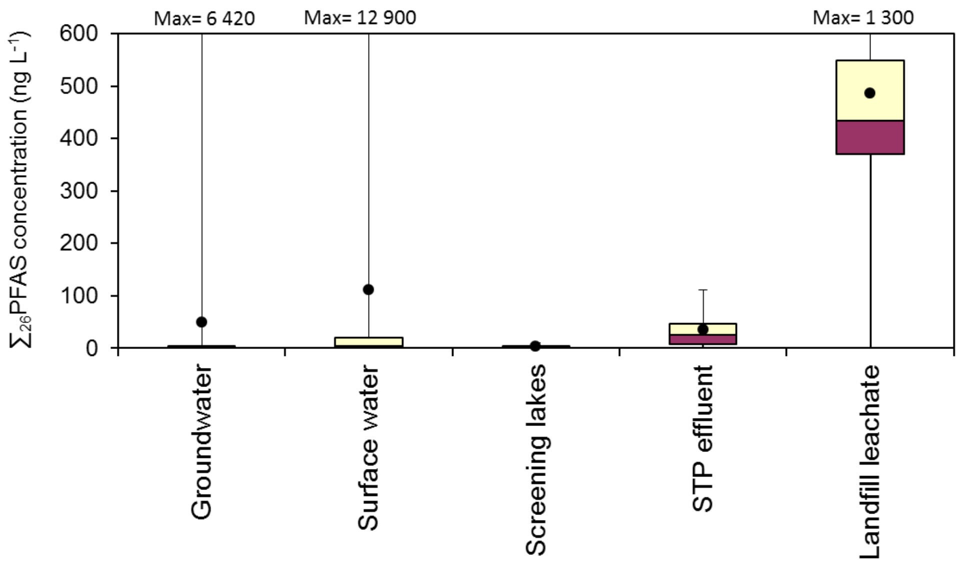


Figure 1 Box- and- whiskers plot for the concentrations of $\sum_{26}$ PFASs (ng L^{-1}) in groundwater (*n*=164), surface water (*n*=285), reference lakes (*n*=10), STP effluent (*n*=13) and landfill leachate (*n*=10). The maximum concentrations in the samples from groundwater was 6420 ng L^{-1} , from surface water samples 12900 ng L^{-1} and 1300 ng L^{-1} in the leachate samples. The figure was also published in Ahrens *et al.* (2016).

4.2.2 Composition of PFAS in groundwater, surface water, STP effluent and landfill leachate

The composition of PFASs varied between the different types of water (Figure 2). The groundwater had a relatively even distribution of the three groups PFCAs, PFSAs and precursor compounds (i.e. 40%, 30%, and 29%, respectively). FOSA and PFHxS were the dominating PFASs in groundwater with 22% and 19% of the average composition respectively. PFHxS was also detected as one of the most frequent PFASs in groundwater in France (Lopez *et al.*, 2015). Data on FOSA in groundwater was not found in literature (Lopez *et al.*, 2015; Loos *et al.*, 2010) and further research on this compound is therefore suggested.

In surface water, reference lakes, STP effluent and landfill leachate, PFCAs were dominating (i.e. 63%, 77%, 53%, and 65%, respectively) compared to PFSAs and precursors. PFCAs of approximately 70% of the total composition was also found in surface water from river Elbe, Germany in Ahrens *et al.* (2009b). High fractions of PFCAs in landfill leachate were detected in Benskin *et al.* (2012). In surface water and landfill leachate PFOA (15% and 26%, respectively) and PFHxA (17% and 25%, respectively) were the dominating compounds. Benskin *et al.* (2012) stated that the composition of PFASs in landfill leachate has reported to be varying between different studies, probably as a result of different types of waste. Several studies have found short chained PFCAs to be the most dominating in the PFASs profiles, such as PFHxA which was the second most dominating in this study.

PFOA and PFHxA were also the compounds found in second and third highest fractions in the STP effluent. 6:2 FTSA was the dominating compound in STP effluent (27%). PFHxA and PFOA were also the dominating compounds found in STP effluent from treatment plants in San Francisco (Houtz *et al.*, 2016). 6:2 FTSA is used in AFFFs and the high percentage of 6:2 FTSA in the STP effluent in this study indicates that users of AFFF are connected to the treatment plants (Houtz *et al.*, 2016). Large fractions of 6:2 FTSA were also detected in the reference lakes (17%), which might be a sign of impact of fire training activity. The reference lakes were dominated by PFHpA (20%), 6:2 FTSA (17%) and PFOA (17%).

In contrast to groundwater, surface water are directly exposed to emission sources such as industries and fire training sites. The groundwater first has to pass through a soil layer which can impact the composition of PFASs and explain the differences between the composition profiles in Figure 2. The average composition profile in the surface water had a higher percentage of both PFOS (14%) and PFOA (15%) compared to the groundwater (5.3% and 5.6%, respectively). Both PFOS and PFOA are considered as long chained PFASs. This gives them higher potential to partition to particles and to bioaccumulate in comparison with their shorter chained analogues (Higgins & Luthy, 2006). The result therefore indicates that PFOS and PFOA have partitioned to the soil and sediment and/or been taken up by biota on the pathway from the surface to the groundwater.

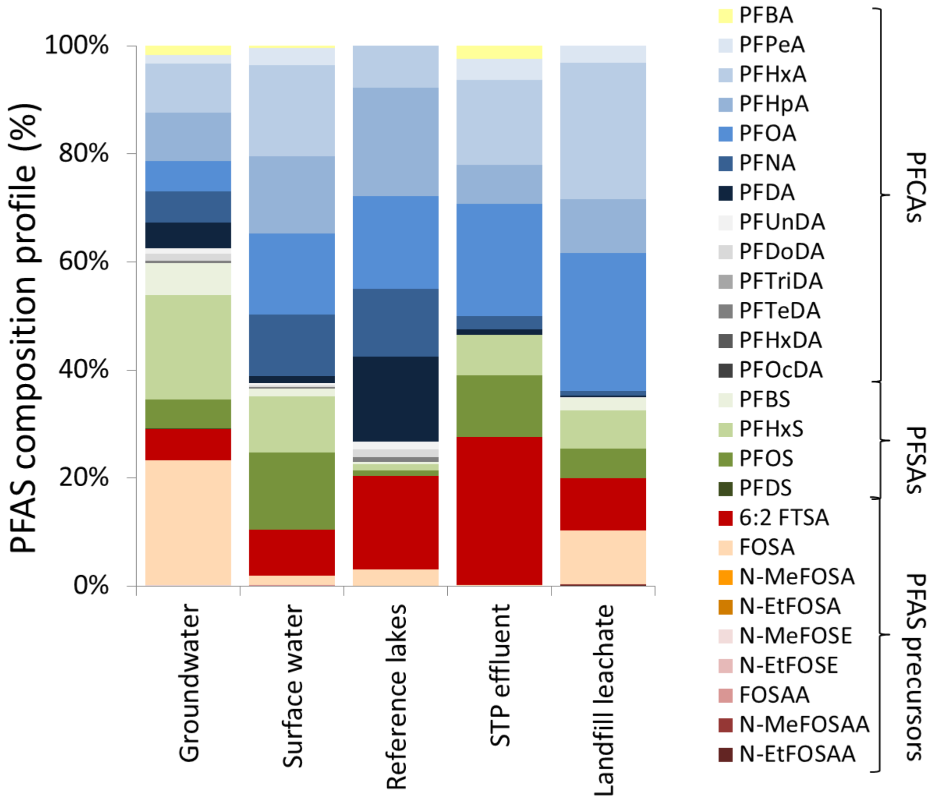


Figure 2 Composition profile (%) of PFASs in the samples from groundwater (n=164), surface water (*n*=285), reference lakes (*n*=10), STP effluent (*n*=13) and landfill leachate (*n*=10). The figure was also published in Ahrens *et al.* (2016).

4.3 Comparison of measured concentrations with guideline values

4.3.1 Comparison of PFASs in drinking water to recommended guideline values

172 of the samples were collected from drinking water sources. A majority of these were groundwater samples (*n*=153) and a few samples were taken from surface water (*n*=19). The concentration of $\sum_{11}$ PFASs from drinking water sources were compared with the recommended guideline value of 90 ng L^{-1}

(Livsmedelsverket, 2016). In addition, a comparison with this guideline was also made using the sum of all 26 PFASs. The aim with this second comparison was to test if the result would be different if more compounds were included in the guideline value.

The result showed that 5 of the samples (2.9% of the total) exceeded the limit of 90 ng L^{-1}, both when basing the concentrations on $\sum_{11}$ PFASs and on $\sum_{26}$ PFASs (Figure 3). All 5 samples exceeding the guideline value were taken from groundwater. This is an indication that the current recommendations are sufficient to identify the polluted drinking water sites although they are only including 11 compounds. Besides revealing a few sites where the PFAS concentrations have to be reduced, the result shows that most drinking water sources (97%) have $\sum_{11}$ PFAS concentrations well below this limit value.

The 11 PFASs listed by the National Food Agency were found among the 12 most dominating compounds in the studied drinking water samples. Interestingly, the compound with highest percentage of the average composition profile, FOSA (20%), is not included in the current regulation (Livsmedelsverket, 2016). FOSA was detected in 31% of the drinking water samples which makes it one of the most frequently detected compounds. Although the result shown in Figure 3 indicates that 11 PFASs are sufficient, it also suggests that FOSA should be considered to be included in the guideline.

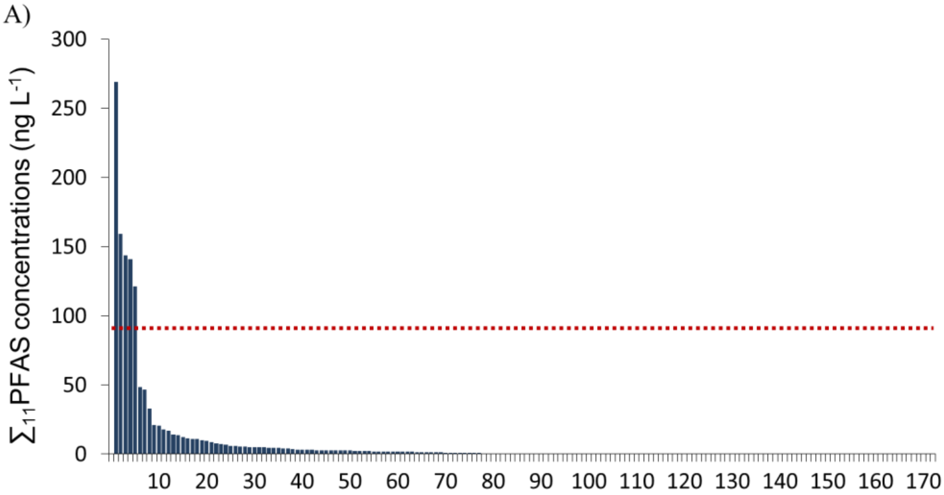
The site information reveals that 4 of the 5 sites that exceeded 90 ng L^{-1} were influenced by fire training sites. The fifth site was impacted by an unknown source from an agricultural area. Skutlarek *et al.* (2006) found high concentrations of PFASs in water close to an agricultural area. In that study it was assumed that application of PFAS-polluted organic waste on the land had caused the pollution. It is not known whether polluted material had been applied close to the site in this study. It would be interesting to study this further to identify more sources of PFASs.

The recommended guidelines from the National Food Agency are based on several assumptions, for example that the toxicity of the different compounds are additive and that all PFASs have the same toxicity as PFOS (Glynn, 2014). These assumptions were made due to the limited knowledge about the toxicity of other PFASs than PFOS. Many assumptions in the calculation of a guideline value imply an uncertainty when deciding which concentrations are acceptable and not.

The recommended limit for when sensitive citizens should avoid drinking the water ($\sum$11 PFAS 900 ng L-1) (Livsmedelsverket, 2016) was not exceeded at any of the drinking water sites. This limit is based on the TDI for PFOS and the result therefore indicates that there is no risk of exceeding the TDI through drinking water at these sites. However, it is mentioned in Glynn (2014) that the TDI might be lowered in the future as research points towards that PFASs are more toxic than what was thought a few years ago.

The knowledge that some of the drinking water areas in Sweden are polluted with PFASs stresses the importance of monitoring the drinking water quality in respect of PFASs. The results suggest that drinking water areas influenced by fire training are at highest risk of being polluted. This is in agreement with the Swedish Chemicals Agency’s recommendations on which areas to prioritize when it comes to monitoring of PFASs in water (Kemikalieinspektionen, 2013).

A)



B)

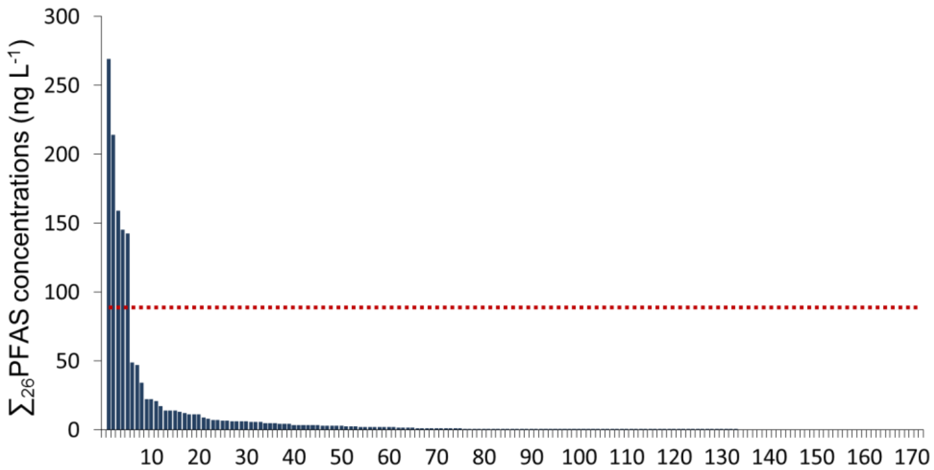


Figure 3 Concentrations of A) $\sum_{11}$ PFASs (ng L^{-1}). B) $\sum_{26}$ PFASs (ng L^{-1}) in samples from drinking water areas (*n*=172). Each bar on the x- axis represent one sample. The red line is marking the guideline limit of 90 ng L^{-1}. The figure was also published in Ahrens *et al.* (2016).

4.3.2 Comparison of PFOS in surface water to environmental quality standards (EQS)

The EU Water Framework Directive's regulation on PFASs is the AA-EQS-value for PFOS in surface water (annual average= 0.65 ng L^{-1} and maximum acceptable concentration= 65 000 ng L^{-1}). The results show that PFOS was detected at concentrations above MDL in 60% of the samples (*n*= 177 of 285 above MDL). 42% of the surface water samples had PFOS concentrations exceeding 0.65 ng L^{-1} (Figure 4). The purpose of this regulation is to protect the aquatic ecosystems (EU, 2000) and the results therefore suggest that PFOS is a threat to this at many sites. The measured median concentration for PFOS (6 ng L^{-1}) in European rivers (Loos *et al.*, 2009) also show that many of the inland surface waters in Europe are exceeding the AA-EQS for PFOS. Compared to the recommended guidelines for drinking water by the Swedish National Food Agency ($\sum_{11}$ PFAS 90 ng L^{-1}) (Livsmedelsverket, 2016) the AA-EQS for PFOS in surface water is low. The AA-EQS of 0.65 ng L^{-1} is also relatively close to the MDL for PFOS in this study (MDL_{PFOS}=0.21 ng L^{-1}, see Table A3 in Appendix). The fact that the guideline is so close to MDL implies an uncertainty in the results. It should also be considered that some of the sampled sites were selected based on the knowledge that they are PFAS hotspots. The result presented in Figure 4 might therefore not be representative for all surface water in Sweden.

The current EU regulation does not cover any of the other PFASs than PFOS. The results show that other compounds are found in the same concentration range as PFOS in the studied samples. PFOS has a composition profile of 14% of the $\sum_{26}$ PFASs. A high percentage of the composition profile in surface water have also PFHxA (17%), PFOA (15%) and PFHpA (14%). These results therefore suggest that more compounds than PFOS need to be regulated.

The high presence of strictly regulated PFASs such as PFOS (UNEP, 2001) and PFOA (USEPA, 2006) in Swedish surface water could be explained by the use or disposal of old products containing these substances. It could also be a result of degradation of PFAS precursors or long term release of PFASs sorbed to soil and sediment (Ahrens & Bundschuh, 2014).

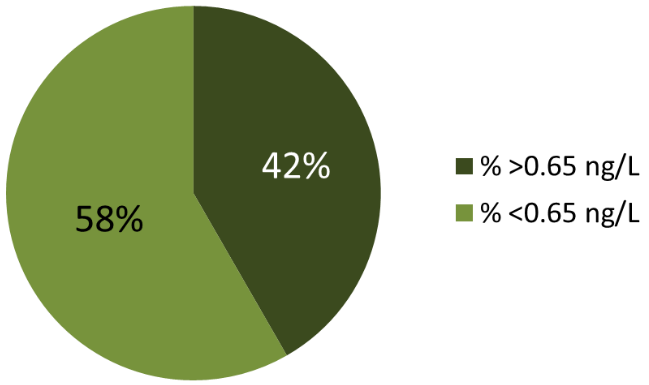


Figure 4 Percentage (%) of surface water samples (*n*= 177) below and exceeding thein relation to the AA-EQS-value of 0.65 ng L^{-1} for PFOS. The figure was also published in Ahrens *et al.* (2016).

4.4 Source tracing of PFASs

4.4.1 Source related PFAS levels and composition profile

Surface- and groundwater samples were assigned categories based on which sources most likely had caused the emissions of PFASs (described in Section 3.2). The categories consisted of fire training sites, unspecific industries, STPs, landfill/ waste disposal sites, skiing and urban areas. Tables 2 and 3 present the PFAS concentrations in the samples affected by each emission source.

Table 2. *Number of detections (n), average, standard deviation (SD), median, minimum and maximum concentrations of $\sum_{26}$ PFASs in the surface water samples categorized by their emission source.*[a]

Sources	*n*	Average (ng L^{-1})	SD (ng L^{-1})	Median (ng L^{-1})	Min. (ng L^{-1})	Max. (ng L^{-1})
Fire training area	142	201	1200	7.9	nd	12900
Unspecific industrial area	45	13	29	3.5	0.20	173
STP	14	9.4	13	2.7	nd	36
Landfill/ waste disposal	20	64	170	3.6	0.30	757
Skiing area	6	13	22	2.2	0.10	57
Urban area	8	1.0	0.7	0.90	0.10	8.0

[a] nd = not detected.

Table 3. *Number of detections (n), average, standard deviation (SD), median, minimum and maximum concentrations of ∑26 PFASs in the groundwater samples categorized by their emission source.*[a]

Sources	*n*	Average (ng L^{-1})	SD (ng L^{-1})	Median (ng L^{-1})	Min. (ng L^{-1})	Max. (ng L^{-1})
Fire training area	41	184	1000	2.7	nd	6420
Unspecific industrial area	61	5.7	28	0.30	nd	214
Landfill/ waste disposal	4	13	24	2.0	nd	49
Skiing area	3	0.20	0.20	0.20	nd	0.40
Urban area	16	3.1	5.5	0.80	nd	22

[a] nd = not detected.

Both the surface- and groundwater influenced by fire training sites had the highest average, median and maximum concentrations of $\sum_{26}$ PFASs. This result is in agreement with the results from other studies i.e. use of AFFFs causes high emissions of PFASs to aquatic environments. Previous studies have detected PFAS concentrations of thousands of ng L^{-1} in water impacted by fire training sites (Ahrens *et al.*, 2015; Moody *et al.*, 2002) which were the levels of some of the samples in this study (Table 2 and 3). Many of the samples that were presumed to be affected by PFAS-containing firefighting foams were however found to have low concentrations. The median concentration was 7.9 ng L^{-1} in surface water and 2.7 ng L^{-1} in groundwater (Table 2 and 3).

As mentioned earlier in the thesis, the concentration of PFASs is believed to be decreasing with increasing distance to the source, due to dilution and partitioning (Ahrens *et al.*, 2015). The samples were collected at different distances to the sources. However, no information about these distances were available. The wide range of concentrations in the samples affected by fire training sites could be a result of varying spatial distribution of PFASs from the point source.

Groundwater and surface water impacted by landfills and waste disposal areas were the second most polluted group of samples. Other studies have shown that degradation of PFAS-containing waste has led to elevated PFAS concentrations in surrounding environments (Eschauzier *et al.*, 2013; Bossi *et al.*, 2008). The risk for humans of being exposed to high amounts of PFASs from leachate has been mentioned to be relatively small since landfill sites are usually not located close to drinking water production (Busch *et al.*, 2010). However, the concentrations presented in Table 2 and 3 shows that emissions from landfills and waste disposal areas can cause high PFAS concentrations in both surface- and groundwater. It is therefore important to prevent leachate from being released to surrounding environments, as mentioned by Busch *et al.* (2010). In contrast to Bossi *et al.* (2008), the results from this study show higher PFAS concentrations at sites influenced by landfills compared to STPs (Bossi *et al.,* 2008).

Also industrial activity seems to have caused relatively high PFAS emissions to surface- and groundwater. The industrial impact is a result of PFAS-containing products and processes used in e.g. metal plating industries and textile industries (Moller *et al.*, 2010; Prevedouros *et al.*, 2006). As mentioned in Section 4.2.1 the inflow of industrial waste water to a STP have a large impact on the STP effluent, which later affects the PFASs concentrations in surrounding surface- and groundwaters (Bossi *et al.*, 2008). The surface water impacted by STPs in this study had relatively low PFAS concentrations compared to the other sources, which might be an indication that the STPs close to the sampled sites had low influence of industrial waste water.

Urban activity was the source causing the lowest PFAS concentrations in surface water. Included in the urban activity could be the use of products containing PFASs, such as waxes, paints and clothes which can lead to release of PFASs (Zushi & Masunaga, 2009). The sites categorized into urban areas in this study have a relatively low population density. PFAS concentration in urban runoff is site specific and is a reflection of factors such as population density and industrial activities in the catchment area (Ahrens, 2011; Zushi & Masunaga, 2009). Skiing was the activity causing lowest amount of emissions to groundwater. Mostly long-chained PFASs are detected in ski waxes (Plassmann & Berger, 2013). These have higher potential to partition to particles than to water (Higgins & Luthy, 2006), which could explain the low concentrations in groundwater.

The composition of PFASs varied between groundwater, surface water and emission sources (Figure 5). Independent of emission source, the surface water was dominated by PFCAs (54%-89%). In contrast the groundwater was dominated by PFSAs (0.0%-49%) and PFAS precursors (9.3%-75%). The results show that PFHxS (0%-37%) and FOSA (0.1%-75%) are two common PFASs in groundwater. In surface water PFHxA (15%-25%), PFHpA (12%-18%), PFOA (11%-25%), and PFNA (8.6%-26%) dominated. Those compounds seem to be more likely to be found in surface water than in groundwater.

Groundwater samples close to fire training sites, industrial sites, landfill/waste disposal areas and urban areas were all dominated by PFHxS (18-37%). The other main compounds in the profile from fire training sites were FOSA (13%) and 6:2 FTSA (10%). Groundwater affected by industrial areas and urban areas had relatively similar composition profiles with FOSA (23% and 19%, respectively) as the second highest fraction after PFHxS (18% and 20%, respectively). Samples affected by skiing areas were separated from the other categories by the fact that it did not contain any PFSAs and contained a very high fraction of FOSA (75%). The low number of groundwater samples from skiing areas (n=3) makes it very uncertain to draw any conclusions about this category of samples. Samples impacted by landfill/waste disposal areas had the only groundwater profile that did not contain any FOSA. It was also the category with the highest fraction of PFOA (18%). The analysis in Section 4.2.2 found PFOA to be dominating in landfill leachate (Figure 2). Although the groundwater samples studied in Figure 5 were not affected by the landfill sites studied in Section 4.2.2, the similar results indicate that PFOA can be released from landfills to groundwater.

In surface water PFOS (19%) and PFHxA (15%) were dominating in the samples impacted by fire training (Figure 5). In samples affected by industrial areas, landfill/waste disposal areas and skiing areas PFOA (22-25%) was the dominating compound followed by PFHxA (17-22%). Both PFOA and PFHxA were found in high fractions in the landfill leachate (Figure 2, Section 4.2.2) indicating that these are PFASs released from landfills to surface water. Surface water affected by STPs was dominated by PFHxA (25%) and PFHpA (15%). PFHxA was found in relatively high fractions in the STP effluent (Figure 2, Section 4.2.2), but were mostly dominated by PFOA and 6:2 FTSA. The surface water samples in Figure 5 were not affected by the same STPs studied in Section 4.2.2, and differences can therefore be a result of site specific conditions in the treatment plants. Water from urban areas contained mostly PFNA (26%), PFOA (19%) and PFHxA (19%).

Previously, PFOS was used in AFFFs and the results in Figure 5 suggest that traces of this are seen in surface water close to fire training sites. After the introduction of restrictions for PFOS, 6:2 FTSA have been used as a replacement. 6:2 FTSA is not as persistent as PFOS, but is a PFAS precursor which can be degraded to PFPeA and PFHxA (Kemikalieinspektionen, 2013). The composition profiles reveal relatively high fractions of 6:2 FTSA in both surface- and groundwater close to fire training sites. Traces of 6:2 FTSA were also found in water from the categories unspecific industry, landfill/waste disposal areas and STP. This might be a result of AFFF-impact of these samples as well. The detection of both PFOS and 6:2 FTSA at fire training sites indicates traces of both old and new products. As mention earlier, this can be explained by the use/disposal of old products or transformation of PFOS precursors. It can also be due to release of old PFOS emissions that have been sorbed to particles in soil and sediment.

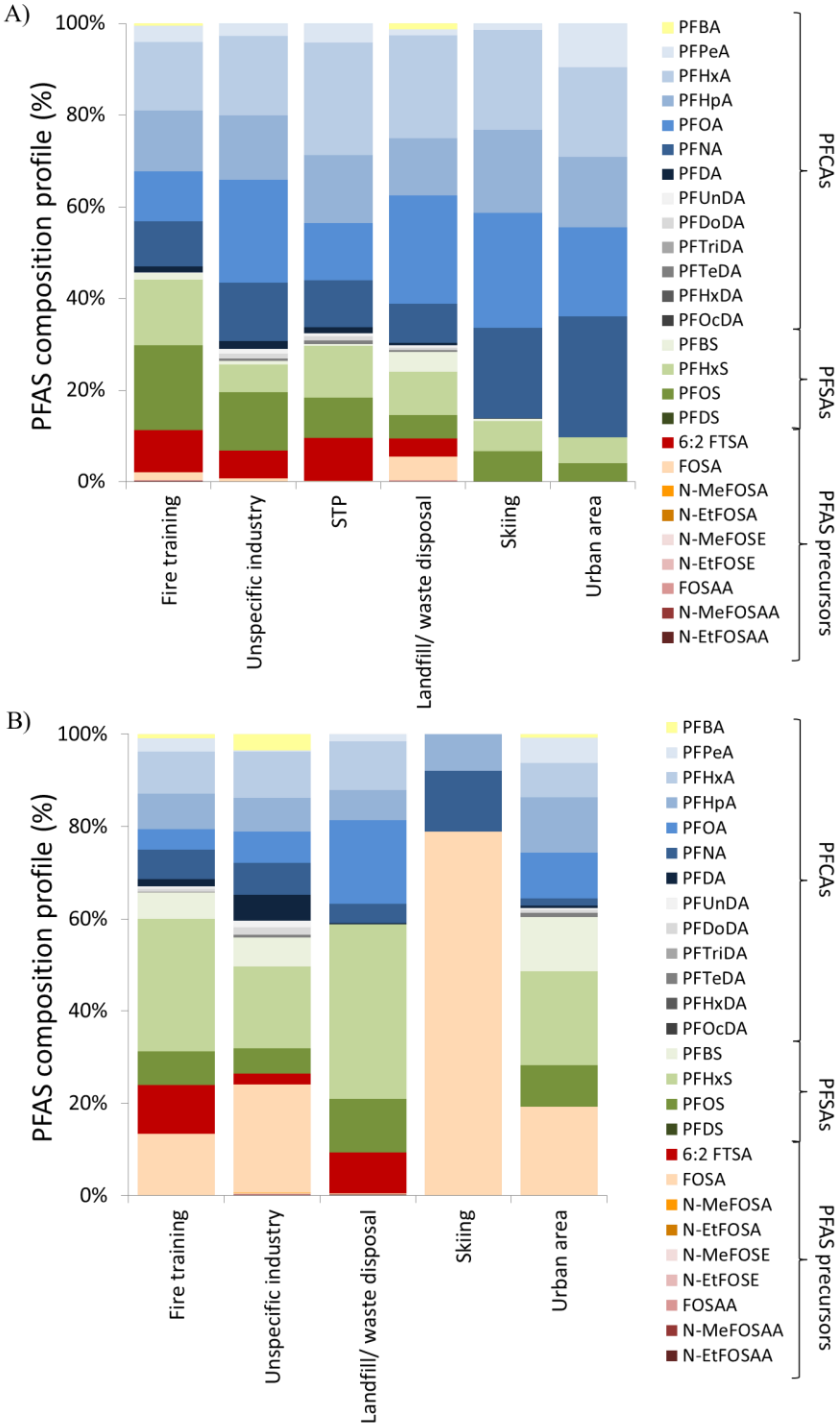


Figure 5 Average composition (%) of PFASs divided into classes after emission source in A) surface water (*n*=235). Samples from fire training sites (*n*= 142), unspecific industry (*n*=45), STP (*n*=14), landfills (*n*=20), skiing (*n*=6) and urban areas (*n*=8). B) groundwater (*n*= 125). Samples from fire training sites (*n*=41), unspecific industry (*n*=61), landfills (*n*=4), skiing (*n*=3) and urban areas (*n*=16). The figure was also published in Ahrens *et al.* (2016).

4.4.2 Multivariate statistical analysis

PCA

PCAs were performed separately for the groundwater and the surface water samples to analyze possible correlations between the emission sources and PFAS compounds (Figure 6, Figure A7 in the Appendix). Strong links between sources and different PFASs could imply the possibility of tracing the emission sources by studying the PFASs in the sample. The PCA models for surface water and groundwater had similar r^2- values (both models using 5 Principal Components, together generating r^2= 0.73 and r^2= 0.72, respectively), but no correlations between sources and specific PFASs were found in the surface water (see PCA result in section A7 in the Appendix). An explanation why the composition profiles in the surface water could not be source traced is the fact that surface water is more mobile than groundwater. Since the PFAS emissions are transported faster from the source in surface water than in groundwater the sample might not catch the actual PFAS profile from the source. An improvement would be to have time integrated sampling , e.g. to catch the peak of released PFASs after a fire training.

The loading plot of the PCA for the source categorized groundwater samples is presented in Figure 6. The model included 5 Principal Components which gave the model best describing the data, together explaining 72% of the variance (r^2=0.72). The r^2 for the Principal Components used in the evaluation of the data were 0.37 for Principal Component 1 and 0.13 for Principal Component 2. 125 samples were included for this analysis. The concentrations were log transformed to reduce the variance in the data.

The loading plot (Figure 6) shows a close correlation of the variables fire training sites and the compounds PFOS, PFHxS, PFPeA and PFBS. This indicates that these compounds are indicative for fire training sites. PFOS, PFHxS and PFPeA are compounds that are found at sites impacted by firefighting foams according to Kemikalieinspektionen (2013).

The sources landfill/waste disposal sites, skiing area and urban area are all placed close to origo and did not correlated with any specific compound. The category unspecific industrial areas is separated from the rest of the sources in the loading plot (Figure 6). However, it is not grouped with any compound and thus not correlated to any specific PFAS.

One potential explanation of the results is the heterogeneity within the source categories. All source categories contain some variation in terms of activities or products use. For example, the category unspecific industry involves a wide range of activities, from wood industries, textile industries to nurseries (plant production). This large variation of activities might explain why no specific PFAS compounds were linked to these sources. Also the categories STP, landfill/waste disposal areas and urban areas have a lot of variation among the samples that are connected to site specific characteristics. The emissions from these types of sources depend on the production, product use and disposal within the specific area.

Fire training activity can be assumed to be one of the more homogenous source categories which might explain the correlation found in the PCA (Figure 6). A recommendation for further studies is to be more specific in the source classification, e.g. separate samples from metal industry, textile industry and agricultural production. More homogeneous categories could suggest a higher potential of identifying “fingerprints” of PFASs in water that can be traced back to the sources.

Another aspect that makes it difficult to connect a water sample to a specific source is the fact that the site is often located in a catchment area with more than one PFAS source. In other words, many samples are impacted by several types of sources. Although sites closely located to more than one source were excluded from the PCA, samples included in the analysis might be impacted by other sources located further away.

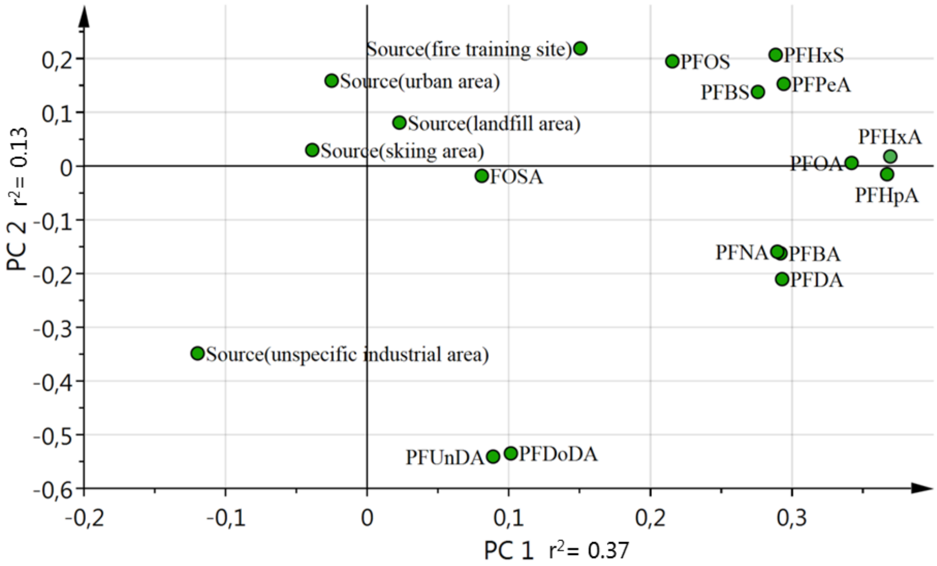


Figure 6 Principal Component Analysis (PCA) for concentrations of PFASs in groundwater samples (*n*=125) classified by emission source. The model uses 5 Principal Components and has an r^2 of 0.72. The model is based on log transformed concentrations. The figure shows the loading plot presenting how the variables are related to each other.

Cluster analysis

The tree- shaped dendrogram from the cluster analysis presents how the samples are related to each other (surface water in Figure 7 and groundwater in Figure 8). Neither the dendrogram of the surface water or groundwater shows any clustering according to the emission source categories. This is in agreement with the result from the PCA mentioned in the previous section.

Figure 7 shows that there are some outliers, samples that are separated from the rest. Samples that can be clearly distinguished from the rest are the samples have high $\sum_{26}$ PFAS concentrations with ID number 454 (12 900 ng L^{-1}), 459 (3 300 ng L^{-1}), 166 (3 950 ng L^{-1}), 224 (1 040 ng L^{-1}) and 385 (2 130ng L^{-1}). These samples are all surface water samples. In addition, all these samples were collected from sites close to fire training sites. Sample ID 110 ($\sum_{26}$ PFAS = 757 ng L^{-1}) is also separated from most of the samples in the dendrogram, and is a highly polluted sample originating from a landfill/waste disposal area.

In the dendrogram presenting the relationships between the groundwater samples, sample ID 473 is the most different sample compared to the others (Figure 8). This sample was affected by a fire training facility and measured a $\sum_{26}$ PFAS concentration of 6420 ng L^{-1} which is the most polluted groundwater sample. Following ID 473 in the dendrogram is a cluster of five samples measuring $\sum_{26}$ PFAS concentrations of 94-569 ng L^{-1}. These were also collected at sites influenced by fire training activity.

The results from the cluster analysis supports the theory presented earlier in the thesis that sites close to fire training sites are at highest risk of being polluted by PFASs.

Figure 7 Dendrogram for surface water samples with concentration of $\sum_{26}$ PFASs > 5 ng L-1 (*n*= 115). The samples are colored based on which source the PFASs origin from; black= fire training sites, blue= unspecific industry, purple= landfill/waste disposal area, green= STP, red= skiing.

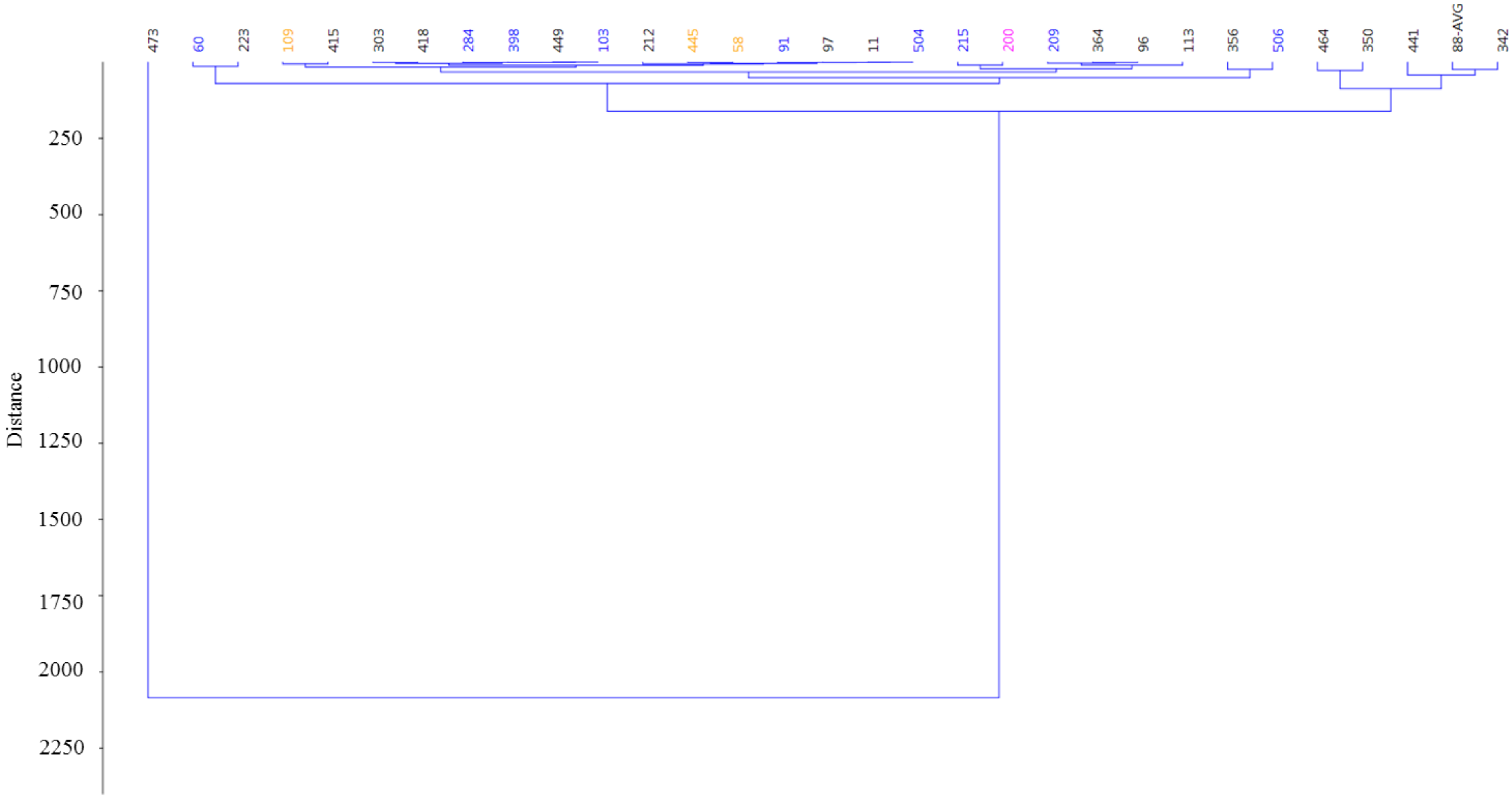


Figure 8 Dendrogram for ground water samples with concentration of $\sum_{26}$ PFASs > 5 ng L-1 (*n*= 31). The samples are colored based on which source the PFASs origin from; black= fire training sites, blue= unspecific industry, orange= urban, purple= landfill/waste disposal areas.

Pearson correlation

Correlations between the PFASs were calculated separately for the surface- and groundwater (Tables 4 and 5). In the surface water strong statistically significant correlations (0.88-0.99) were observed between the compounds PFPeA, PFHxA, PFHpA, PFOA, PFHxS and 6:2 FTSA (Table 4).

In the groundwater (Table 5) strong statistical significance correlations (0.87-1.00) were observed between PFHxA, PFHpA, PFOA, PFNA, PFDA, PFUnDA, PFDoDa and PFTeDA. These compounds are all PFCAs with a chain length of 6 to 14 carbons (Table 1). A statistically significant correlation of 0.95 was also observed between the compounds PFBS and PFHxS. PFBS and PFHxS belongs to the PFSAs and have a chain length of 4 and 6 carbons, respectively.

The correlation coefficients tell how likely it is to find two PFASs together in a sample. The PFASs with strong significant correlation in Tables 4 and 5 suggest that PFASs with similar structure are often found in the same samples. As mentioned in Section 4.4.1, 6:2 FTSA is a precursor that can degrade into PFPeA and PFHpA (Kemikalieinspektionen, 2013). The result in Table 4 supports a correlation between these compounds.

A strong correlation between two compounds indicates that they origin from the same source (Moller *et al.*, 2010). However, since no clustering of the sources was found in the results, this study cannot tell from which sources the correlated compounds origin.

Knowledge about the correlation between different PFASs can be valuable. For example when monitoring PFAS concentration in a water sample and the analyze method only allows detection of one or few of the compounds. In such case, the correlation coefficients would give information about other PFASs that are likely to be present in the sample.

Table 4. *Correlation coefficients between PFASs in surface water (n=285). Correlations > 0.8 red, between 0.5 and 0.8 yellow and below 0.5 green).*

	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFBS	PFHxS	PFOS	6:2 FTSA	FOSA
PFPeA											
PFHxA	0.99*										
PFHpA	0.97*	0.95*									
PFOA	0.93*	0.94*	0.96*								
PFNA	0.20*	0.15*	0.34*	0.21*							
PFDA	0.19*	0.12*	0.30*	0.17*	0.62*						
PFBS	0.15*	0.12	0.23*	0.27*	0.07	0.04					
PFHxS	0.98*	0.99*	0.92*	0.92*	0.11	0.06	0.09				
PFOS	0.19*	0.13*	0.26*	0.30*	0.22*	0.13*	0.68*	0.12*			
6:2 FTSA	0.93*	0.92*	0.96*	0.89*	0.40*	0.30*	0.15*	0.88*	0.22*		
FOSA	0.08	0.09	0.17*	0.25*	0.10	0.03	0.36*	0.06	0.67*	0.19*	

Statistically significant for p< 0.05*

Table 5. *Correlation coefficients between PFASs in groundwater (n=285). Correlations > 0.8 red, between 0.5 and 0.8 yellow and below 0.5 green).*

	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFUnDA	PFDoDA	PFTeDA	PFBS	PFHxS	PFOS	FOSA
PFPeA													
PFHxA	0.02												
PFHpA	0.01	1.00*											
PFOA	0.04	0.99*	0.99*										
PFNA	0.02	0.99*	0.99*	0.98*									
PFDA	0.00	1.00*	1.00*	0.98*	1.00*								
PFUnDA	0.07	0.91*	0.91*	0.90*	0.96*	0.94*							
PFDoDA	0.02	0.99*	0.99*	0.98*	1.00*	1.00*	0.96*						
PFTeDA	0.15	0.88*	0.88*	0.87*	0.93*	0.90*	0.98*	0.93*					
PFBS	0.49*	0.03	0.02	0.11	0.04	0.03	0.12	0.04	0.13				
PFHxS	0.58*	0.02	0.01	0.10	0.02	0.01	0.05	0.01	0.06	0.95*			
PFOS	0.35*	0.00	0.00	0.02	0.02	0.00	0.06	0.01	0.07	0.31*	0.40*		
FOSA	0.13	0.02	0.02	0.03	0.14	0.08	0.40*	0.14	0.40*	0.27*	0.13	0.18	

Statistically significant for p< 0.05*

4.4.3 Linear vs branched PFASs/ % branched isomers

Branching of the compounds FOSA, PFHxS and PFOS were studied in the samples from surface- and groundwater. The percentage of branched isomers of the total concentration (sum of linear and branched molecules) was calculated for each compound separately for surface water and groundwater (Figure 9).

Earlier studies have suggested that analyzing branched isomers could be used to trace a pollution back to its source (Butt *et al.*, 2010; Prevedouros *et al.*, 2006). Coherent with other results in this thesis, no large differences between the sources could be seen in the aspect of branched isomers. Since the ratio of branched isomers did not vary with emission source these results cannot be used to trace PFASs to its source.

The samples in this study showed a higher proportion of branched isomers in surface water compared to groundwater (Figure 9). Branched isomers of FOSA were only present in the surface water where it was 1.7 % of the total FOSA concentration. The percentage of branched PFHxS was 5.1% in the groundwater and 7.3% in the surface water. Of the three studied compounds PFOS had the highest proportion of branched isomers. PFOS was also the compound with the largest difference between groundwater and surface water. In the groundwater samples 8.1% of the PFOS were branched isomers while the percentage of branched PFOS in surface water was 20%. This study shows much lower percentages of branched PFOS-isomers compared to Kärrman *et al.* (2011) and Houde *et al.* (2008). In those studies the proportion of branched PFOS in water where 39-42 % and 44-57 %, respectively, of the total PFOS concentration.

The results from the isomer analysis in this study is in contradiction to the results from Kärrman *et al.* (2011), which conclude that branched isomers are more water soluble compared to their linear form. Branched isomers are therefore predicted to be found at higher extent in groundwater while the linear molecules have higher potential to partition to particles or be taken up by biota. The reason why this was not the case in these samples is not known, but the error bars in Figure 9 reveals a high uncertainty in the results. It would be interesting to analyze soil or sediment samples at the same sites and compare the fractions of branched isomers in soil with the result in Figure 9. A prediction based on the conclusions in Kärrman *et al.* (2011) would be to find a lower ratio of branched isomers associated to particles compared to water.

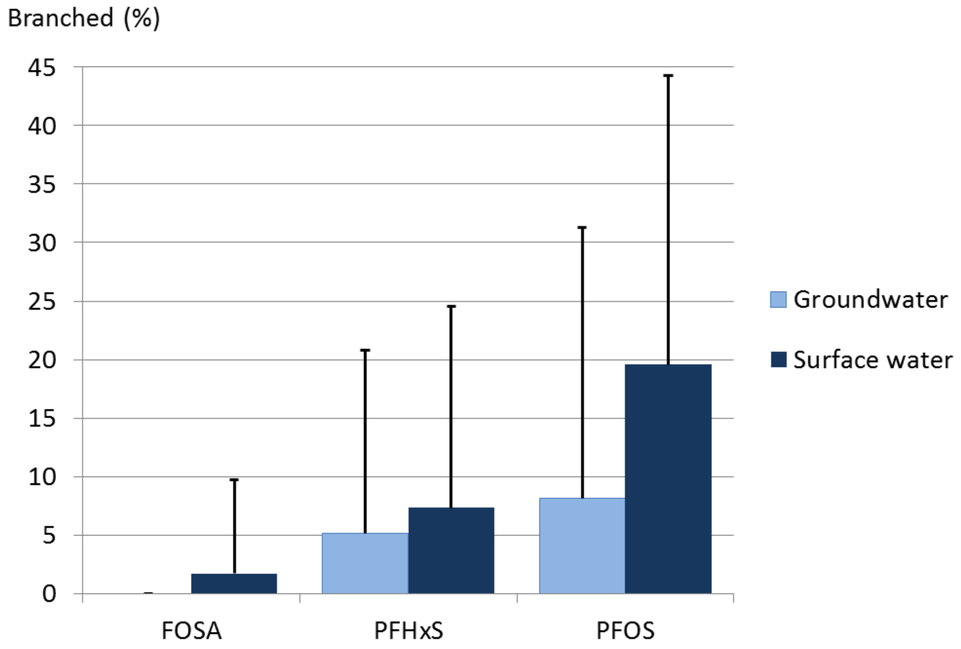


Figure 9 Average fraction (%) of branched isomers of total concentration in samples from groundwater (*n*=164) and surface water (*n*=285). Error bars show the standard deviation.

5 Conclusions

The results of this study have shown that PFASs are found groundwater, surface water, STP effluent and landfill leachate across whole Sweden. Out of these types of water, landfill leachate had the highest average PFAS concentration. Elevated PFAS concentrations in surface- and groundwater close to landfill areas indicate a risk of PFASs spreading from landfill leachate.

Fire training sites were identified as the main point source of PFASs to surface- and groundwater. The results showed that use of PFAS containing firefighting foam has led to extremely high concentrations in surface- and groundwater at some sites. Fire training sites were also identified as a potential threat to drinking water. Monitoring of drinking water sources potentially impacted by fire training sites is needed according to the findings in the thesis. Impact from agricultural areas was also pointed out as a potential threat to drinking water quality in respect of PFASs. Further research about that type of source is suggested.

The results of this study indicate that in most parts of Sweden, PFASs in drinking water is not a threat to human health. It also indicates that the current recommendations are sufficient to identify PFAS polluted drinking water sources.

PFOS and PFOA where identified at a high extent in the samples, although these compounds are highly restricted. The EU guideline limit for PFOS was exceeded in almost half of the samples. It could not be concluded from this study whether this is a result of new or old PFOS emissions. The study recommends an expansion of the current EU regulation to include PFHxA, PFOA and PFHpA.

This study could not trace sources of PFAS emissions in water. Too heterogeneous source categories and influence from multiple sources were suggested to be the reasons. For further research more specific source categorization is suggested.

Acknowledgements

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Appendix

A1. Sampling protocol

Namn på den som provtar:	
Telefonnummer:	

1. Provtagning **OBS!**	• Använd de medskickade blåa handskarna **Grundvatten:** Innan provet tas, pumpa ur så att stillastående vatten försvinner ur systemet **Ytvatten:** Ta provet ca 10 cm under vattenytan • Innan provtagning: Skölj flaskan 3 gånger med vattnet som ska provtas. Fyll upp till hälften, skaka om och skölj mellan varje sköljning. • Fyll sedan flaskan helt och skruva åt korken relativt hårt • På några av era provtagningsplatser ska flaskan märkt med FB (står för fältblank) bara öppnas och sedan stängas, men INTE fyllas med vatten och inte sköljas. • Fyll i provtagningsprotokollet, en rad för varje prov (se baksidan)

2. Förvaring	• Placera provet mörkt i kylskåp (4 °C) till dess att det ska sändas iväg

3. Returfrakt	• Returnera fyllda flaskor så snart som möjligt, helst inom 1-2 veckor från provtagningen. Använd returetiketten och skicka till: **Lutz Ahrens** **Vatten och Miljö, SLU** **Gerda Nilssons väg 5** **756 51 Uppsala**

Provtagningsprotokoll

Koordinatsystem (markera med ett kryss) (anges ej för vattentäkter):
RT90: exempel: 6636530, 1603651 ☐
SWEREF99 TM: exempel: 6636041, 648724 ☐

Flaskans ID-nummer	**Ytvatten eller grundvatten?**	**Stationsnamn**	**Datum**	**Latitud/N**	**Longitud/E**	**Vattentäkts-ID/Brunns-ID/vattenförekomst-ID**	**Vem bekostar?**	**Beskriv lokalen / Andra noteringar**	**Vattentäkt**
	Ytvatten ☐ Grundvatten ☐ **Djup (m)**: ☐ Annat **specificera**: ☐						Naturvårdsverket ☐ Länssyrelsen ☐		Ja ☐ Nej ☐
	Ytvatten ☐ Grundvatten ☐ **Djup (m)**: ☐ Annat **specificera**: ☐						Naturvårdsverket ☐ Länssyrelsen ☐		Ja ☐ Nej ☐

A2. Sampling site information

Table A2. *Sampling site information. Sample ID, county, coordinate, type of water, drinking water source and sampling depth.*

ID	**County**	**Latitude**	**Longitude**	**Type of water**	**Drinking water source**	**Sampling depth (m)**
1-1	Gotland	NA	NA	groundwater	yes	NA
1-2	Gotland	NA	NA	groundwater	yes	NA
1-3	Gotland	NA	NA	groundwater	yes	NA
2	Gotland	NA	NA	groundwater	yes	NA
3	Gotland	NA	NA	surface water	yes	NA
4	Gotland	NA	NA	groundwater	yes	NA
5	Gotland	NA	NA	groundwater	yes	NA
6	Gotland	NA	NA	groundwater	yes	NA
7	Gotland	NA	NA	surface water	yes	NA
8	Gotland	NA	NA	surface water	yes	NA
9	Gotland	NA	NA	groundwater	yes	NA
10	Gotland	NA	NA	groundwater	yes	NA
11	Gotland	NA	NA	groundwater	yes	NA
12	Gotland	NA	NA	groundwater	yes	NA
13	Gotland	NA	NA	groundwater	yes	NA
14	Gotland	NA	NA	groundwater	yes	NA
15	Gotland	NA	NA	groundwater	yes	NA
16	Gotland	NA	NA	groundwater	yes	NA
17	Gotland	NA	NA	groundwater	yes	NA
18	Gotland	NA	NA	groundwater	yes	NA
20	Gotland	698834	6397655	surface water	no	NA
21	Gotland	698598	6396727	surface water	no	NA
22	Gotland	NA	NA	groundwater	yes	NA
23	Gotland	NA	NA	groundwater	yes	NA
24	Gotland	NA	NA	groundwater	yes	NA

ID	County	Latitude	Longitude	Type of water	Drinking water source	Sampling depth (m)
25	Gotland	NA	NA	groundwater	yes	NA
26	Gotland	NA	NA	groundwater	yes	NA
27	Gotland	NA	NA	surface water	yes	NA
28	Gotland	NA	NA	groundwater	yes	NA
29	Gotland	NA	NA	groundwater	yes	NA
30	Gotland	NA	NA	groundwater	yes	NA
31-1	Dalarna	6664694	567468	surface water	no	0.01
31-2	Dalarna	6664694	567468	surface water	no	0.01
31-3	Dalarna	6664694	567468	surface water	no	0.01
32	Dalarna	6665522	568930	surface water	no	0.01
33	Dalarna	6720974	535886	surface water	no	0.01
34	Dalarna	6716685	536316	surface water	no	0.01
35	Dalarna	6732942	500829	surface water	no	0.01
36	Dalarna	6758174	475187	surface water	no	0.01
37	Dalarna	6775652	408256	surface water	no	0.01
38	Dalarna	6674437	572707	surface water	no	0.01
39-1	Gävleborg	6798795	571295	surface water	no	NA
39-2	Gävleborg	6798795	571295	surface water	no	NA
39-3	Gävleborg	6798795	571295	surface water	no	NA
40	Gävleborg	6801015	551511	surface water	no	NA
41	Gävleborg	6800881	576092	surface water	no	NA
42	Gävleborg	NA	NA	groundwater	yes	NA
43	Gävleborg	NA	NA	groundwater	yes	NA
44	Gävleborg	6719768	588676	groundwater	no	NA
45	Gävleborg	6719927	598940	surface water	no	NA
46	Gävleborg	6744352	620335	groundwater	no	NA
47	Gävleborg	NA	NA	groundwater	yes	NA

ID	County	Latitude	Longitude	Type of water	Drinking water source	Sampling depth (m)
48	Gävleborg	NA	NA	groundwater	yes	NA
49	Gävleborg	6857155	557042	surface water	no	NA
50	Gävleborg	NA	NA	groundwater	yes	NA
51	Gävleborg	NA	NA	surface water	yes	NA
52	Gävleborg	NA	NA	groundwater	yes	NA
53	Gävleborg	NA	NA	groundwater	yes	NA
54	Gävleborg	NA	NA	groundwater	yes	NA
55	Gävleborg	6797260	611909	surface water	no	NA
56	Gävleborg	6756186	610251	surface water	no	NA
57	Gävleborg	6727694	613504	surface water	no	NA
58	Gävleborg	NA	NA	groundwater	yes	NA
59	Gävleborg	6739516	619413	groundwater	no	NA
60	Gävleborg	NA	NA	groundwater	yes	NA
61	Gävleborg	NA	NA	groundwater	yes	NA
62	Gävleborg	6722088	607862	surface water	no	NA
63	Gävleborg	6713400	614728	surface water	no	NA
64	Gävleborg	6708612	579890	surface water	no	NA
65	Gävleborg	6710745	573452	surface water	no	NA
66	Gävleborg	6751782	593770	surface water	no	NA
67	Gävleborg	NA	NA	groundwater	yes	NA
68	Gävleborg	NA	NA	groundwater	yes	NA
69	Gävleborg	NA	NA	groundwater	yes	NA
70	Gävleborg	NA	NA	groundwater	yes	NA
71	Gävleborg	NA	NA	groundwater	yes	NA
72	Gävleborg	6843791	608200	surface water	no	NA
73	Gävleborg	6844977	607245	leachate	no	NA
74	Gävleborg	6839361	618566	surface water	no	NA

ID	County	Latitude	Longitude	Type of water	Drinking water source	Sampling depth (m)
75	Gävleborg	6838821	607396	surface water	no	NA
76	Gävleborg	6835746	610083	surface water	no	NA
77	Gävleborg	6835675	610521	surface water	no	NA
78	Reference lake	6633396	530845	surface water	no	0.5
79	Reference lake	6835462	584003	surface water	no	0.5
80	Reference lake	6282493	381448	surface water	no	0.5
81	Reference lake	6524272	6528886	surface water	no	0.5
82	Reference lake	6423441	564895	surface water	no	0.5
83	Reference lake	7580298	649261	surface water	no	0.5
84	Reference lake	6555227	634745	surface water	no	0.5
85	Reference lake	6272735	544544	surface water	no	0.5
86	Reference lake	6327724	471494	surface water	no	0.5
87	Reference lake	7085765	660807	surface water	no	0.5
88-1	Halland	NA	NA	groundwater	yes	50
88-2	Halland	NA	NA	groundwater	yes	50
88-3	Halland	NA	NA	groundwater	yes	50
89	Halland	NA	NA	groundwater	yes	18
90	Halland	NA	NA	surface water	yes	NA
91	Halland	NA	NA	groundwater	yes	33
92	Halland	NA	NA	surface water	yes	NA
93	Halland	NA	NA	groundwater	yes	36
94	Halland	NA	NA	groundwater	yes	13
95	Halland	NA	NA	groundwater	yes	13
96	Halland	NA	NA	groundwater	yes	90
97	Halland	NA	NA	groundwater	yes	NA
98	Halland	6315894	392368	surface water	no	NA
99	Halland	6286362	379913	surface water	no	NA

ID	County	Latitude	Longitude	Type of water	Drinking water source	Sampling depth (m)
100	Halland	NA	NA	groundwater	yes	NA
101	Halland	NA	NA	groundwater	yes	NA
102	Halland	NA	NA	surface water	yes	NA
103	Halland	NA	NA	groundwater	yes	NA
104	Halland	NA	NA	groundwater	yes	NA
105	Halland	NA	NA	groundwater	yes	NA
106	Halland	NA	NA	groundwater	yes	NA
107	Halland	6285178	378498	surface water	no	NA
108	Halland	6335520	336000	surface water	no	NA
109	Halland	NA	NA	groundwater	yes	NA
110	Halland	6278497	373246	surface water	no	NA
111-1	Västmanland	6608379	588370	surface water	no	0.2
111-2	Västmanland	6608379	588370	surface water	no	0.2
111-3	Västmanland	6608379	588370	surface water	no	0.2
112	Västmanland	6599275	571857	surface water	no	0.2
113	Västmanland	6607963	592286	groundwater	no	0.2
114	Västmanland	6642614	590931	surface water	no	0.2
115	Västmanland	6642654	591714	surface water	no	0.2
116	Västmanland	6643765	596296	leachate	no	0.2
117	Västmanland	NA	NA	groundwater	yes	NA
118	Västmanland	NA	NA	groundwater	yes	NA
119	Västmanland	NA	NA	groundwater	yes	NA
120	Västmanland	NA	NA	groundwater	yes	NA
121	Västmanland	NA	NA	groundwater	yes	NA
122-1	Östergötland	6467216	506972	surface water	no	0.4
122-2	Östergötland	6467216	506972	surface water	no	0.4
122-3	Östergötland	6467216	506972	surface water	no	0.4

ID	County	Latitude	Longitude	Type of water	Drinking water source	Sampling depth (m)
123	Östergötland	NA	NA	groundwater	yes	0.4
124	Östergötland	NA	NA	surface water	yes	0.4
125	Östergötland	NA	NA	groundwater	yes	0.4
126	Östergötland	NA	NA	surface water	yes	0.4
127	Östergötland	NA	NA	groundwater	yes	0.4
128	Östergötland	6497956	572374	surface water	no	0.4
129	Östergötland	NA	NA	groundwater	yes	0.4
130	Östergötland	6473359	528443	surface water	no	0.4
131	Östergötland	NA	NA	surface water	yes	0.4
132	Östergötland	6471858	536038	surface water	no	0.4
133	Östergötland	6495470	571458	surface water	no	0.4
134	Östergötland	6476551	536597	surface water	no	0.4
135-1	Örebro	6570646	514753	ditch, outlet STP	no	0.1
135-2	Örebro	6570646	514753	ditch, outlet STP	no	0.1
135-3	Örebro	6570646	514753	ditch, outlet STP	no	0.1
136	Örebro	6335520	336007	surface water	no	0.1
137	Örebro	6573917	466748	surface water	no	0.1
138	Örebro	6579573	471913	surface water	no	0.1
139	Örebro	NA	NA	groundwater	yes	NA
140	Örebro	6574333	472503	STP effluent	no	NA
141	Örebro	6553511	508086	ditch (surface water)	no	NA
142	Örebro	6607027	510622	surface water	no	0.1
143	Örebro	6563786	512552	surface water	no	0.1
144	Örebro	6571286	513152	surface water	no	0.1
145	Örebro	6570401	513803	surface water	no	0.1
146	Örebro	6554427	509186	ditch, outlet STP	no	0.1
147	Örebro	6555993	512152	ditch (surface water)	no	0.1

ID	County	Latitude	Longitude	Type of water	Drinking water source	Sampling depth (m)
148	Örebro	6569247	507678	surface water	no	0.1
150	Örebro	6570522	513268	surface water	no	0.1
151	Örebro	6552085	505234	ditch (surface water)	no	0.1
152	Örebro	6551769	505458	ditch (surface water)	no	0.1
153	Örebro	6540959	503381	surface water	no	0.1
154	Örebro	NA	NA	groundwater	yes	NA
155	Örebro	6563657	502446	surface water	no	0.1
156	Örebro	6563022	503483	surface water	no	0.1
157	Jämtland	NA	NA	groundwater	yes	NA
158	Jämtland	NA	NA	groundwater	yes	NA
159	Jämtland	NA	NA	groundwater	yes	NA
160	Jämtland	NA	NA	groundwater	yes	NA
161	Jämtland	6976369	512296	surface water	no	0.1
162	Jämtland	NA	NA	groundwater	yes	NA
163	Jämtland	6948444	367681	surface water	no	0.1
164	Jämtland	6999935	531180	surface water	no	0.1
165	Jämtland	NA	NA	groundwater	yes	NA
166	Jämtland	7006884	473914	surface water	no	0.1
167	Jämtland	NA	NA	groundwater	yes	NA
168-1	Jönköping	6357577	424407	surface water	no	0.5
168-2	Jönköping	6357577	424407	surface water	no	0.5
168-3	Jönköping	6357577	424407	surface water	no	0.5
169	Jönköping	NA	NA	surface water	yes	NA
170	Jönköping	NA	NA	surface water	yes	NA
171	Jönköping	6363838	506462	STP effluent	no	NA
172	Jönköping	6363561	506959	STP effluent	no	NA
173	Jönköping	6362796	499049	other, leachate	no	NA

ID	County	Latitude	Longitude	Type of water	Drinking water source	Sampling depth (m)
174	Jönköping	NA	NA	groundwater	yes	11
175	Jönköping	NA	NA	groundwater	yes	25
176	Jönköping	6430571	499195	surface water	no	0.5
177	Jönköping	6390159	495108	surface water	no	0.5
178	Jönköping	6365998	510136	surface water	no	NA
179	Jönköping	6365922	506299	surface water	no	0.5
180	Jönköping	6343368	508904	surface water	no	0.5
181	Jönköping	6364161	506030	surface water	no	0.5
182	Jönköping	6389294	498733	surface water	no	0.5
183	Jönköping	6361922	479419	surface water	no	0.5
184	Jönköping	6338624	443315	surface water	no	0.5
185	Jönköping	6360483	424396	surface water	no	0.5
186	Jönköping	6346442	415215	surface water	no	0.5
187	Jönköping	6400603	444423	surface water	no	0.5
188	Jönköping	6360889	421444	other, leachate	no	NA
189	Jönköping	6350027	414255	other, leachate	no	NA
190	Jönköping	6349303	411325	surface water	no	0.5
191	Jönköping	6353742	431506	surface water	no	0.5
192	Jönköping	6348772	417138	surface water	no	0.5
193	Jönköping	6360562	420967	surface water	no	0.5
194-1	Kalmar	6334274	587662	surface water	no	0.1
194-2	Kalmar	6334274	587662	surface water	no	0.1
194-3	Kalmar	6334274	587662	surface water	no	0.1
195	Kalmar	NA	NA	surface water	yes	NA
196	Kalmar	NA	NA	groundwater	yes	NA
197	Kalmar	NA	NA	groundwater	yes	NA
198	Kalmar	NA	NA	groundwater	yes	NA

ID	County	Latitude	Longitude	Type of water	Drinking water source	Sampling depth (m)
199	Kalmar	NA	NA	groundwater	yes	NA
200	Kalmar	NA	NA	groundwater	yes	NA
201	Kalmar	6345205	587274	surface water	no	0.1
202	Kalmar	6275331	534074	surface water	no	0.1
203	Kalmar	6290494	554843	surface water	no	0.1
204	Kalmar	6252242	562740	surface water	no	0.1
205	Kalmar	6376141	551648	surface water	no	0.1
206	Kalmar	6335764	588520	surface water	no	0.1
207	Kalmar	6334976	588387	surface water	no	0.1
208	Kalmar	6226200	490631	surface water	no	NA
209	Kalmar	NA	NA	groundwater	yes	NA
210	Blekinge	6226200	490631	surface water	no	0.2
211	Blekinge	NA	NA	groundwater	yes	NA
212	Blekinge	NA	NA	groundwater	yes	NA
213	Blekinge	NA	NA	groundwater	yes	NA
214	Blekinge	NA	NA	groundwater	yes	NA
215	Blekinge	NA	NA	groundwater	yes	NA
216	Blekinge	NA	NA	surface water	yes	0.2
217	Blekinge	6236953	470311	surface water	no	0.2
218	Blekinge	6236649	470823	surface water	no	0.2
219	Blekinge	6212155	475452	surface water	no	0.2
220	Blekinge	6230484	517978	surface water	no	0.2
222	Norrbotten	NA	NA	groundwater	yes	NA
223	Norrbotten	7279456	698266	groundwater	no	NA
224	Norrbotten	7314962	806272	recipient water (surface water)	no	NA
225	Norrbotten	7317959	802055	surface water	no	NA
226	Norrbotten	7290976	836720	recipient water (surface water)	no	NA

ID	County	Latitude	Longitude	Type of water	Drinking water source	Sampling depth (m)
227	Norrbotten	7290435	835402	recipient water (surface water)	no	NA
228	Norrbotten	7461772	749192	recipient water (surface water)	no	NA
229	Norrbotten	7459598	749460	recipient water (surface water)	no	NA
230	Norrbotten	7388333	883147	recipient water (surface water)	no	NA
234	Norrbotten	NA	NA	surface water	yes	NA
236	Norrbotten	NA	NA	groundwater	yes	NA
237	Norrbotten	7265408	796201	leachate	no	NA
238	Norrbotten	7265561	796158	recipient water (surface water)	no	NA
239	Norrbotten	7316985	803511	recipient water (surface water)	no	NA
240	Norrbotten	7543386	755076	groundwater	no	NA
241	Norrbotten	7536864	722426	leachate	no	NA
242	Norrbotten	7536790	722487	leachate	no	NA
243	Norrbotten	7459891	748294	STP effluent	no	NA
244	Norrbotten	NA	NA	groundwater	yes	NA
245	Norrbotten	NA	NA	groundwater	yes	NA
246	Norrbotten	7289444	832681	STP effluent	no	NA
247	Norrbotten	7395118	715112	STP effluent	no	NA
248	Norrbotten	NA	NA	surface water	yes	NA
249	Norrbotten	NA	NA	groundwater	yes	NA
250	Norrbotten	NA	NA	surface water	yes	NA
251	Norrbotten	NA	NA	groundwater	yes	NA
252	Norrbotten	7327150	870945	recipient water (surface water)	no	NA
253	Norrbotten	NA	NA	groundwater	yes	NA
254	Norrbotten	7319452	807302	leachate	no	NA
255	Norrbotten	7255595	801144	STP effluent	no	NA
256	Norrbotten	7300375	819960	recipient water (surface water)	no	NA
257	Norrbotten	7300258	819960	leachate	no	NA

ID	County	Latitude	Longitude	Type of water	Drinking water source	Sampling depth (m)
258	Stockholm	6541218	664404	surface water	no	0.1
259	Stockholm	6565340	659946	surface water	no	0.1
260	Stockholm	6567962	683162	surface water	no	0.1
261	Stockholm	6578338	669663	surface water	no	0.1
262	Stockholm	6582635	663350	surface water	no	0.1
263	Stockholm	6583729	654919	surface water	no	0.1
264	Stockholm	6597482	670739	surface water	no	0.1
265	Stockholm	6599706	663465	surface water	no	0.1
266	Stockholm	6606669	664071	surface water	no	0.1
267	Stockholm	6569118	672765	surface water	no	0.1
268	Stockholm	6563617	650966	surface water	no	0.1
269	Stockholm	6544522	661329	surface water	no	0.1
270	Stockholm	6552105	649461	surface water	no	0.1
271	Stockholm	6568699	663237	surface water	no	0.1
272	Stockholm	6589575	660595	surface water	no	0.1
273	Stockholm	6587119	664016	surface water	no	0.1
274	Stockholm	6586214	665036	surface water	no	0.1
275	Stockholm	6598174	686459	surface water	no	0.1
276	Stockholm	6630225	708169	surface water	no	0.1
277	Stockholm	6626759	690029	surface water	no	0.1
278	Stockholm	6662428	699956	surface water	no	0.1
279	Stockholm	6566360	664000	surface water	no	0.1
280	Stockholm	NA	NA	surface water	yes	0.1
281	Stockholm	6546310	661795	groundwater	no	0.1
283	Stockholm	NA	NA	groundwater	yes	NA
284	Stockholm	NA	NA	groundwater	yes	NA
285	Södermanland	6542007	567935	surface water	no	0.1

ID	County	Latitude	Longitude	Type of water	Drinking water source	Sampling depth (m)
286	Södermanland	6543014	568689	surface water	no	0.1
287	Södermanland	6541682	568819	surface water	no	0.1
288	Södermanland	6540305	570561	storm water, surface water	no	0.1
289	Södermanland	6543825	542466	surface water	no	0.1
290	Södermanland	6546275	551573	surface water	no	0.1
291	Södermanland	6539359	566917	surface water	no	0.1
292	Södermanland	6535211	574615	surface water	no	0.1
293	Södermanland	6520504	588555	surface water	no	0.1
294	Södermanland	6537791	570981	STP effluent	no	0.1
295	Södermanland	6546776	591393	surface water	no	0.1
296	Södermanland	6507923	616486	surface water	no	0.05
297	Södermanland	6508158	618662	surface water, coast	no	0.1
298	Södermanland	6516730	614502	surface water	no	0.1
299	Södermanland	6512955	617492	surface water, coast	no	0.1
300	Södermanland	NA	NA	groundwater	yes	NA
301	Södermanland	6581665	615978	STP effluent	no	0.1
302	Södermanland	7024408	690108	STP effluent	no	0.1
303	Södermanland	NA	NA	groundwater	yes	NA
305	Västernorrland	7024408	690108	surface water	no	0.1
306	Västernorrland	7007019	613072	surface water	no	0.1
307	Västernorrland	7036616	701226	surface water	no	0.1
308	Västernorrland	6975742	647476	surface water	no	0.1
309	Västernorrland	7010707	610664	surface water	no	0.1
310	Västernorrland	6934382	625047	surface water	no	0.1
311	Västernorrland	7007499	615114	surface water	no	0.1
312	Västernorrland	6614548	365111	surface water	no	0.5
313	Västernorrland	6984362	638437	surface water	no	0.1

ID	County	Latitude	Longitude	Type of water	Drinking water source	Sampling depth (m)
314	Västernorrland	7021434	683887	surface water	no	0.1
315	Västernorrland	NA	NA	groundwater	yes	NA
316	Västernorrland	NA	NA	groundwater	yes	NA
318	Kronoberg	6298690	435110	surface water	no	0.1
319	Kronoberg	NA	NA	groundwater	yes	NA
320	Kronoberg	6305894	484308	surface water	no	0.1
321	Kronoberg	NA	NA	groundwater	yes	NA
322	Västra Götaland	NA	NA	groundwater	yes	12
323	Västerbotten	7272092	616648	surface water	no	0.05
324	Västerbotten	NA	NA	groundwater	yes	3
326	Västerbotten	7179046	792958	surface water	no	0.1
327	Värmland	6619953	452620	surface water	no	0.5
328	Värmland	6578299	410765	surface water	no	0.5
329	Värmland	6584896	414108	surface water	no	0.5
330	Värmland	6656364	426471	surface water	no	0.5
331	Värmland	6640793	347692	groundwater	no	0.1
332	Värmland	6979720	643156	surface water	no	0.1
333	Värmland	NA	NA	groundwater	yes	12
334	Värmland	6612171	427399	surface water	no	0.5
335	Värmland	NA	NA	groundwater	yes	82
336	Värmland	6551797	379567	surface water	no	0.5
337	Skåne	6193250	366700	surface water	no	0.1
338	Skåne	6194357	364977	surface water	no	0.1
339	Skåne	6239317	367582	surface water	no	0.1
340	Skåne	6239032	367287	surface water	no	0.1
341	Skåne	6237749	366769	surface water	no	0.1
342	Skåne	NA	NA	groundwater	yes	6

ID	County	Latitude	Longitude	Type of water	Drinking water source	Sampling depth (m)
343	Skåne	6218344	386300	surface water	no	0.1
344	Skåne	6216322	390389	surface water	no	0.1
345	Skåne	6217501	388842	surface water	no	0.1
346	Skåne	6216106	388622	surface water	no	0.1
347	Skåne	6217956	386764	surface water	no	0.1
348	Skåne	6215982	386883	surface water	no	0.1
349	Skåne	NA	NA	groundwater	yes	120
350	Skåne	NA	NA	groundwater	yes	32
351	Skåne	6193250	366700	surface water	no	0.1
352	Skåne	6194357	364977	surface water	no	0.1
353	Skåne	6239317	367582	surface water	no	0.1
354	Skåne	6239032	367287	surface water	no	0.1
355	Skåne	6237749	366769	surface water	no	0.1
356	Skåne	NA	NA	groundwater	yes	6
357	Skåne	6218344	386300	surface water	no	0.1
358	Skåne	6216322	390389	surface water	no	0.1
359	Skåne	6217501	388842	surface water	no	0.1
360	Skåne	6216106	388622	surface water	no	0.1
361	Skåne	6217956	386763	surface water	no	0.1
362	Skåne	6215982	386883	surface water	no	0.1
363	Skåne	NA	NA	groundwater	yes	120
364	Skåne	NA	NA	groundwater	yes	32
365	Skåne	6240135	366323	groundwater	no	NA
366	Skåne	6217440	390250	surface water	no	0.1
367	Västra Götaland	6477547	437301	surface water	no	0.2
368	Västra Götaland	6474660	436302	surface water	no	0.2
369	Västra Götaland	6449257	417488	surface water	no	0.2

ID	County	Latitude	Longitude	Type of water	Drinking water source	Sampling depth (m)
370	Västra Götaland	6391846	350689	surface water	no	0.2
371	Västra Götaland	6389094	337879	surface water	no	0.2
372	Västra Götaland	6388683	339247	surface water	no	0.2
373	Västra Götaland	6397034	375603	surface water	no	0.2
374	Västra Götaland	6409829	313384	surface water	no	0.2
375	Västra Götaland	6396297	375345	surface water	no	0.2
376	Västra Götaland	6375037	361319	surface water	no	0.2
377	Västra Götaland	6393239	374310	surface water	no	0.2
378	Västra Götaland	6409619	314908	surface water	no	0.2
379	Västra Götaland	6392303	374234	surface water	no	0.2
380	Västra Götaland	6370742	355162	surface water	no	0.2
381	Västra Götaland	6486406	470414	surface water	no	0.2
382	Västra Götaland	6486595	470144	surface water	no	0.2
383	Västra Götaland	6481396	440289	surface water	no	0.2
384	Västra Götaland	6359755	349112	surface water	no	0.2
385	Västra Götaland	6400418	308561	Fire dam, surface water	no	0.2
386	Västra Götaland	6400550	308554	surface water	no	0.2
387	Uppsala	6650692	650398	surface water	no	0.1
388	Uppsala	6645520	604240	surface water	no	0.1
389	Uppsala	6624327	630205	surface water	no	0.1
390	Uppsala	6612554	616769	surface water	no	0.1
391	Uppsala	6610210	616253	surface water	no	0.1
392	Uppsala	6601918	642110	surface water	no	0.1
393	Uppsala	6607363	640470	surface water	no	0.05
394	Uppsala	NA	NA	groundwater	yes	NA
395	Uppsala	NA	NA	groundwater	yes	NA
396	Uppsala	NA	NA	groundwater	yes	NA

ID	County	Latitude	Longitude	Type of water	Drinking water source	Sampling depth (m)
397	Uppsala	NA	NA	groundwater	yes	NA
398	Uppsala	NA	NA	groundwater	yes	NA
399	Uppsala	NA	NA	groundwater	yes	NA
409	Södermanland	6587478	583382	surface water	no	0.1
410	Södermanland	6589114	593043	surface water	no	0.1
411	Södermanland	6581120	616466	surface water	no	0.1
412	Södermanland	6584872	613442	surface water	no	0.1
414	Södermanland	6547253	632040	surface water	no	0.1
415	Södermanland	NA	NA	groundwater	yes	NA
416	Södermanland	NA	NA	groundwater	yes	NA
418	Stockholm	NA	NA	groundwater	yes	NA
420	Uppsala	6692221	639756	surface water	no	0.1
421	Uppsala	6692241	639806	surface water	no	0.1
422	Uppsala	6685073	635229	surface water	no	0.05
423	Uppsala	6690992	633724	surface water	no	0.1
424	Uppsala	6670389	672806	surface water	no	0.05
425	Uppsala	6676479	677454	surface water	no	0.1
426	Uppsala	6685282	686299	surface water	no	0.1
427	Uppsala	6685846	687126	surface water	no	0.1
428	Uppsala	6624363	656572	surface water	no	0.1
429	Uppsala	6624268	653392	surface water	no	0.1
430	Uppsala	6622837	655470	surface water	no	0.1
431	Uppsala	6623323	656975	surface water	no	0.1
432	Uppsala	6656386	641682	surface water	no	0.1
433	Uppsala	6661242	643532	surface water	no	0.05
434	Uppsala	6644261	641627	surface water	no	0.1
435	Gävleborg	6833971	613180	surface water	no	NA

ID	County	Latitude	Longitude	Type of water	Drinking water source	Sampling depth (m)
436	Gävleborg	6843691	610995	surface water	no	NA
437	Gävleborg	6842223	603772	surface water	no	NA
438	Halland	NA	NA	groundwater	yes	NA
441	Halland	NA	NA	groundwater	yes	NA
442	Halland	NA	NA	groundwater	yes	NA
443	Halland	6280605	371791	surface water	no	NA
445	Halland	6285317	370155	groundwater	no	NA
446	Halland	6294966	376353	surface water	no	NA
447	Halland	6318444	392058	surface water	no	NA
448	Halland	6336328	334442	surface water	no	NA
449	Halland	NA	NA	groundwater	yes	5
450-1	Jämtland	NA	NA	groundwater	yes	NA
450-2	Jämtland	NA	NA	groundwater	yes	NA
450-3	Jämtland	NA	NA	groundwater	yes	NA
451	Jämtland	7070292	382033	surface water	no	0.1
452	Jämtland	6983887	554878	surface water	no	0.1
453	Jämtland	7089131	424141	surface water	no	0.1
454	Jämtland	7006643	472271	surface water	no	0.1
456	Västra Götaland	NA	NA	groundwater	yes	NA
457	Västra Götaland	NA	NA	groundwater	yes	73 m (filter 14 m)
458	Västra Götaland	NA	NA	groundwater	yes	30
459	Västra Götaland	6481074	366272	surface water	no	0.2
460	Västra Götaland	NA	NA	groundwater	yes	22.5 m (filter 7 m)
461	Västra Götaland	NA	NA	surface water	yes	0.2
462	Västra Götaland	6465616	343058	surface water	no	0.2
463	Västra Götaland	NA	NA	groundwater	yes	14 m (filter 4 m)
464	Västra Götaland	6442010	313729	groundwater	no	1.5-2

ID	County	Latitude	Longitude	Type of water	Drinking water source	Sampling depth (m)
465	Västra Götaland	6465705	342720	surface water	no	0.2
466	Västra Götaland	6406045	312842	surface water	no	0.2
467	Västra Götaland	NA	NA	groundwater	yes	22 m (filter 5 m)
468	Västra Götaland	6471566	319871	surface water	no	0.2
469	Västra Götaland	6540775	279739	surface water	no	0.2
470	Västra Götaland	6467931	343889	surface water	no	0.2
471	Västra Götaland	NA	NA	groundwater	yes	14 m (filter 3 m)
472	Västra Götaland	6541581	280145	surface water	no	0.2
473	Västra Götaland	6442010	313729	groundwater	no	1.5
474	Västra Götaland	6471527	318123	surface water	no	0.2
475	Västra Götaland	6441865	313755	surface water	no	0.2
476	Gotland	6391721	695317	STP effluent	no	NA
477	Gotland	695317	695317	surface water	no	NA
478	Dalarna	NA	NA	groundwater	yes	NA
479	Dalarna	NA	NA	groundwater	yes	NA
480	Jämtland	7007591	483856	surface water	no	0.1
481	Västernorrland	7059850	646292	surface water	no	0.05
482	Västernorrland	7005519	618803	surface water	no	0.1
483	Västernorrland	7005831	615937	surface water	no	0.1
484	Västernorrland	7008184	621549	surface water	no	0.1
485	Västernorrland	6916752	620256	surface water	no	0.1
486	Västernorrland	6992124	640417	surface water	no	0.1
487	Västernorrland	6931726	536127	surface water	no	0.1
488	Västernorrland	6927316	568581	surface water	no	0.1
489	Västernorrland	NA	NA	groundwater	yes	NA
490	Västra Götaland	NA	NA	groundwater	yes	NA
491	Västra Götaland	6481637	368066	surface water	no	0.2

ID	County	Latitude	Longitude	Type of water	Drinking water source	Sampling depth (m)
493	Västra Götaland	NA	NA	groundwater	yes	NA
494	Västra Götaland	NA	NA	groundwater	yes	NA
497	Västra Götaland	6481038	365659	surface water	no	0.2
498	Västra Götaland	NA	NA	groundwater	yes	5-15.5
499	Västra Götaland	NA	NA	groundwater	yes	15
500	Västra Götaland	NA	NA	groundwater	yes	20
501	Västra Götaland	NA	NA	groundwater	yes	23
502	Västra Götaland	NA	NA	groundwater	yes	25
503	Västra Götaland	NA	NA	groundwater	yes	27
504	Västra Götaland	NA	NA	groundwater	yes	6
505	Västra Götaland	NA	NA	groundwater	yes	14-20
506	Västra Götaland	NA	NA	groundwater	yes	7-9m
507	Västra Götaland	NA	NA	groundwater	yes	10
508	Västra Götaland	NA	NA	groundwater	yes	14
509	Västra Götaland	NA	NA	groundwater	yes	NA
510	Västra Götaland	NA	NA	groundwater	yes	11
511	Västra Götaland	NA	NA	groundwater	yes	8
512	Västernorrland	NA	NA	groundwater	yes	2

A3. MDL for the analyzed PFASs

Table A3. *PFAS concentrations in blanks (ng L^{-1}) and MDL for PFAS compounds.*[a]

	PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFUnDA	PFDoDA	PFTriDA	PFTeDA	PFHxDA	PFOcDA
MDL (ng/L)	0.25	0.030	0.093	0.053	0.40	0.084	0.19	0.16	0.19	0.050	0.050	0.050	0.25
Blanks													
LB01	nd	nd	nd	nd	nd	nd	0.17	nd	nd	nd	nd	nd	nd
LB02	nd	nd	nd	nd	nd	nd	0.11	nd	nd	nd	nd	nd	nd
LB03	nd	nd	nd	nd	nd	nd	0.02	nd	nd	nd	nd	nd	nd
LB04	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
LB05	nd	nd	nd	nd	nd	nd	0.025	nd	nd	nd	nd	nd	nd
LB06	nd	nd	0.015	nd	0.030	0.017	0.061	nd	nd	nd	nd	nd	nd
LB11	nd	nd	nd	nd	nd	nd	0.036	nd	nd	nd	nd	nd	nd
LB12	nd	nd	nd	nd	nd	0.009	0.018	nd	nd	nd	nd	nd	nd
LB13	nd	nd	0.024	0.0041	0.038	0.080	0.029	0.025	nd	nd	nd	nd	nd
LB14	nd	nd	nd	nd	nd	nd	0.014	0.0081	nd	nd	nd	nd	nd
LB15	nd	nd	nd	nd	0.031	0.084	0.16	0.25	0.30	nd	nd	nd	nd
LB16	nd	nd	nd	nd	0.11	nd	nd	nd	nd	nd	nd	nd	nd
LB17	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
LB18	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
LB19	nd	nd	nd	nd	0.10	nd	nd	nd	nd	nd	nd	nd	nd
LB22	nd	nd	nd	nd	0.071	nd	nd	nd	nd	nd	nd	nd	nd
LB23	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
LB24	nd	nd	nd	nd	0.0041	nd	nd	nd	nd	nd	nd	nd	nd
LB25	nd	nd	nd	nd	0.0049	nd	nd	nd	nd	nd	nd	nd	nd
LB26	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
LB27	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
LB29	nd	nd	0.011	nd	0.23	nd	nd	nd	nd	nd	nd	nd	nd

LB30	nd	nd	0.076	0.025	0.32	nd	nd	nd	nd	nd	nd	nd	nd
LB28	nd	nd	0.015	nd	0.12	nd	nd	nd	nd	nd	nd	nd	nd
LB32	nd	nd	0.12	0.078	0.26	0.065	0.090	nd	0.037	nd	nd	nd	nd
LB31	nd	0.049	0.036	0.017	0.40	nd	0.10	nd	nd	nd	nd	nd	nd
Avg	nd	0.0019	0.011	0.0048	0.07	0.010	0.032	0.011	0.013	nd	nd	nd	nd
SD	nd	0.010	0.027	0.016	0.11	0.025	0.051	0.049	0.059	nd	nd	nd	nd

[a] nd = not detected.

Table A3 *Continuing.*[a]

	PFBS	PFHxS	PFOS	PFDS	6:2 FTSA	FOSA	N-MeFOSA	N-EtFOSA	N-MeFOSE	N-EtFOSE	FOSAA	N-MeFOSAA	N-EtFOSAA
MDL (ng/L)	0.22	0.15	0.21	0.25	1.8	0.11	0.050	0.050	1.0	0.25	0.25	0.25	0.25
Blanks													
LB01	nd	nd	nd	nd	nd	0.18	nd	nd	nd	nd	nd	nd	nd
LB02	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
LB03	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
LB04	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
LB05	nd	nd	nd	nd	2.6	nd	nd	nd	nd	nd	nd	nd	nd
LB06	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
LB11	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
LB12	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
LB13	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
LB14	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
LB15	0.34	0.25	0.33	nd	1.0	nd	nd	nd	nd	nd	nd	nd	nd
LB16	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
LB17	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
LB18	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
LB19	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
LB22	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
LB23	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
LB24	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
LB25	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
LB26	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
LB27	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd

LB29	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
LB30	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
LB28	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
LB32	0.088	nd	nd	nd	nd	0.0086	nd	nd	nd	nd	nd	nd	nd
LB31	nd	nd	nd	nd	nd	0.031	nd	nd	nd	nd	nd	nd	nd
Avg	0.016	0.0094	0.013	nd	0.14	0.0083	nd	nd	nd	nd	nd	nd	nd
SD	0.068	0.048	0.065	nd	0.55	0.035	nd	nd	nd	nd	nd	nd	nd

[a] nd = not detected.

Table A3 *Continuing*.[a]

Blank	∑PFCAs	∑PFSAs	∑PFSAs	∑11PFAS	Σ:PFASs
LB01	0.17	nd	0.18	nd	0.34
LB02	0.11	nd	nd	nd	0.11
LB03	0.02	nd	nd	nd	0.025
LB04	nd	nd	nd	nd	nd
LB05	0.025	nd	2.6	nd	2.7
LB06	0.12	nd	nd	0.045	0.12
LB11	0.036	nd	nd	nd	0.036
LB12	0.027	nd	nd	nd	0.027
LB13	0.20	nd	nd	0.067	0.20
LB14	0.022	nd	nd	nd	0.02
LB15	0.83	0.92	1.03	0.95	2.78
LB16	0.11	nd	nd	0.11	0.11
LB17	nd	nd	nd	nd	nd
LB18	nd	nd	nd	nd	nd
LB19	0.10	nd	nd	0.10	0.10
LB22	0.071	nd	nd	0.071	0.07
LB23	nd	nd	nd	nd	nd
LB24	0.0041	nd	nd	0.0041	0.0041
LB25	0.0049	nd	nd	0.0049	0.0049
LB26	nd	nd	nd	nd	nd
LB27	nd	nd	nd	nd	nd
LB29	0.24	nd	nd	0.24	0.24
LB30	0.42	nd	nd	0.42	0.42
LB28	0.13	nd	nd	0.13	0.13
LB32	0.64	0.088	0.0086	0.54	0.74
LB31	0.60	nd	0.031	0.50	0.64
Avg	0.15	0.039	0.15	0.12	0.34
SD	0.22	0.18	0.55	0.23	0.73

[a] nd = not detected.

A4. Triplicate samples

Table A4. *Average, standard deviation and relative standard deviation for triplicate samples*.

Triplicates	Avg (ng L^{-1})	SD (ng L^{-1})	SD (%)
1 (1,2,3)	0.067	0.12	173
31 (1,2,3)	26	11	43
39 (1,2,3)	0.3	0.1	33
88 (1,2,3)	143	5.5	3.9
111 (1,2,3)	31	0.0	0.0
122 (1,2,3)	3.5	0.12	3.3
135 (1,2,3)	23	1.2	4.9
168 (1,2,3)	13	11	88
194 (1,2,3)	1.4	0.68	47
450 (1,2,3)	0.067	0.12	173

A5. Recovery

Table A5. *Average recovery for the PFASs in the internal standard (IS).*

	Avg recovery (%)
PFHxS IS (ISTD)	97.4
C04 PFBA IS (ISTD)	24.9
C06 PFHxA IS (ISTD)	64.4
C08 PFOA IS (ISTD)	97.8
C09 PFNA IS (ISTD)	105
C10 PFDA IS (ISTD)	109
C11 PFUnDA IS (ISTD)	108
C12 PFDoDA IS (ISTD)	88.2
EtFOSA IS (ISTD)	24.6
EtFOSAA IS (ISTD)	128
EtFOSE IS (ISTD)	39.9
FOSA IS (ISTD)	83.6
MeFOSAA IS (ISTD)	121
MeFOSA IS (ISTD)	31.3
MeFOSE IS (ISTD)	46.5
PFOS IS (ISTD)	102

A6. Lab analysis results

Table A6. *Results from lab analysis. Sample ID and concentrations (ng L^{*1}) of each PFAS compound.*

ID	PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFUnDA	PFDoDA	PFTriDA	PFTeDA	PFHxDA	PFOcDA	PFBS	PFHxS	PFOS	PFDS
1-1	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
1-2	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
1-3	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	0.2	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
2	<0.25	<0.03	0.3	<0.05	<0.40	0.1	1.3	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
3	<0.25	<0.03	<0.09	0.2	0.4	0.4	0.7	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
4	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
5	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	0.5	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
6	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	0.3	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
7	<0.25	<0.03	<0.09	0.4	0.5	0.4	0.8	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
8	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	0.4	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
9	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
10	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
11	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
12	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
13	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
14	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
15	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
16	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
17	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
18	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
20	6.2	7.5	18	6.8	7.5	0.5	0.3	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	3.5	49	66	<0.25

ID	PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFUnDA	PFDoDA	PFTriDA	PFTeDA	PFHxDA	PFOcDA	PFBS	PFHxS	PFOS	PFDS
21	1.0	0.8	1.4	0.6	0.9	<0.08	0.2	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	1.3	9.0	11	<0.25
22	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
23	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
24	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.5	<0.21	<0.25
25	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
26	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
27	<0.25	<0.03	<0.09	0.2	<0.40	0.2	0.3	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
28	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
29	<0.25	0.1	0.3	0.1	<0.40	0.1	0.3	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	2.2	<0.21	<0.25
30	<0.25	0.2	0.5	0.8	1.1	1.1	1.1	0.8	0.7	<0.05	0.1	<0.05	<0.25	0.3	<0.15	<0.21	<0.25
31-1	<0.25	<0.03	0.9	0.3	0.8	0.3	0.5	0.6	0.7	<0.05	<0.05	<0.05	<0.25	0.5	1.2	1.5	<0.25
31-2	<0.25	<0.03	0.9	0.3	0.7	0.4	0.5	0.7	0.7	<0.05	<0.05	<0.05	<0.25	0.5	1.2	1.6	<0.25
31-3	<0.25	<0.03	0.8	0.3	0.6	0.2	<0.19	0.2	<0.19	<0.05	<0.05	<0.05	<0.25	0.3	0.6	0.9	<0.25
32	<0.25	<0.03	<0.09	0.1	<0.40	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
33	<0.25	<0.03	0.6	0.4	1.2	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
34	<0.25	<0.03	0.8	0.4	1.0	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.2	0.4	<0.25
35	<0.25	<0.03	0.3	0.2	<0.40	0.09	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
36	<0.25	<0.03	0.6	0.3	0.6	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
37	<0.25	<0.03	<0.09	<0.05	<0.40	0.09	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
38	<0.25	<0.03	0.4	0.3	1.1	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	0.9	<0.25
39-1	<0.25	<0.03	<0.09	0.1	<0.40	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
39-2	<0.25	<0.03	0.1	0.1	<0.40	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
39-3	<0.25	<0.03	<0.09	0.1	<0.40	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
40	<0.25	<0.03	<0.09	0.1	<0.40	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
41	<0.25	<0.03	<0.09	0.1	<0.40	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25

ID	PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFUnDA	PFDoDA	PFTriDA	PFTeDA	PFHxDA	PFOcDA	PFBS	PFHxS	PFOS	PFDS
42	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
43	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.2	<0.21	<0.25
44	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
45	<0.25	<0.03	0.4	0.2	<0.40	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
46	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
47	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	0.2	<0.25
48	<0.25	0.2	0.9	0.2	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	0.6	1.5	<0.21	<0.25
49	<0.25	<0.03	0.8	0.3	<0.40	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	1.4	0.7	<0.25
50	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
51	<0.25	<0.03	<0.09	0.2	<0.40	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
52	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
53	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
54	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
55	<0.25	17	20	5.4	<0.40	0.5	0.4	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	0.4	3.4	5.2	<0.25
56	<0.25	<0.03	<0.09	0.1	<0.40	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
57	<0.25	<0.03	0.5	0.3	<0.40	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
58	<0.25	<0.03	0.2	0.2	3.8	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	1.8	0.9	<0.21	<0.25
59	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
60	<0.25	0.2	0.9	0.6	28	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	0.8	2.0	0.4	<0.25
61	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	0.3	1.6	<0.21	<0.25
62	<0.25	<0.03	0.2	0.1	<0.40	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.3	0.3	<0.25
63	<0.25	<0.03	3.3	0.4	<0.40	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	0.5	29	28	<0.25
64	<0.25	<0.03	0.6	0.4	<0.40	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.2	0.3	<0.25
65	<0.25	<0.03	0.5	0.3	<0.40	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	0.2	<0.25
66	<0.25	<0.03	<0.09	<0.05	<0.40	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25

ID	PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFUnDA	PFDoDA	PFTriDA	PFTeDA	PFHxDA	PFOcDA	PFBS	PFHxS	PFOS	PFDS
67	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
68	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
69	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.2	<0.21	<0.25
70	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.4	<0.21	<0.25
71	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	1.2	<0.21	<0.25
72	<0.25	4.2	22	6.4	12	0.4	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	2.3	21	3.7	<0.25
73	<0.25	30	149	54	117	1.5	0.2	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	36	66	16	<0.25
74	<0.25	1.1	1.2	0.6	<0.40	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
75	<0.25	<0.03	<0.09	0.1	<0.40	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
76	<0.25	<0.03	<0.09	0.1	<0.40	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
77	<0.25	<0.03	<0.09	0.1	<0.40	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
78	<0.25	<0.03	0.5	0.5	0.9	0.9	0.6	0.5	0.6	<0.05	0.5	<0.05	<0.25	0.3	0.3	0.4	<0.25
79	<0.25	<0.03	<0.09	<0.05	<0.40	0.1	0.5	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
80	<0.25	<0.03	0.1	0.2	<0.40	0.1	1.1	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
81	<0.25	<0.03	0.4	0.1	0.7	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
82	<0.25	<0.03	0.1	0.2	<0.40	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
83	<0.25	<0.03	<0.09	0.1	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
84	<0.25	<0.03	<0.09	0.2	0.6	0.3	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
85	<0.25	<0.03	<0.09	0.2	0.5	0.2	0.3	0.4	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.3	<0.21	<0.25
86	<0.25	<0.03	0.2	0.3	0.7	0.3	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
87	<0.25	<0.03	0.2	<0.05	<0.40	0.2	<0.19	0.3	0.4	<0.05	<0.05	<0.05	<0.25	<0.22	0.3	0.4	<0.25
88-1	1.6	2.2	13	2.9	52	0.08	0.2	0.5	<0.19	<0.05	<0.05	<0.05	<0.25	14	62	<0.21	<0.25
88-2	1.5	2.1	12	2.5	48	<0.08	<0.19	0.3	0.6	<0.05	<0.05	<0.05	<0.25	10	60	<0.21	<0.25
88-3	1.5	2.1	12	2.6	49	<0.08	<0.19	0.3	0.5	<0.05	<0.05	<0.05	<0.25	9.8	59	0.3	<0.25
89	0.6	<0.03	0.2	0.2	<0.40	0.5	0.5	0.5	0.8	<0.05	0.5	<0.05	<0.25	0.3	0.3	<0.21	<0.25

ID	PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFUnDA	PFDoDA	PFTriDA	PFTeDA	PFHxDA	PFOcDA	PFBS	PFHxS	PFOS	PFDS
90	<0.25	<0.03	0.4	0.3	0.8	0.6	0.4	0.4	0.5	<0.05	0.3	<0.05	<0.25	<0.22	0.3	0.3	<0.25
91	0.7	<0.03	0.3	0.3	0.7	1.3	0.6	0.5	0.8	<0.05	0.3	<0.05	<0.25	0.3	0.2	<0.21	<0.25
92	<0.25	<0.03	0.3	0.3	0.9	0.8	0.6	0.5	0.7	<0.05	0.6	<0.05	<0.25	0.3	0.4	0.5	<0.25
93	<0.25	<0.03	0.2	0.1	<0.40	0.09	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
94	0.7	<0.03	0.2	0.2	<0.40	0.5	0.6	0.7	<0.19	<0.05	<0.05	<0.05	<0.25	0.3	0.2	<0.21	<0.25
95	0.6	<0.03	0.2	0.2	<0.40	0.5	0.5	0.5	0.9	<0.05	0.1	<0.05	<0.25	<0.22	0.2	<0.21	<0.25
96	<0.25	<0.03	0.7	0.1	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	2.7	12	1.1	<0.25
97	<0.25	<0.03	<0.09	0.06	<0.40	<0.08	0.2	0.3	0.5	<0.05	0.1	<0.05	<0.25	<0.22	0.6	0.8	<0.25
98	17	4.7	11	4.6	11	0.5	0.2	0.3	0.4	<0.05	0.07	<0.05	<0.25	1.8	4.4	3.5	<0.25
99	<0.25	<0.03	0.7	0.6	1.2	1.1	0.8	0.6	0.9	<0.05	0.2	<0.05	<0.25	0.6	0.6	0.5	<0.25
100	<0.25	<0.03	0.2	0.08	<0.40	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	0.7	0.9	<0.21	<0.25
101	<0.25	<0.03	<0.09	0.2	0.5	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
102	<0.25	<0.03	<0.09	0.2	0.6	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
103	<0.25	<0.03	<0.09	0.1	0.4	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	0.6	4.8	<0.21	<0.25
104	<0.25	<0.03	0.1	0.06	<0.40	0.09	<0.19	<0.16	<0.19	<0.05	0.07	<0.05	<0.25	<0.22	0.2	<0.21	<0.25
105	<0.25	<0.03	0.1	0.06	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	0.2	<0.15	<0.21	<0.25
106	<0.25	<0.03	0.1	0.06	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
107	<0.25	<0.03	<0.09	0.3	0.9	0.3	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	1.1	<0.25
108	<0.25	<0.03	0.2	0.2	0.6	0.2	0.2	0.3	0.4	<0.05	<0.05	<0.05	<0.25	<0.22	0.4	0.5	<0.25
109	2.2	7.5	0.8	0.7	1.2	1.6	1.3	1.1	1.8	<0.05	1.3	<0.05	<0.25	0.8	0.8	0.9	<0.25
110	<0.25	25	112	30	79	2.3	0.6	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	299	30	18	<0.25
111-1	<0.25	1.6	4.6	2.0	6.6	0.6	0.3	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	4.7	2.4	<0.25
111-2	<0.25	1.7	4.6	1.9	6.3	0.6	1.2	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	4.6	1.9	<0.25
111-3	<0.25	1.9	4.8	2.0	6.5	0.7	0.6	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	4.4	2.2	<0.25
112	<0.25	<0.03	0.4	0.2	0.5	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.3	0.4	<0.25

ID	PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFUnDA	PFDoDA	PFTriDA	PFTeDA	PFHxDA	PFOcDA	PFBS	PFHxS	PFOS	PFDS
113	0.7	1.1	2.8	1.0	2.6	<0.08	0.3	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	1.7	20	2.3	<0.25
114	<0.25	<0.03	1.5	0.5	1.1	0.3	0.7	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	2.6	2.3	3.5	<0.25
115	<0.25	<0.03	0.3	0.2	<0.40	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	0.3	<0.15	<0.21	<0.25
116	<0.25	<0.03	508	130	373	5.7	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	84	49	<0.25
117	<0.25	<0.03	0.1	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	0.9	1.4	<0.21	<0.25
118	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
119	<0.25	<0.03	<0.09	<0.05	<0.40	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	0.4	<0.15	0.5	<0.25
120	<0.25	<0.03	0.1	0.09	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	2.1	0.3	0.6	<0.25
121	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	2.1	0.7	<0.21	<0.25
122-1	<0.25	<0.03	0.8	0.6	1.0	0.4	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	0.6	0.2	<0.21	<0.25
122-2	<0.25	<0.03	0.8	0.6	1.0	0.5	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	0.6	<0.15	<0.21	<0.25
122-3	<0.25	<0.03	0.8	0.6	1.0	0.5	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	0.6	0.2	<0.21	<0.25
123	<0.25	<0.03	0.1	0.07	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
124	<0.25	<0.03	0.5	0.3	0.5	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	0.3	0.5	0.3	<0.25
125	<0.25	<0.03	0.2	0.1	<0.40	0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	0.3	<0.15	<0.21	<0.25
126	<0.25	<0.03	0.5	0.3	0.5	0.4	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
127	<0.25	<0.03	0.3	0.1	<0.40	0.3	0.2	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	0.3	<0.15	<0.21	<0.25
128	<0.25	<0.03	0.6	0.4	0.7	0.5	0.2	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.4	0.5	<0.25
129	1.5	0.5	2.5	2.2	1.2	0.6	0.4	0.3	0.4	<0.05	0.2	<0.05	<0.25	0.5	0.3	<0.21	<0.25
130	<0.25	<0.03	<0.09	0.3	0.5	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.3	0.4	<0.25
131	<0.25	<0.03	0.8	0.4	0.8	0.7	0.4	0.3	<0.19	<0.05	0.07	<0.05	<0.25	<0.22	0.6	0.6	<0.25
132	<0.25	<0.03	3.2	0.9	1.1	0.3	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	1.3	1.5	<0.25
133	<0.25	<0.03	2.2	1.0	1.7	0.7	0.3	0.2	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	1.7	3.8	<0.25
134	<0.25	<0.03	0.7	0.3	0.6	0.3	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.2	0.4	<0.25
135-1	<0.25	0.9	2.5	0.6	2.3	0.5	0.5	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	1.8	3.4	<0.25

ID	PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFUnDA	PFDoDA	PFTriDA	PFTeDA	PFHxDA	PFOcDA	PFBS	PFHxS	PFOS	PFDS
135-2	<0.25	0.9	2.3	0.6	2.2	0.4	0.4	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	1.7	3.3	<0.25
135-3	<0.25	1.0	2.5	0.6	2.2	0.5	0.5	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	1.9	3.1	<0.25
136	<0.25	<0.03	0.3	0.2	<0.40	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
137	<0.25	<0.03	0.8	0.5	1.4	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	1.6	<0.25
138	<0.25	<0.03	2.6	1.5	1.3	0.4	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	2.4	5.1	<0.25
139	<0.25	<0.03	<0.09	<0.05	<0.40	0.3	0.2	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	0.3	<0.15	1.9	<0.25
140	6.5	3.1	7.9	3.7	8.5	0.6	0.4	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	1.2	1.5	<0.25
141	<0.25	<0.03	<0.09	<0.05	44	9.9	9.9	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
142	<0.25	1.3	1.3	0.4	0.8	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	1.6	0.7	<0.25
143	<0.25	9.7	43	14	38	17	0.8	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	3.9	8.0	9.5	<0.25
144	<0.25	<0.03	0.5	0.3	0.8	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.3	<0.21	<0.25
145	<0.25	<0.03	2.3	0.8	1.7	0.3	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	0.6	3.5	3.6	<0.25
146	<0.25	0.7	1.4	0.5	2.1	0.4	0.4	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.8	0.6	<0.25
147	<0.25	<0.03	2.8	0.9	2.1	0.4	0.3	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	3.4	2.7	<0.25
148	<0.25	<0.03	0.3	0.2	0.6	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.2	0.6	<0.25
150	<0.25	<0.03	<0.09	0.2	0.4	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	0.3	<0.25
151	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
152	<0.25	<0.03	0.7	0.2	0.7	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.3	<0.21	<0.25
153	<0.25	0.3	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
154	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
155	<0.25	4.8	8.6	2.9	4.6	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	0.4	6.8	5.3	<0.25
156	<0.25	4.0	7.9	2.5	3.9	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	0.6	9.0	4.5	<0.25
157	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
158	<0.25	<0.03	0.1	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	1.4	1.1	<0.25
159	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25

ID	PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFUnDA	PFDoDA	PFTriDA	PFTeDA	PFHxDA	PFOcDA	PFBS	PFHxS	PFOS	PFDS
160	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
161	<0.25	<0.03	<0.09	0.1	<0.40	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
162	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
163	<0.25	<0.03	0.2	0.2	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
164	<0.25	<0.03	<0.09	0.09	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
165	<0.25	<0.03	<0.09	0.06	<0.40	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
166	44	107	168	35	104	1.6	0.4	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	279	890	2280	<0.25
167	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
168-1	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
168-2	<0.25	1.8	1.4	0.8	1.6	1.0	1.2	1.1	1.4	<0.05	0.7	<0.05	<0.25	<0.22	1.0	1.2	<0.25
168-3	<0.25	<0.03	3.6	0.9	3.1	0.4	0.2	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	3.4	6.0	<0.25
169	<0.25	<0.03	0.4	0.2	0.5	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.3	0.3	<0.25
170	<0.25	<0.03	0.4	0.2	0.5	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.3	0.3	<0.25
171	<0.25	<0.03	0.5	0.4	1.1	0.3	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.3	2.5	<0.25
172	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
173	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
174	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
175	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
176	13	18	28	15	10	3.4	3.1	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	1.2	32	73	<0.25
177	<0.25	<0.03	<0.09	<0.05	<0.40	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
178	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
179	<0.25	8.2	14	6.2	4.7	0.3	0.4	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	3.1	3.1	<0.25
180	<0.25	<0.03	0.2	0.1	<0.40	0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
181	<0.25	<0.03	0.1	0.07	0.4	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
182	<0.25	<0.03	0.4	0.2	0.7	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.2	<0.21	<0.25

ID	PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFUnDA	PFDoDA	PFTriDA	PFTeDA	PFHxDA	PFOcDA	PFBS	PFHxS	PFOS	PFDS
183	<0.25	<0.03	0.1	0.09	<0.40	0.09	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
184	<0.25	<0.03	2.1	0.6	1.9	0.2	0.3	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
185	<0.25	<0.03	0.6	0.4	0.8	0.7	0.5	0.4	0.5	<0.05	0.4	<0.05	<0.25	<0.22	0.4	0.4	<0.25
186	<0.25	<0.03	<0.09	0.2	0.6	0.2	0.2	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.2	0.4	<0.25
187	<0.25	6.9	11	3.8	11	0.6	0.6	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	1.2	20	42	<0.25
188	<0.25	5.9	24	12	52	1.4	0.4	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	8.4	20	<0.25
189	<0.25	<0.03	120	34	150	7.1	4.2	2.7	3.7	<0.05	3.8	<0.05	<0.25	6.2	40	46	<0.25
190	<0.25	1.9	7.1	2.2	7.9	0.4	0.2	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	2.6	1.9	<0.25
191	<0.25	<0.03	5.2	1.0	4.1	0.9	0.8	0.5	0.6	<0.05	0.2	<0.05	<0.25	<0.22	0.3	0.4	<0.25
192	<0.25	14	3.4	3.2	6.9	9.2	6.5	5.3	6.5	<0.05	5.1	<0.05	<0.25	2.1	3.7	3.2	<0.25
193	<0.25	<0.03	0.6	0.3	0.9	0.7	0.5	0.4	0.5	<0.05	0.4	<0.05	<0.25	<0.22	0.3	0.3	<0.25
194-1	<0.25	<0.03	0.3	0.2	0.5	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
194-2	<0.25	<0.03	0.4	0.2	0.5	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.8	<0.21	<0.25
194-3	<0.25	<0.03	0.3	<0.05	0.5	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
195	<0.25	<0.03	<0.09	<0.05	<0.40	0.09	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
196	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
197	<0.25	<0.03	0.2	0.1	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
198	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
199	<0.25	<0.03	0.2	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.4	<0.21	<0.25
200	<0.25	2.2	8.3	2.6	6.9	0.8	0.5	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	6.0	8.0	<0.25
201	<0.25	3.4	8.5	3.0	4.3	0.8	0.4	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	0.8	7.0	13	<0.25
202	<0.25	<0.03	1.5	0.6	1.0	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	1.2	1.7	<0.25
203	<0.25	0.6	1.6	0.6	1.1	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	2.9	3.7	<0.25
204	<0.25	<0.03	<0.09	0.3	0.8	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	0.5	<0.25
205	<0.25	<0.03	1.8	0.4	0.8	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	0.4	8.6	4.9	<0.25

ID	PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFUnDA	PFDoDA	PFTriDA	PFTeDA	PFHxDA	PFOcDA	PFBS	PFHxS	PFOS	PFDS
206	<0.25	<0.03	0.3	0.2	0.6	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
207	<0.25	<0.03	0.3	0.2	0.5	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	0.3	<0.25
208	<0.25	<0.03	0.3	0.2	0.6	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
209	0.4	0.07	0.3	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	2.8	8.7	<0.21	<0.25
210	<0.25	<0.03	0.2	0.2	0.6	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.2	0.4	<0.25
211	<0.25	0.3	0.9	0.1	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	1.2	2.2	<0.21	<0.25
212	<0.25	<0.03	1.0	1.7	2.2	2.3	2.0	1.9	1.9	<0.05	0.4	<0.05	<0.25	0.4	<0.15	0.3	<0.25
213	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
214	<0.25	<0.03	<0.09	0.06	0.6	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.2	0.5	<0.25
215	<0.25	<0.03	0.1	0.06	0.4	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.5	13	<0.25
216	<0.25	<0.03	0.2	0.2	0.5	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.2	<0.21	<0.25
217	<0.25	<0.03	0.8	0.3	1.1	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	0.2	2.5	3.8	<0.25
218	<0.25	<0.03	0.4	0.2	0.5	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.4	0.4	<0.25
219	<0.25	0.6	1.0	0.4	0.7	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	0.4	1.5	0.6	<0.25
220	<0.25	<0.03	1.5	0.5	1.3	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	1.0	7.3	0.9	<0.25
222	<0.25	1.4	1.4	0.8	0.6	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
223	<0.25	5.7	12	5.6	41	0.7	0.4	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	3.5	2.6	<0.25
224	24	64	87	34	32	5.9	2.0	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	11	116	167	<0.25
225	<0.25	4.7	16	10	23	1.9	0.3	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.2	<0.21	<0.25
226	<0.25	<0.03	8.2	1.8	6.2	0.3	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	2.3	28	83	<0.25
227	<0.25	1.2	0.5	0.3	0.6	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.2	0.5	<0.25
228	<0.25	0.5	0.1	0.1	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	0.4	<0.25
229	<0.25	<0.03	1.2	0.6	1.3	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.3	0.4	<0.25
230	<0.25	<0.03	0.4	0.2	0.7	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
234	<0.25	0.6	<0.09	0.1	<0.40	0.09	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25

ID	PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFUnDA	PFDoDA	PFTriDA	PFTeDA	PFHxDA	PFOcDA	PFBS	PFHxS	PFOS	PFDS
236	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
237	<0.25	<0.03	167	76	185	3.6	1.5	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	28	66	68	<0.25
238	<0.25	0.5	3.5	1.1	3.9	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	0.7	3.7	0.7	<0.25
239	<0.25	<0.03	49	17	25	1.5	0.2	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	1.9	12	1.7	<0.25
240	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
241	<0.25	28	128	62	83	7.6	2.2	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	22	12	6.1	<0.25
242	<0.25	24	115	53	79	7.7	1.8	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	19	12	5.7	<0.25
243	<0.25	<0.03	1.9	0.8	1.7	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.6	0.8	<0.25
244	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
245	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
246	<0.25	1.9	6.6	2.9	8.8	0.4	0.2	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	6.2	13	<0.25
247	<0.25	<0.03	1.0	0.5	1.5	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.3	<0.21	<0.25
248	<0.25	<0.03	<0.09	0.1	<0.40	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
249	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
250	<0.25	<0.03	<0.09	0.1	<0.40	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
251	<0.25	<0.03	<0.09	0.08	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
252	<0.25	<0.03	1.6	0.6	1.1	0.09	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	0.6	9.6	13	<0.25
253	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
254	<0.25	22	126	46	130	2.3	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	49	29	<0.25
255	<0.25	<0.03	8.0	4.1	9.7	0.4	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	3.6	2.3	<0.25
256	<0.25	<0.03	1.6	0.6	2.0	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.5	<0.21	<0.25
257	<0.25	16	140	62	193	2.0	0.4	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	50	24	<0.25
258	<0.25	<0.03	0.2	0.3	0.5	0.4	0.2	0.3	0.5	<0.05	0.1	<0.05	<0.25	<0.22	0.3	0.5	<0.25
259	<0.25	3.8	6.9	2.8	2.5	1.2	0.7	0.4	0.5	<0.05	0.08	<0.05	<0.25	<0.22	2.1	4.3	<0.25
260	<0.25	2.3	4.4	1.7	2.2	0.6	0.4	0.3	0.4	<0.05	0.07	<0.05	<0.25	0.7	2.5	4.1	<0.25

ID	PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFUnDA	PFDoDA	PFTriDA	PFTeDA	PFHxDA	PFOcDA	PFBS	PFHxS	PFOS	PFDS
261	<0.25	<0.03	1.0	0.4	1.0	0.3	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	0.7	0.7	1.4	<0.25
262	<0.25	5.8	9.4	3.7	3.7	0.9	0.9	0.4	0.5	<0.05	0.08	<0.05	<0.25	1.2	2.0	3.8	<0.25
263	<0.25	<0.03	0.8	0.4	0.8	0.3	0.2	0.3	0.4	<0.05	0.1	<0.05	<0.25	<0.22	0.8	1.2	<0.25
264	<0.25	1.7	3.5	1.7	2.2	0.5	0.4	0.4	0.5	<0.05	0.1	<0.05	<0.25	0.5	1.6	5.5	<0.25
265	<0.25	1.7	3.8	1.6	2.6	0.4	0.3	0.3	0.4	<0.05	0.09	<0.05	<0.25	0.7	1.8	3.1	<0.25
266	<0.25	<0.03	1.3	0.6	1.2	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	1.2	0.4	<0.25
267	<0.25	<0.03	3.7	1.4	2.7	0.6	0.7	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	0.3	1.5	1.2	<0.25
268	<0.25	0.5	0.8	0.4	1.0	0.4	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	0.7	0.4	0.9	<0.25
269	<0.25	<0.03	<0.09	0.2	0.6	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
270	<0.25	<0.03	0.6	0.3	0.6	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
271	<0.25	7.9	15	7.2	2.8	0.7	0.3	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.6	0.5	<0.25
272	<0.25	2.2	4.5	1.9	3.6	0.5	0.3	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	1.5	6.2	5.0	<0.25
273	<0.25	3.4	9.7	4.6	6.7	1.0	0.6	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	2.0	13	48	<0.25
274	<0.25	4.2	11	4.8	5.9	0.8	0.5	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	2.0	12	37	<0.25
275	<0.25	<0.03	0.6	0.2	0.6	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.2	0.4	<0.25
276	<0.25	<0.03	1.3	0.5	1.0	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.3	0.8	<0.25
277	<0.25	<0.03	0.5	0.2	0.7	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
278	<0.25	<0.03	<0.09	0.09	<0.40	0.09	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
279	<0.25	3.0	5.1	1.9	2.2	0.6	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	2.1	2.0	<0.25
280	<0.25	<0.03	0.9	0.4	1.1	0.5	0.2	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	0.8	0.4	2.7	<0.25
281	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
283	<0.25	<0.03	<0.09	<0.05	0.5	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	1.6	2.4	<0.25
284	<0.25	<0.03	0.5	0.1	0.5	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	5.4	1.3	<0.25
285	<0.25	3.4	11	3.3	4.6	0.4	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	0.6	4.6	5.0	<0.25
286	<0.25	<0.03	8.2	2.7	4.4	0.4	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	0.5	2.6	2.0	<0.25

ID	PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFUnDA	PFDoDA	PFTriDA	PFTeDA	PFHxDA	PFOcDA	PFBS	PFHxS	PFOS	PFDS
287	<0.25	5.5	12	3.5	10	0.7	0.3	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	1.7	25	61	<0.25
288	<0.25	5.5	14	3.4	7.6	0.5	0.2	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	4.2	54	107	<0.25
289	<0.25	<0.03	0.2	0.1	<0.40	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	0.3	<0.25
290	<0.25	<0.03	0.3	0.2	0.5	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
291	<0.25	2.9	10	3.5	10	0.5	0.3	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	8.5	12	6.7	<0.25
292	<0.25	<0.03	0.3	0.2	<0.40	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
293	<0.25	<0.03	<0.09	0.08	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.2	0.3	<0.25
294	<0.25	1.2	3.0	1.0	3.0	0.4	0.3	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	3.2	2.5	<0.25
295	<0.25	<0.03	3.6	1.8	2.5	0.5	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	1.1	2.3	<0.25
296	<0.25	22	31	11	9.7	3.1	2.0	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	8.1	25	<0.25
297	<0.25	<0.03	0.3	0.3	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
298	<0.25	<0.03	0.8	0.4	0.7	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.2	<0.21	<0.25
299	<0.25	<0.03	0.7	0.4	0.6	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
300	<0.25	<0.03	<0.09	<0.05	<0.40	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
301	<0.25	2.2	8.0	2.6	6.7	0.8	0.5	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	5.6	7.7	<0.25
302	12	5.9	12	5.7	40	0.6	0.3	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	3.3	2.5	<0.25
303	0.6	0.5	0.7	0.5	0.6	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	0.5	2.4	2.8	<0.25
305	<0.25	<0.03	0.4	0.2	0.5	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.4	0.4	<0.25
306	<0.25	<0.03	<0.09	0.1	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
307	<0.25	<0.03	0.7	0.2	0.9	0.3	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	2.5	2.1	<0.25
308	<0.25	<0.03	<0.09	0.2	<0.40	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
309	<0.25	<0.03	<0.09	0.1	<0.40	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
310	<0.25	<0.03	<0.09	0.1	<0.40	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
311	<0.25	<0.03	0.2	0.1	0.4	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.2	<0.21	<0.25
312	<0.25	<0.03	0.5	0.2	0.6	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.3	0.4	<0.25

ID	PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFUnDA	PFDoDA	PFTriDA	PFTeDA	PFHxDA	PFOcDA	PFBS	PFHxS	PFOS	PFDS
313	<0.25	2.8	6.5	3.0	6.8	0.4	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	0.7	5.3	5.9	<0.25
314	<0.25	<0.03	<0.09	<0.05	<0.40	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
315	<0.25	<0.03	<0.09	0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
316	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	0.3	0.4	0.7	<0.05	0.1	<0.05	<0.25	0.5	0.2	0.3	<0.25
318	<0.25	<0.03	0.2	0.2	0.6	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
319	<0.25	<0.03	<0.09	0.2	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.2	<0.21	<0.25
320	<0.25	<0.03	0.4	0.3	0.8	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	0.3	<0.25
321	<0.25	<0.03	<0.09	<0.05	<0.40	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
322	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
323	<0.25	<0.03	1.1	0.7	0.8	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
324	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
326	2.2	3.4	7.3	2.0	3.4	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	4.5	33	33	<0.25
327	<0.25	<0.03	0.3	0.1	<0.40	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
328	<0.25	<0.03	0.3	0.2	0.6	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	0.3	<0.25
329	<0.25	6.1	16	6.2	1.4	1.0	0.4	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	2.2	24	59	<0.25
330	<0.25	<0.03	0.2	0.2	<0.40	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
331	<0.25	<0.03	<0.09	0.08	<0.40	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
332	<0.25	1.2	1.3	0.5	0.9	0.3	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.3	0.8	<0.25
333	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
334	<0.25	<0.03	<0.09	0.2	<0.40	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
335	<0.25	<0.03	<0.09	0.07	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
336	<0.25	<0.03	<0.09	0.1	<0.40	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
337	<0.25	9.5	13	4.3	4.7	0.7	0.3	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	1.0	5.3	7.2	<0.25
338	<0.25	1.6	2.4	1.1	2.3	0.8	0.5	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.7	1.6	<0.25
339	<0.25	<0.03	2.0	0.6	1.5	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	0.6	7.2	18	<0.25

ID	PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFUnDA	PFDoDA	PFTriDA	PFTeDA	PFHxDA	PFOcDA	PFBS	PFHxS	PFOS	PFDS
340	<0.25	0.6	1.3	0.4	1.2	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	0.3	4.3	9.7	<0.25
341	<0.25	<0.03	0.9	0.4	1.1	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	0.2	2.8	6.1	<0.25
342	3.6	3.4	20	3.7	26	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	22	80	0.7	<0.25
343	<0.25	0.7	0.6	0.4	0.7	0.2	0.2	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.2	<0.21	<0.25
344	<0.25	<0.03	0.9	0.3	0.9	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	0.3	3.4	4.8	<0.25
345	<0.25	3.2	2.6	0.3	1.8	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	1.5	11	1.4	<0.25
346	<0.25	<0.03	0.2	0.2	<0.40	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
347	<0.25	<0.03	0.7	0.2	0.7	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	0.4	6.0	8.3	<0.25
348	<0.25	<0.03	0.4	0.5	1.2	0.4	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	0.3	<0.25
349	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
350	9.3	19	41	9.8	3.3	0.6	0.6	0.5	0.9	<0.05	0.4	<0.05	<0.25	5.9	35	0.3	<0.25
351	<0.25	<0.03	2.1	1.0	1.4	0.6	0.4	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.7	4.6	<0.25
352	<0.25	<0.03	3.8	1.2	2.7	1.0	0.5	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.5	1.8	<0.25
353	3.1	3.2	19	3.7	23	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	24	75	0.6	<0.25
354	<0.25	<0.03	1.7	0.5	1.4	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	0.4	4.8	16	<0.25
355	<0.25	<0.03	1.9	0.5	1.5	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	0.5	5.2	10	<0.25
356	<0.25	<0.03	3.6	0.8	2.2	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	0.8	9.9	29	<0.25
357	<0.25	<0.03	0.7	0.4	0.9	0.3	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.3	<0.21	<0.25
358	<0.25	<0.03	1.1	0.5	1.3	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	3.3	6.0	<0.25
359	4.8	2.6	1.8	0.3	1.4	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	1.1	7.8	1.2	<0.25
360	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
361	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
362	<0.25	<0.03	<0.09	0.07	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
363	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
364	<0.25	<0.03	1.3	0.2	0.4	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	0.6	11	0.3	<0.25

ID	PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFUnDA	PFDoDA	PFTriDA	PFTeDA	PFHxDA	PFOcDA	PFBS	PFHxS	PFOS	PFDS
365	<0.25	<0.03	<0.09	0.1	<0.40	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
366	<0.25	<0.03	2.6	0.8	3.6	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	1.5	6.0	21	<0.25
367	<0.25	<0.03	0.8	0.3	0.7	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.2	0.3	<0.25
368	<0.25	<0.03	0.8	0.3	0.8	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.3	0.6	<0.25
369	18	18	42	12	13	0.6	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	3.4	33	31	<0.25
370	<0.25	<0.03	0.4	0.2	0.7	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	0.5	<0.25
371	<0.25	3.2	7.0	2.3	4.3	1.1	0.2	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	0.6	12	61	<0.25
372	<0.25	<0.03	0.6	0.4	1.1	0.3	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.5	5.3	<0.25
373	<0.25	0.7	1.4	0.8	1.9	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.3	0.7	<0.25
374	<0.25	6.3	17	4.9	7.3	0.6	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	4.1	55	90	<0.25
375	<0.25	1.0	1.7	1.1	2.3	0.3	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.4	0.8	<0.25
376	<0.25	<0.03	0.3	0.2	0.7	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	0.3	<0.25
377	<0.25	<0.03	1.8	1.1	2.0	0.3	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.6	1.2	<0.25
378	<0.25	4.3	11	3.3	5.0	0.5	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	2.3	38	74	<0.25
379	<0.25	<0.03	1.8	1.0	2.0	0.3	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.6	1.4	<0.25
380	<0.25	<0.03	0.7	0.4	0.9	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	0.6	<0.25
381	<0.25	7.8	25	6.2	24	0.8	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	3.8	107	155	<0.25
382	<0.25	4.9	15	3.9	14	0.7	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	2.5	64	112	<0.25
383	<0.25	<0.03	0.5	0.2	0.5	<0.08	0.2	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
384	<0.25	0.7	1.2	0.6	1.5	0.3	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.3	0.8	<0.25
385	40	72	134	63	67	301	14	132	0.5	1.1	<0.05	<0.05	<0.25	20	183	530	<0.25
386	<0.25	21	43	23	29	3.3	0.2	0.8	<0.19	<0.05	<0.05	<0.05	<0.25	1.6	27	26	<0.25
387	<0.25	<0.03	0.6	0.2	<0.40	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.2	<0.21	<0.25
388	<0.25	<0.03	0.3	0.1	<0.40	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
389	<0.25	<0.03	0.5	<0.05	<0.40	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25

ID	PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFUnDA	PFDoDA	PFTriDA	PFTeDA	PFHxDA	PFOcDA	PFBS	PFHxS	PFOS	PFDS
390	<0.25	<0.03	1.1	0.4	0.6	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	1.9	1.9	<0.25
391	<0.25	<0.03	2.0	0.7	1.5	0.4	0.3	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	7.2	2.7	4.7	<0.25
392	<0.25	<0.03	1.0	0.4	0.9	0.4	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	0.7	0.5	1.4	<0.25
393	5.6	9.0	15	8.7	4.9	1.1	2.5	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	0.4	0.7	0.4	<0.25
394	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	0.7	0.6	<0.21	<0.25
395	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
396	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
397	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.4	<0.21	<0.25
398	<0.25	<0.03	0.4	0.1	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	0.4	3.7	1.0	<0.25
399	<0.25	<0.03	0.2	0.06	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	0.3	1.7	<0.21	<0.25
409	<0.25	<0.03	1.1	0.5	0.9	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.7	0.7	<0.25
410	<0.25	<0.03	1.1	0.4	0.5	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.7	<0.21	<0.25
411	<0.25	<0.03	<0.09	0.2	0.4	0.09	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
412	<0.25	4.8	11	4.5	26	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	1.1	5.1	5.7	<0.25
414	<0.25	<0.03	1.1	<0.05	0.8	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	0.2	3.4	3.2	<0.25
415	1.8	7.1	8.3	2.0	0.4	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	1.1	<0.21	<0.25
416	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
418	<0.25	1.4	2.0	1.1	1.4	0.2	0.2	0.3	0.6	<0.05	0.07	<0.05	<0.25	1.0	2.9	1.5	<0.25
420	<0.25	<0.03	2.1	0.7	1.7	0.3	0.2	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	3.2	2.5	<0.25
421	<0.25	<0.03	0.4	0.2	0.4	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
422	<0.25	<0.03	0.2	0.07	<0.40	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
423	<0.25	<0.03	0.4	0.1	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	1.5	0.4	<0.25
424	<0.25	<0.03	<0.09	0.1	<0.40	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	1.2	<0.21	<0.25
425	<0.25	<0.03	0.3	0.1	<0.40	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.3	<0.21	<0.25
426	<0.25	2.5	6.5	1.5	2.7	0.3	0.2	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	0.7	9.9	23	<0.25

ID	PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFUnDA	PFDoDA	PFTriDA	PFTeDA	PFHxDA	PFOcDA	PFBS	PFHxS	PFOS	PFDS
427	<0.25	0.4	0.4	0.3	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
428	<0.25	<0.03	1.2	0.5	1.2	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	1.1	1.0	<0.25
429	<0.25	<0.03	<0.09	<0.05	4.0	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
430	<0.25	<0.03	<0.09	0.2	0.7	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
431	<0.25	<0.03	1.5	0.7	1.6	0.4	0.2	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	1.3	0.9	<0.25
432	<0.25	<0.03	0.5	0.2	<0.40	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
433	<0.25	<0.03	0.1	0.06	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
434	<0.25	<0.03	0.2	0.1	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
435	<0.25	<0.03	0.2	<0.05	<0.40	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
436	<0.25	<0.03	0.4	0.3	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.3	0.3	<0.25
437	<0.25	<0.03	0.09	0.09	<0.40	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
438	<0.25	0.1	0.2	0.08	<0.40	0.09	0.2	0.4	0.6	<0.05	0.1	<0.05	<0.25	0.3	0.3	0.4	<0.25
441	<0.25	16	40	13	17	1.0	1.0	<0.16	0.2	<0.05	0.09	<0.05	<0.25	13	74	24	<0.25
442	<0.25	<0.03	<0.09	<0.05	<0.40	0.1	0.2	0.4	0.7	<0.05	<0.05	<0.05	<0.25	0.3	0.3	0.5	<0.25
443	<0.25	<0.03	0.4	0.2	0.5	0.3	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.2	<0.21	<0.25
445	<0.25	<0.03	0.7	1.0	2.5	0.1	<0.19	<0.16	<0.19	<0.05	0.2	<0.05	<0.25	0.5	0.4	<0.21	<0.25
446	<0.25	4.6	11	4.0	15	3.3	2.3	1.8	2.3	<0.05	1.8	<0.05	<0.25	1.5	4.5	5.0	<0.25
447	<0.25	<0.03	0.4	0.3	0.7	0.8	<0.19	0.8	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	2.0	<0.25
448	<0.25	<0.03	<0.09	0.1	0.6	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
449	<0.25	<0.03	0.2	0.09	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	0.7	4.5	<0.21	<0.25
450-1	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	0.2	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
450-2	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
450-3	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
451	<0.25	<0.03	<0.09	0.08	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
452	<0.25	<0.03	0.3	<0.05	0.5	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	1.7	54	<0.25

ID	PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFUnDA	PFDoDA	PFTriDA	PFTeDA	PFHxDA	PFOcDA	PFBS	PFHxS	PFOS	PFDS
453	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
454	377	607	1990	221	522	26	1.4	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	7550	<0.21	<0.25
456	<0.25	<0.03	0.4	0.4	1.1	0.3	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	0.5	<0.25
457	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
458	<0.25	<0.03	0.1	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
459	<0.25	41	194	41	132	26	0.9	0.9	<0.19	<0.05	<0.05	<0.05	<0.25	124	423	1870	<0.25
460	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
461	<0.25	0.3	0.4	0.3	0.9	0.3	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.2	0.5	<0.25
462	<0.25	<0.03	1.0	0.6	1.3	0.4	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.9	1.9	<0.25
463	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	1.2	<0.21	<0.25
464	<0.25	10	35	15	2.3	0.2	0.7	0.2	0.3	<0.05	<0.05	<0.05	<0.25	<0.22	0.7	<0.21	<0.25
465	<0.25	<0.03	1.1	0.5	1.2	0.3	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	1.8	2.7	<0.25
466	<0.25	3.3	5.7	2.3	5.6	0.5	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	8.9	17	<0.25
467	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
468	<0.25	<0.03	1.6	0.7	1.7	0.3	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.7	12	<0.25
469	<0.25	<0.03	24	27	149	2.5	0.5	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	2.7	12	107	<0.25
470	3.5	3.5	15	2.5	3.7	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	9.4	66	43	<0.25
471	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
472	<0.25	9.2	22	8.7	10	2.8	2.7	<0.16	0.2	<0.05	<0.05	<0.05	<0.25	0.8	10	43	<0.25
473	409	<0.03	1890	740	436	66	113	20	59	2.1	4.9	1.0	<0.25	0.7	1.4	<0.21	<0.25
474	<0.25	0.9	0.7	0.4	1.0	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.4	2.9	<0.25
475	31	64	101	35	15	5.2	14	1.5	0.6	<0.05	<0.05	<0.05	<0.25	<0.22	3.7	11	<0.25
476	<0.25	3.9	6.5	4.7	3.2	1.1	0.3	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.8	0.9	<0.25
477	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
478	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25

ID	PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFUnDA	PFDoDA	PFTriDA	PFTeDA	PFHxDA	PFOcDA	PFBS	PFHxS	PFOS	PFDS
479	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
480	<0.25	<0.03	1.5	0.3	0.7	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	0.5	5.4	5.6	<0.25
481	<0.25	<0.03	1.3	0.2	0.4	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	0.6	10	0.3	<0.25
482	<0.25	<0.03	<0.09	0.1	<0.40	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
483	<0.25	<0.03	<0.09	0.1	<0.40	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
484	<0.25	<0.03	<0.09	0.1	<0.40	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
485	<0.25	<0.03	0.3	0.4	1.0	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
486	<0.25	<0.03	<0.09	0.1	<0.40	0.09	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
487	<0.25	<0.03	<0.09	<0.05	<0.40	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
488	<0.25	<0.03	<0.09	0.1	<0.40	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
489	<0.25	<0.03	<0.09	0.1	<0.40	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
490	0.6	<0.03	0.1	0.09	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
491	<0.25	<0.03	4.2	1.0	3.1	0.4	0.2	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	3.5	6.1	<0.25
493	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.3	<0.21	<0.25
494	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
497	<0.25	<0.03	0.6	0.4	1.1	0.3	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.3	2.4	<0.25
498	<0.25	<0.03	<0.09	0.2	<0.40	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
499	<0.25	<0.03	0.3	0.4	1.0	0.1	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
500	<0.25	<0.03	0.1	0.1	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
501	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
502	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
503	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
504	<0.25	<0.03	0.3	0.07	1.0	0.1	0.6	<0.16	0.4	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
505	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
506	11	5.0	9.4	8.7	9.7	8.7	8.4	8.9	8.3	4.1	2.3	0.9	0.4	8.9	20	8.6	4.7

ID	PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFUnDA	PFDoDA	PFTriDA	PFTeDA	PFHxDA	PFOcDA	PFBS	PFHxS	PFOS	PFDS
507	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
508	<0.25	<0.03	<0.09	<0.05	<0.40	0.09	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
509	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
510	<0.25	<0.03	0.1	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25
511	<0.25	<0.03	0.3	0.2	0.6	0.2	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	0.2	<0.21	<0.25
512	<0.25	<0.03	<0.09	<0.05	<0.40	<0.08	<0.19	<0.16	<0.19	<0.05	<0.05	<0.05	<0.25	<0.22	<0.15	<0.21	<0.25

Table A.6 *Continuing.*

ID	6:2 FTSA	FOSA	N-MeFOSA	N-EtFOSA	N-MeFOSE	N-EtFOSE	FOSAA	N-MeFOSAA	N-EtFOSAA	∑PFCAs	∑PFSAs	∑PFAS precursors	Σ11:PFASs	Σ:PFASs
1-1	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	ND	ND	ND
1-2	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	ND	ND	ND
1-3	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.2	ND	ND	0.2	0.2
2	<1.79	0.2	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.7	ND	0.2	1.7	1.9
3	<1.79	0.2	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.7	ND	0.2	1.7	1.8
4	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	ND	ND	ND
5	<1.79	0.2	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.5	ND	0.2	0.5	0.7
6	<1.79	0.1	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.3	ND	0.1	0.3	0.4
7	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	2.1	ND	ND	2.1	2.1
8	<1.79	0.3	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.4	ND	0.3	0.4	0.6
9	<1.79	0.4	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	0.4	ND	0.4
10	<1.79	0.2	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	0.2	ND	0.2
11	11	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	11	11	11
12	<1.79	0.2	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	0.2	ND	0.2
13	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	ND	ND	ND
14	<1.79	0.3	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	0.3	ND	0.3
15	6.0	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	6.0	6.0	6.0
16	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	ND	ND	ND
17	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	ND	ND	ND
18	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	ND	ND	ND
20	<1.79	0.3	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	47	119	0.3	165.3	166
21	<1.79	1.1	<0.05	<0.05	<1.00	<0.25	<0.25	7.4	<0.25	4.9	21	8.5	26.2	35
22	<1.79	0.9	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	0.9	ND	0.9

ID	6:2 FTSA	FOSA	N-MeFOSA	N-EtFOSA	N-MeFOSE	N-EtFOSE	FOSAA	N-MeFOSAA	N-EtFOSAA	∑PFCAs	∑PFSAs	∑PFAS precursors	Σ11:PFASs	Σ:PFASs
23	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	ND	ND	ND
24	<1.79	0.1	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	0.5	0.1	0.5	0.6
25	<1.79	0.2	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	0.2	ND	0.2
26	<1.79	0.2	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	0.2	ND	0.2
27	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.7	ND	ND	0.7	0.7
28	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	ND	ND	ND
29	<1.79	0.1	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.9	2.2	0.1	3.1	3.3
30	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	6.4	0.3	ND	5.1	6.8
31-1	25	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	4.1	3.2	25	31	32
31-2	26	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	4.2	3.3	26	32.1	33
31-3	9.5	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	2.1	1.8	9.5	13	13
32	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.3	ND	ND	0.3	0.3
33	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	2.4	ND	ND	2.4	2.4
34	<1.79	0.1	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	2.4	0.6	0.1	3	3.2
35	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.6	ND	ND	0.6	0.6
36	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.6	ND	ND	1.6	1.7
37	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.09	ND	ND	0.1	0.1
38	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.9	0.9	ND	2.8	2.8
39-1	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.2	ND	ND	0.2	0.3
39-2	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.3	ND	ND	0.3	0.4
39-3	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.2	ND	ND	0.2	0.2
40	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.2	ND	ND	0.2	0.3
41	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.2	ND	ND	0.2	0.2
42	<1.79	0.6	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	0.6	ND	0.6

ID	6:2 FTSA	FOSA	N-MeFOSA	N-EtFOSA	N-MeFOSE	N-EtFOSE	FOSAA	N-MeFOSAA	N-EtFOSAA	∑PFCAs	∑PFSAs	∑PFAS precursors	Σ11:PFASs	Σ:PFASs
43	<1.79	0.7	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	0.2	0.7	0.2	0.9
44	<1.79	0.2	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	0.2	ND	0.2
45	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.8	ND	ND	0.8	0.8
46	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	ND	ND	ND
47	<1.79	0.2	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	0.2	0.2	0.2	0.4
48	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.3	2.1	ND	3.4	3.4
49	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.2	2.1	ND	3.3	3.3
50	<1.79	0.3	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	0.3	ND	0.3
51	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.4	ND	ND	0.4	0.4
52	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	ND	ND	ND
53	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	ND	ND	ND
54	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	ND	ND	ND
55	18	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	43	9.0	18	69	69
56	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.2	ND	ND	0.2	0.3
57	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.0	ND	ND	0.9	0.9
58	<1.79	0.2	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	4.2	2.7	0.2	6.9	7.2
59	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	ND	ND	ND
60	<1.79	0.5	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	30	3.2	0.5	33	34
61	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	1.9	ND	1.9	2.0
62	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.4	0.6	ND	1.0	1.1
63	<1.79	0.8	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	3.8	58	0.8	61	63
64	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.2	0.5	ND	1.6	1.6
65	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.0	0.2	ND	1.1	1.1
66	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.1	ND	ND	0.1	0.1

ID	6:2 FTSA	FOSA	N-MeFOSA	N-EtFOSA	N-MeFOSE	N-EtFOSE	FOSAA	N-MeFOSAA	N-EtFOSAA	∑PFCAs	∑PFSAs	∑PFAS precursors	Σ11:PFASs	Σ:PFASs
67	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	ND	ND	ND
68	<1.79	0.3	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	0.3	ND	0.3
69	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	0.2	ND	0.2	0.2
70	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	0.4	ND	0.4	0.4
71	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	1.2	ND	1.2	1.2
72	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	45	27	ND	72	72
73	72	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	352	118	72	542	543
74	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	3.0	ND	ND	3.0	3.0
75	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.2	ND	ND	0.2	0.2
76	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.2	ND	ND	0.2	0.2
77	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.2	ND	ND	0.2	0.2
78	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	5.0	1.0	ND	4.4	6.0
79	<1.79	0.1	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.6	ND	0.1	0.6	0.7
80	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.5	ND	ND	1.5	1.5
81	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.3	ND	ND	1.3	1.3
82	<1.79	0.1	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.5	ND	0.1	0.3	0.6
83	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.1	ND	ND	0.1	0.1
84	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.1	ND	ND	1.1	1.1
85	9.5	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.6	0.3	9.5	11	11
86	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.5	ND	ND	1.5	1.6
87	8.7	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.1	0.7	8.7	9.8	10
88-1	<1.79	0.4	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	72	76	0.4	148	149
88-2	<1.79	0.4	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	67	70	0.4	136	139
88-3	1.7	0.3	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	68	69	2.0	138	140

ID	6:2 FTSA	FOSA	N-MeFOSA	N-EtFOSA	N-MeFOSE	N-EtFOSE	FOSAA	N-MeFOSAA	N-EtFOSAA	∑PFCAs	∑PFSAs	∑PFAS precursors	Σ11:PFASs	Σ:PFASs
89	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	3.8	0.6	ND	2.6	4.3
90	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	3.7	0.6	ND	3.1	4.3
91	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	5.5	0.5	ND	4.4	6.2
92	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	4.7	1.2	ND	4.1	6.0
93	<1.79	0.2	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.4	ND	0.2	0.4	0.7
94	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	2.9	0.5	ND	2.7	3.3
95	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	3.5	0.2	ND	2.2	3.5
96	<1.79	0.1	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.8	16	0.1	17	17
97	9.8	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.2	1.4	9.8	11.5	12
98	9.3	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	50	9.7	9.3	68	69
99	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	6.1	1.7	ND	6.1	7.9
100	<1.79	0.2	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.4	1.6	0.2	2.0	2.2
101	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.8	ND	ND	0.8	0.8
102	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.0	ND	ND	1.0	1.0
103	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.5	5.4	ND	5.9	5.9
104	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.3	0.2	ND	0.45	0.5
105	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.2	0.2	ND	0.4	0.4
106	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.2	ND	ND	0.2	0.2
107	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.5	1.1	ND	2.5	2.5
108	9.7	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	2.1	0.9	9.7	12	13
109	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	20	2.5	ND	18	22
110	161	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	0.4	0.8	249	347	162	757	757
111-1	8.4	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	16	7.1	8.4	31	31
111-2	8.3	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	16	6.5	8.3	31	31

ID	6:2 FTSA	FOSA	N-MeFOSA	N-EtFOSA	N-MeFOSE	N-EtFOSE	FOSAA	N-MeFOSAA	N-EtFOSAA	∑PFCAs	∑PFSAs	∑PFAS precursors	Σ11:PFASs	Σ:PFASs
111-3	8.4	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	17	6.6	8.4	31	31
112	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.3	0.7	ND	2.0	2.1
113	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	8.5	24	ND	32	32
114	3.5	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	4.1	8.4	3.5	12	16
115	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.6	0.3	ND	0.9	0.9
116	132	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	4.2	16	1020	133	152	1282	1300
117	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.1	2.3	ND	2.4	2.5
118	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	ND	ND	ND
119	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.1	0.9	ND	1.0	1.0
120	<1.79	0.1	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.2	3.0	0.1	3.2	3.3
121	<1.79	0.2	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	2.8	0.2	2.8	3.0
122-1	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	2.8	0.8	ND	3.6	3.6
122-2	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	2.9	0.6	ND	3.4	3.4
122-3	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	2.9	0.8	ND	3.6	3.6
123	<1.79	0.1	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.2	ND	0.1	0.2	0.3
124	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.5	1.1	ND	2.5	2.5
125	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.4	0.3	ND	0.7	0.7
126	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.7	ND	ND	1.6	1.6
127	<1.79	0.1	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.9	0.3	0.1	1.2	1.3
128	<1.79	0.1	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	2.4	0.9	0.1	3.3	3.5
129	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	9.8	0.8	ND	9.7	11
130	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.0	0.7	ND	1.7	1.7
131	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	3.5	1.2	ND	4.3	4.6
132	3.9	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	5.5	2.8	3.9	12	12

ID	6:2 FTSA	FOSA	N-MeFOSA	N-EtFOSA	N-MeFOSE	N-EtFOSE	FOSAA	N-MeFOSAA	N-EtFOSAA	∑PFCAs	∑PFSAs	∑PFAS precursors	Σ11:PFASs	Σ:PFASs
133	6.8	0.3	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	6.1	5.5	7.1	18.2	19
134	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.9	0.6	ND	2.5	2.5
135-1	11	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	7.3	5.2	11	24	24
135-2	9.8	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	6.8	5.0	9.8	22	22
135-3	12	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	7.3	5.0	12	23.5	24
136	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.7	ND	ND	0.7	0.7
137	<1.79	3.0	<0.05	<0.05	<1.00	<0.25	0.5	<0.25	<0.25	2.9	1.6	3.5	4.5	7.9
138	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	5.8	7.5	ND	13	13
139	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.5	2.2	ND	2.7	2.7
140	2.0	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	31	2.7	2.0	35	35
141	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	64	ND	ND	63	63
142	<1.79	6.0	<0.05	<0.05	<1.00	<0.25	1.0	<0.25	<0.25	4.0	2.3	7.0	6.3	13
143	9.5	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	123	21	9.5	153	153
144	<1.79	0.5	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.8	0.3	0.5	2.1	2.6
145	6.5	0.4	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	5.1	7.7	6.9	19.3	20
146	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	5.5	1.4	ND	7.0	7.0
147	2.0	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	6.5	6.1	2.0	14.6	15
148	<1.79	2.9	<0.05	<0.05	<1.00	<0.25	0.5	<0.25	<0.25	1.3	0.8	3.4	2.1	5.4
150	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.8	0.3	ND	1.0	1.0
151	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	ND	ND	ND
152	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.8	0.3	ND	2.1	2.1
153	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.3	ND	ND	0.3	0.3
154	<1.79	0.4	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	0.4	ND	0.4
155	2.4	0.1	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	21	13	2.5	36	36

ID	6:2 FTSA	FOSA	N-MeFOSA	N-EtFOSA	N-MeFOSE	N-EtFOSE	FOSAA	N-MeFOSAA	N-EtFOSAA	∑PFCAs	∑PFSAs	∑PFAS precursors	Σ11:PFASs	Σ:PFASs
156	2.2	0.2	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	18	14	2.4	34.7	35
157	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	ND	ND	ND
158	<1.79	0.5	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.1	2.5	0.5	2.6	3.2
159	<1.79	0.1	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	0.1	ND	0.1
160	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	ND	ND	ND
161	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.2	ND	ND	0.2	0.2
162	<1.79	0.9	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	0.9	ND	0.9
163	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.4	ND	ND	0.4	0.4
164	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.09	ND	ND	0.09	0.09
165	<1.79	0.2	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.2	ND	0.2	0.2	0.4
166	47	3.1	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	460	3450	50	3950	3950
167	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	ND	ND	ND
168-1	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	ND	ND	ND
168-2	<1.79	3.5	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	11	2.2	3.5	10	17
168-3	3.3	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	8.2	9.4	3.3	21	21
169	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.2	0.6	ND	1.8	1.8
170	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.2	0.6	ND	1.8	1.9
171	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	2.3	2.8	ND	5.2	5.2
172	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	ND	ND	ND
173	<1.79	0.3	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	0.3	ND	0.3
174	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	ND	ND	ND
175	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	ND	ND	ND
176	19	0.2	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	91	106	19	216	216
177	<1.79	0.2	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.1	ND	0.2	0.1	0.3

ID	6:2 FTSA	FOSA	N-MeFOSA	N-EtFOSA	N-MeFOSE	N-EtFOSE	FOSAA	N-MeFOSAA	N-EtFOSAA	∑PFCAs	∑PFSAs	∑PFAS precursors	Σ11:PFASs	Σ:PFASs
178	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	ND	ND	ND
179	29	0.8	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	34	6.2	30	69	69
180	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.4	ND	ND	0.4	0.4
181	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.6	ND	ND	0.6	0.6
182	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.5	0.2	ND	1.7	1.7
183	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.3	ND	ND	0.3	0.3
184	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	5.1	ND	ND	5.1	5.2
185	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	4.3	0.8	ND	3.8	5.1
186	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.2	0.6	ND	1.8	1.9
187	22	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	34	63	22	119	119
188	16	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	0.5	96	28	17	140	141
189	24	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	0.8	326	92	25	432	442
190	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	20	4.5	ND	24	24
191	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	13	0.7	ND	12.7	14
192	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	60	9.0	ND	52.2	70
193	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	4.3	0.6	ND	3.6	4.9
194-1	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.2	ND	ND	1.2	1.2
194-2	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.3	0.8	ND	2.1	2.2
194-3	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.0	ND	ND	0.9	0.9
195	<1.79	0.2	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.09	ND	0.2	0.1	0.3
196	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	ND	ND	ND
197	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.3	ND	ND	0.3	0.3
198	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	ND	ND	ND
199	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.2	0.4	ND	0.6	0.6

ID	6:2 FTSA	FOSA	N-MeFOSA	N-EtFOSA	N-MeFOSE	N-EtFOSE	FOSAA	N-MeFOSAA	N-EtFOSAA	∑PFCAs	∑PFSAs	∑PFAS precursors	Σ11:PFASs	Σ:PFASs
200	13	0.2	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	0.4	21	14	14	48	49
201	9.8	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	20	21	9.8	51	51
202	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	3.3	2.9	ND	6.2	6.3
203	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	4.1	6.6	ND	11	11
204	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.3	0.5	ND	1.8	1.8
205	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	3.0	14	ND	17	17
206	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.3	ND	ND	1.2	1.2
207	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.2	0.3	ND	1.4	1.4
208	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.3	ND	ND	1.3	1.3
209	<1.79	0.3	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.8	12	0.3	12	13
210	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.2	0.6	ND	1.8	1.8
211	<1.79	0.2	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.3	3.4	0.2	4.7	4.9
212	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	13	0.7	ND	10	14
213	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	ND	ND	ND
214	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.7	0.7	ND	1.3	1.3
215	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.6	14	ND	14	14
216	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.1	0.2	ND	1.3	1.4
217	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	2.4	6.5	ND	8.9	8.9
218	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.3	0.8	ND	2.1	2.2
219	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	2.9	2.5	ND	5.4	5.4
220	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	3.5	9.2	ND	13	13
222	<1.79	0.4	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	4.2	ND	0.4	4.2	4.7
223	30	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	65	6.1	30	101	101
224	495	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	249	294	495	1038	1040

ID	6:2 FTSA	FOSA	N-MeFOSA	N-EtFOSA	N-MeFOSE	N-EtFOSE	FOSAA	N-MeFOSAA	N-EtFOSAA	∑PFCAs	∑PFSAs	∑PFAS precursors	Σ11:PFASs	Σ:PFASs
225	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	56	0.2	ND	56	57
226	14	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	17	113	14	144	144
227	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	2.7	0.7	ND	3.4	3.5
228	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.7	0.4	ND	1.1	1.1
229	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	3.2	0.7	ND	3.9	3.9
230	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.4	ND	ND	1.4	1.4
234	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.8	ND	ND	0.8	0.8
236	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	ND	ND	ND
237	95	<0.11	<0.05	<0.05	<1.00	<0.25	0.9	<0.25	2.8	433	162	99	690	694
238	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	9.0	5.1	ND	14	14
239	64	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	93	16	64	172	172
240	<1.79	0.2	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	0.2	ND	0.2
241	59	0.3	<0.05	<0.05	<1.00	<0.25	<0.25	0.3	0.4	311	40	60	409	411
242	41	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	281	37	41	357	357
243	5.7	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	4.6	1.4	5.7	12	12
244	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	ND	ND	ND
245	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	ND	ND	ND
246	32	0.3	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	21	19	32	72	72
247	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	3.2	0.3	ND	3.4	3.4
248	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.2	ND	ND	0.2	0.3
249	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	ND	ND	ND
250	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.2	ND	ND	0.2	0.2
251	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.08	ND	ND	0.08	0.08
252	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	3.4	23	ND	26	26

ID	6:2 FTSA	FOSA	N-MeFOSA	N-EtFOSA	N-MeFOSE	N-EtFOSE	FOSAA	N-MeFOSAA	N-EtFOSAA	∑PFCAs	∑PFSAs	∑PFAS precursors	Σ11:PFASs	Σ:PFASs
253	<1.79	1.0	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	1.0	ND	1.0
254	24	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	326	78	24	427	427
255	6.5	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	22	5.9	6.5	35	35
256	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	4.3	0.5	ND	4.8	5.0
257	62	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	2.3	413	74	64	549	551
258	11	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	2.5	0.8	11	13	14
259	14	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	19	6.4	14	38	39
260	13	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	12	7.3	13	32	32
261	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	2.7	2.8	ND	5.5	5.5
262	30	<0.11	<0.05	<0.05	<1.00	<0.25	0.6	<0.25	0.4	25	7.0	31	61	64
263	11	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	3.3	2.0	11	16	16
264	12	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	11	7.6	12	30	30
265	12	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	11	5.6	12	28	29
266	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	3.3	1.6	ND	4.8	4.8
267	5.3	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	9.1	3.0	5.3	17	17
268	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	3.1	2.0	ND	5.0	5.0
269	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.0	ND	ND	1.0	1.0
270	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.7	ND	ND	1.7	1.7
271	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	34	1.1	ND	35	35
272	2.6	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	13	13	2.6	28	28
273	95	0.3	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	26	63	95	184	184
274	101	0.2	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	27	51	101	179	180
275	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.5	0.6	ND	2.1	2.1
276	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	3.0	1.1	ND	4.1	4.1

ID	6:2 FTSA	FOSA	N-MeFOSA	N-EtFOSA	N-MeFOSE	N-EtFOSE	FOSAA	N-MeFOSAA	N-EtFOSAA	∑PFCAs	∑PFSAs	∑PFAS precursors	Σ11:PFASs	Σ:PFASs
277	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.6	ND	ND	1.6	1.6
278	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.2	ND	ND	0.2	0.2
279	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	13	4.1	ND	17	17
280	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	3.1	3.9	ND	6.9	6.9
281	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	ND	ND	ND
283	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.5	4.0	ND	4.5	4.5
284	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.1	6.7	ND	7.8	7.8
285	9.1	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	23	10	9.1	42	42
286	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	16	5.1	ND	21	21
287	59	0.6	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	32	88	60	179	179
288	45	0.5	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	31	165	46	241	242
289	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.4	0.3	ND	0.7	0.8
290	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.1	ND	ND	1.1	1.1
291	118	0.6	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	27	27	119	172	173
292	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.6	ND	ND	0.6	0.6
293	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.08	0.5	ND	0.5	0.5
294	11	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	8.9	5.7	11	26	26
295	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	8.4	3.4	ND	12	12
296	45	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	79	33	45	157	157
297	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.6	ND	ND	0.5	0.5
298	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	2.1	0.2	ND	2.0	2.2
299	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.9	ND	ND	1.9	1.9
300	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.1	ND	ND	0.1	0.1
301	13	0.2	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	0.4	21	13	14	47	47

ID	6:2 FTSA	FOSA	N-MeFOSA	N-EtFOSA	N-MeFOSE	N-EtFOSE	FOSAA	N-MeFOSAA	N-EtFOSAA	∑PFCAs	∑PFSAs	∑PFAS precursors	Σ11:PFASs	Σ:PFASs
302	30	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	77	5.8	30	112	112
303	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	3.0	5.7	ND	8.7	8.7
305	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.3	0.8	ND	2.0	2.0
306	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.1	ND	ND	0.1	0.1
307	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	2.1	4.6	ND	6.7	6.7
308	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.4	ND	ND	0.3	0.3
309	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.2	ND	ND	0.2	0.2
310	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.2	ND	ND	0.2	0.2
311	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.7	0.2	ND	0.9	0.9
312	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.5	0.7	ND	2.1	2.1
313	1.7	0.2	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	0.5	20	12	2.4	33	34
314	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.1	ND	ND	0.1	0.1
315	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.05	ND	ND	0.05	0.05
316	3.7	0.3	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.5	1.0	4.0	5.0	6.5
318	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.2	ND	ND	1.2	1.2
319	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.2	0.2	ND	0.4	0.4
320	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.7	0.3	ND	2.0	2.0
321	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.1	ND	ND	0.1	0.1
322	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	ND	ND	ND
323	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	2.8	ND	ND	2.8	2.8
324	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	ND	ND	ND
326	5.5	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	19	71	5.5	94	94
327	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.5	ND	ND	0.5	0.5
328	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.3	0.3	ND	1.6	1.7

ID	6:2 FTSA	FOSA	N-MeFOSA	N-EtFOSA	N-MeFOSE	N-EtFOSE	FOSAA	N-MeFOSAA	N-EtFOSAA	∑PFCAs	∑PFSAs	∑PFAS precursors	Σ11:PFASs	Σ:PFASs
329	4.8	0.8	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	31	85	5.6	121	122
330	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.6	ND	ND	0.5	0.5
331	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.2	ND	ND	0.2	0.2
332	3.1	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	4.2	1.1	3.1	8.4	8.4
333	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	ND	ND	ND
334	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.4	ND	ND	0.3	0.3
335	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.07	ND	ND	0.07	0.07
336	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.2	ND	ND	0.2	0.3
337	24	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	33	14	24	70	70
338	6.4	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	8.7	2.3	6.4	17	17
339	3.0	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	4.3	26	3.0	33	33
340	2.2	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	3.7	14	2.2	20	20
341	3.1	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	2.6	9.1	3.1	15	15
342	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	57	103	ND	159	159
343	4.5	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	2.8	0.2	4.5	7.5	7.5
344	3.8	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	2.2	8.5	3.8	14	14
345	3.3	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	7.9	14	3.3	25	25
346	2.8	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.5	ND	2.8	3.3	3.3
347	2.3	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.6	15	2.3	19	19
348	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	2.5	0.3	ND	2.3	2.7
349	<1.79	0.6	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	0.6	ND	0.6
350	19	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	85	41	19	144	145
351	7.3	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	5.5	5.3	7.3	18	18
352	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	9.2	2.3	ND	12	12

ID	6:2 FTSA	FOSA	N-MeFOSA	N-EtFOSA	N-MeFOSE	N-EtFOSE	FOSAA	N-MeFOSAA	N-EtFOSAA	∑PFCAs	∑PFSAs	∑PFAS precursors	Σ11:PFASs	Σ:PFASs
353	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	52	100	ND	151	151
354	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	3.8	21	ND	25	25
355	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	4.1	16	ND	20	20
356	<1.79	0.1	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	6.8	40	0.1	47	47
357	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	2.3	0.3	ND	2.6	2.6
358	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	3.1	9.3	ND	12	12
359	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	11	10	ND	21	21
360	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	ND	ND	ND
361	<1.79	0.2	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	0.2	ND	0.2
362	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.07	ND	ND	0.07	0.07
363	<1.79	0.2	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	0.2	ND	0.2
364	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.9	12	ND	14	14
365	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.2	ND	ND	0.2	0.2
366	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	7.2	29	ND	36	36
367	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	2.0	0.5	ND	2.4	2.4
368	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	2.0	0.9	ND	2.9	3.0
369	145	0.2	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	104	67	145	315	315
370	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.5	0.5	ND	1.9	1.9
371	4.5	0.4	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	18	74	4.9	96	97
372	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	2.4	5.8	ND	8.2	8.2
373	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	5.0	1.0	ND	6.0	6.1
374	24	0.2	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	36	149	24	209	210
375	2.2	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	6.4	1.2	2.2	9.8	9.7
376	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.4	0.3	ND	1.7	1.7

ID	6:2 FTSA	FOSA	N-MeFOSA	N-EtFOSA	N-MeFOSE	N-EtFOSE	FOSAA	N-MeFOSAA	N-EtFOSAA	∑PFCAs	∑PFSAs	∑PFAS precursors	Σ11:PFASs	Σ:PFASs
377	9.4	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	5.2	1.8	9.4	16	16
378	15	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	24	114	15	153	154
379	11	0.1	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	5.1	2.0	11	18	18
380	3.5	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	2.2	0.6	3.5	6.3	6.4
381	17	0.7	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	64	266	18	347	347
382	7.9	0.4	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	39	179	8.3	225	225
383	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.4	ND	ND	1.4	1.4
384	5.4	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	4.3	1.1	5.4	11	11
385	572	0.6	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	825	733	573	1996	2130
386	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	120	55	ND	174	174
387	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.0	0.2	ND	1.1	1.1
388	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.5	ND	ND	0.4	0.5
389	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.7	ND	ND	0.7	0.7
390	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	2.2	3.8	ND	5.9	6.0
391	4.9	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	4.9	15	4.9	24	24
392	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	2.7	2.6	ND	5.3	5.3
393	36	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	47	1.5	36	84	85
394	<1.79	0.1	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	1.3	0.1	1.3	1.4
395	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	ND	ND	ND
396	<1.79	0.1	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	0.1	ND	0.1
397	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	0.4	ND	0.4	0.4
398	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.5	5.1	ND	5.6	5.6
399	<1.79	0.4	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.3	2.0	0.4	2.3	2.6
409	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	2.7	1.4	ND	4.0	4.0

ID	6:2 FTSA	FOSA	N-MeFOSA	N-EtFOSA	N-MeFOSE	N-EtFOSE	FOSAA	N-MeFOSAA	N-EtFOSAA	∑PFCAs	∑PFSAs	∑PFAS precursors	Σ11:PFASs	Σ:PFASs
410	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	2.1	0.7	ND	2.8	2.9
411	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.7	ND	ND	0.7	0.7
412	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	47	12	ND	58	58
414	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	2.0	6.8	ND	8.8	8.8
415	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	20	1.1	ND	21	21
416	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	ND	ND	ND
418	9.2	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	7.3	5.4	9.2	21	22
420	8.4	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	5.0	5.7	8.4	19	19
421	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.2	ND	ND	1.2	1.2
422	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.4	ND	ND	0.4	0.4
423	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.5	1.9	ND	2.4	2.5
424	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.2	1.2	ND	1.4	1.4
425	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.5	0.3	ND	0.8	0.8
426	79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	14	34	79	126	126
427	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.1	ND	ND	1.0	1.0
428	2.2	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	3.1	2.1	2.2	7.3	7.3
429	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	4.2	ND	ND	4.2	4.3
430	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.0	ND	ND	1.0	1.0
431	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	4.4	2.2	ND	6.6	6.7
432	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.8	ND	ND	0.8	0.9
433	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.2	ND	ND	0.2	0.2
434	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.3	ND	ND	0.3	0.3
435	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.3	ND	ND	0.3	0.4
436	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.7	0.6	ND	1.2	1.2

ID	6:2 FTSA	FOSA	N-MeFOSA	N-EtFOSA	N-MeFOSE	N-EtFOSE	FOSAA	N-MeFOSAA	N-EtFOSAA	∑PFCAs	∑PFSAs	∑PFAS precursors	Σ11:PFASs	Σ:PFASs
437	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.3	ND	ND	0.3	0.3
438	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.8	1.0	ND	1.7	2.8
441	70	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	88	111	70	269	269
442	3.7	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.4	1.1	3.7	5.1	6.2
443	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.4	0.2	ND	1.6	1.6
445	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	4.5	0.9	ND	5.2	5.4
446	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	46	11	ND	51	57
447	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	3.0	2.0	ND	4.2	4.9
448	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.8	ND	ND	0.8	0.9
449	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.3	5.2	ND	5.6	5.6
450-1	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.2	ND	ND	0.2	0.2
450-2	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	ND	ND	ND
450-3	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	ND	ND	ND
451	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.08	ND	ND	0.08	0.08
452	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.9	56	ND	57	57
453	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	ND	ND	ND
454	1610	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	3740	7550	1610	12900	12900
456	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	2.2	0.5	ND	2.7	2.8
457	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	ND	ND	ND
458	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.1	ND	ND	0.1	0.1
459	435	11	<0.05	<0.05	<1.00	<0.25	0.8	<0.25	<0.25	436	2420	447	3287	3300
460	<1.79	0.2	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	0.2	ND	0.2
461	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	2.2	0.7	ND	2.8	2.8
462	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	3.3	2.8	ND	6.1	6.2

ID	6:2 FTSA	FOSA	N-MeFOSA	N-EtFOSA	N-MeFOSE	N-EtFOSE	FOSAA	N-MeFOSAA	N-EtFOSAA	∑PFCAs	∑PFSAs	∑PFAS precursors	Σ11:PFASs	Σ:PFASs
463	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	1.2	ND	1.2	1.2
464	30	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	64	0.7	30	94	94
465	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	3.1	4.5	ND	7.6	7.6
466	5.7	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	17	26	5.7	49	49
467	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	ND	ND	ND
468	18	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	4.3	13	18	35	36
469	4.1	2.4	<0.05	0.6	<1.00	<0.25	1.5	<0.25	12	203	122	21	329	346
470	7.2	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	28	118	7.2	154	154
471	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	ND	ND	ND
472	54	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	56	54	54	163	164
473	2680	0.3	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	3740	2.1	2680	6336	6420
474	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	3.2	3.3	ND	6.5	6.5
475	166	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	267	15	166	446	448
476	50	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	20	1.7	50	71	72
477	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	ND	ND	ND
478	<1.79	0.2	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	0.2	ND	0.2
479	<1.79	0.2	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	0.2	ND	0.2
480	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	2.5	12	ND	14	14
481	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.9	11	ND	13	13
482	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.2	ND	ND	0.2	0.2
483	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.2	ND	ND	0.2	0.2
484	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.2	ND	ND	0.2	0.2
485	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.8	ND	ND	1.8	1.9
486	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.2	ND	ND	0.2	0.2

ID	6:2 FTSA	FOSA	N-MeFOSA	N-EtFOSA	N-MeFOSE	N-EtFOSE	FOSAA	N-MeFOSAA	N-EtFOSAA	∑PFCAs	∑PFSAs	∑PFAS precursors	Σ11:PFASs	Σ:PFASs
487	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.1	ND	ND	0.1	0.1
488	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.2	ND	ND	0.2	0.2
489	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.2	ND	ND	0.2	0.3
490	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.8	ND	ND	0.8	0.8
491	3.2	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	8.9	9.6	3.2	22	22
493	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	0.3	ND	0.3	0.3
494	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	ND	ND	ND
497	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	2.4	2.7	ND	5.1	5.1
498	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.3	ND	ND	0.2	0.3
499	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.8	ND	ND	1.8	1.9
500	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.2	ND	ND	0.2	0.2
501	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	ND	ND	ND
502	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	ND	ND	ND
503	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	ND	ND	ND
504	9.0	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	2.5	ND	9.0	11	11
505	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	ND	ND	ND
506	23	9.0	8.4	7.4	7.9	7.8	7.0	8.3	8.0	86	42	87	121	214
507	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	ND	ND	ND
508	<1.79	0.2	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.09	ND	0.2	0.1	0.3
509	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	ND	ND	ND
510	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	0.1	ND	ND	0.1	0.1
511	<1.79	<0.11	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	1.3	0.2	ND	1.5	1.6
512	<1.79	0.3	<0.05	<0.05	<1.00	<0.25	<0.25	<0.25	<0.25	ND	ND	0.3	ND	0.3

A7. PCA analysis for surface water

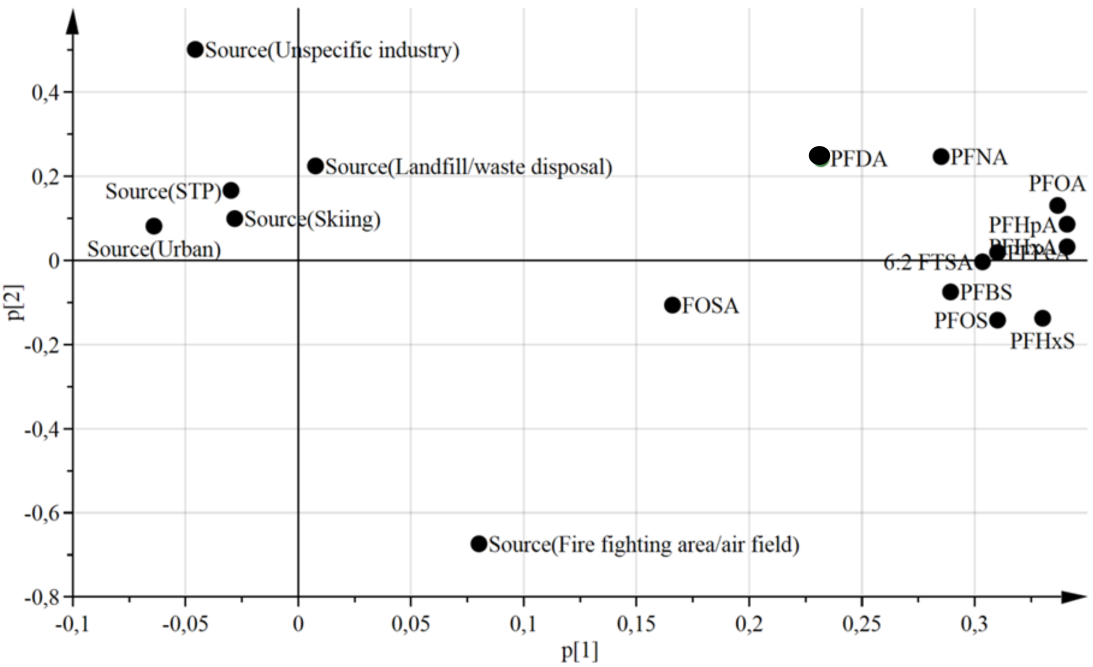

Figure A7 Principal Component Analysis (PCA) for surface water samples (*n*=235) classified by emission source. The model uses 5 Principal Components and has a r2 of 0.73. The model is based on log transformed concentrations. The figure shows the loading plot presenting how the variables are related to each other.