Attachments

Attachment 1 Side 1 - Perfluoroalkyl Carboxylic Acids (PFCAs) in Ambient Waters of the Tidal Delaware River 2009
A. Ronald MacGillivray, Ph.D. Delaware River Basin Commission Source Water Collaborative Webinar (September 2012). "Contaminants of Emerging Concern in the Tidal Delaware River Pilot Monitoring Survey 2007-2009" Power Point Presentation, slide 13

Attachment 1 Side 2 – Fish Fillet 2004 to 2007 PFUnA C11
A. Ronald MacGillivray, Ph.D. Delaware River Basin Commission Source Water Collaborative Webinar (September 2012). "Contaminants of Emerging Concern in the Tidal Delaware River Pilot Monitoring Survey 2007-2009" Power Point Presentation, slide 16

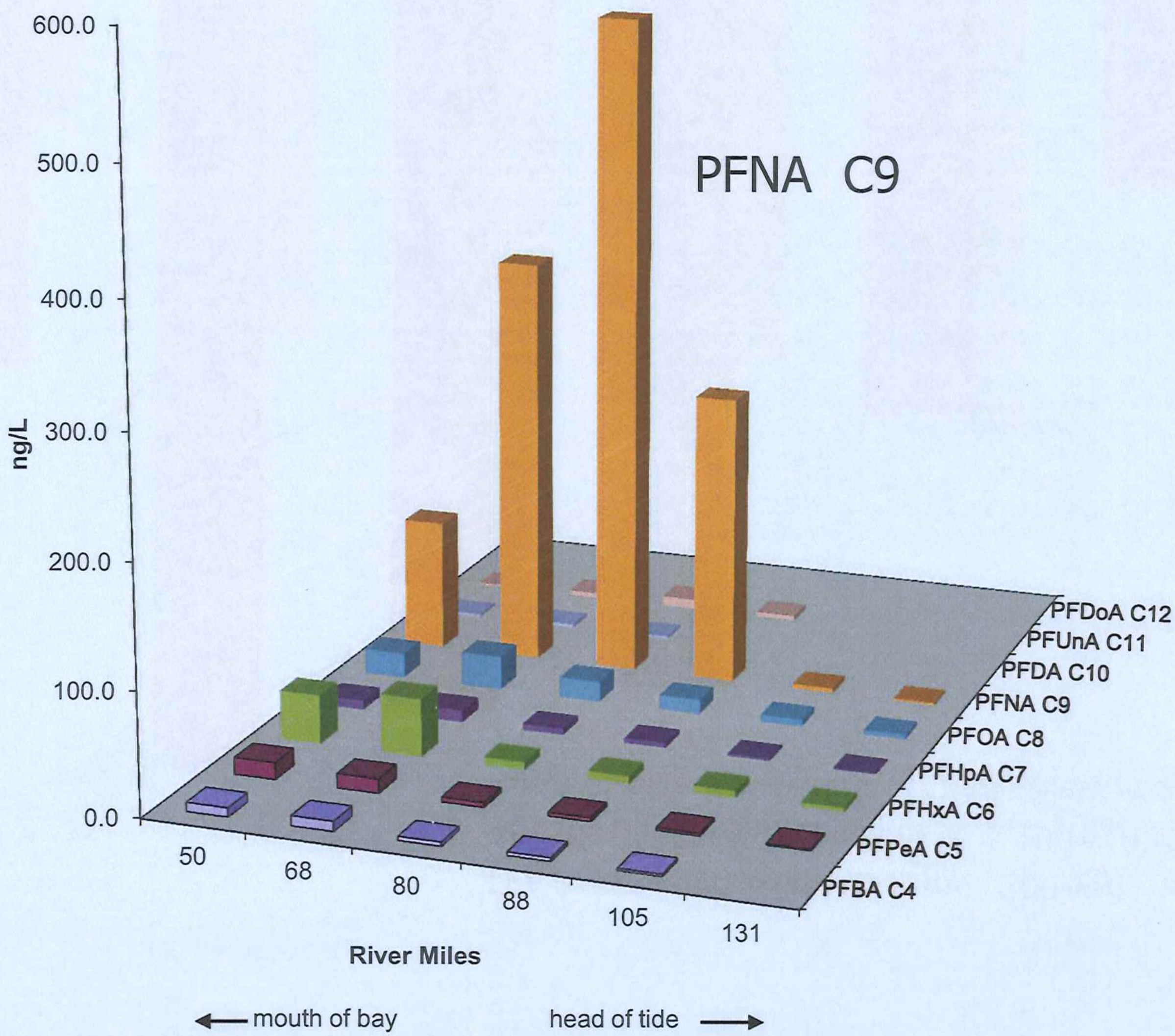
Attachment 2 – 2009 NJDEP Study – Perfluorinated Chemicals in Raw Water Samples from NJ Public Water Supplies (ng/L)
NJ Department of Environmental Protection

Attachment 3 – Emerging Contaminants – Perfluorooctane Sulfonate (PFOS) and Perfluorooctanoic Acid (PFOA), May 2012
U.S. Environmental Protection Agency, Solid Waste and Emergency Response (5106P), EPA 505-F-11-002, May 2012

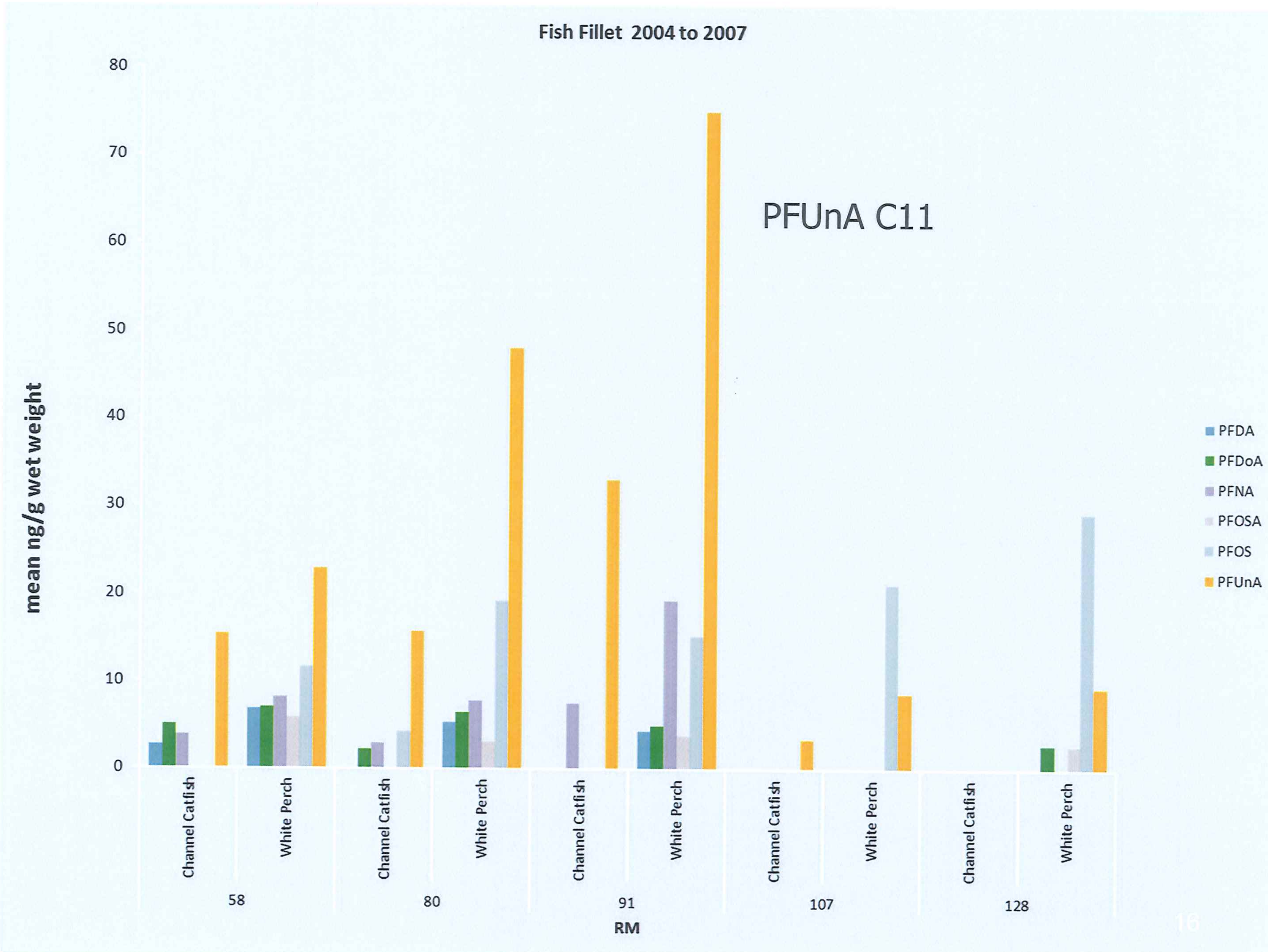
Attachment 4 - APFN/NaPFO Mass Balance
SOLVAY SOLEXIS, INC. 2010/2015 PFOA STEWARDSHIP PROGRAM DOCKET ID NUMBER EPA-HQ-OPPT-2006-0621 Report to USEPA October 31, 2008.
http://www.epa.gov/opptintr/pfoa/pubs/!Solvay%20Solexis%20report.pdf

Attachment #1 Side 1

Perfluoroalkyl Carboxylic Acids (PFCAs) In Ambient Waters Of The Tidal Delaware River 2009



Attachment #1 Side 2



2009 NJDEP Study - Perfluorinated Chemicals in Raw Water Samples from NJ Public Water Supplies (ng/L)

PWSID	System Name	County	Type	PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFBS	PFHxS	PFOS	TOTAL
0251001	Ridgewood Water Department	Bergen	GW-U	6	11	12	<5	30	6	<5	6	<5	7	78
0408001	Camden City Water Department	Camden	GW-U	<5	10	8.5	<5	14	13	<5	<5	7	12	70
0516001	Woodbine MUA	Cape May	GW-U	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ND
0610001	Millville Water Department	Cumberland	GW-U	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ND
0814001	Paulsboro Water Department	Gloucester	GW-U	<5	<5	<5	<5	26	96	<5	<5	<5	10	138
1003001	Bloomsbury Water Department	Hunterdon	GW-U	<5	<5	<5	<5	<5	<5	<5	<5	<5	5	5
1103001	Aqua NJ - Hamilton Square	Mercer	GW-U	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ND
1216001	Perth Amboy Water Department	Middlesex	GW-U	<5	<5	<5	<5	14	<5	<5	<5	<5	<5	14
1321001	Keansburg Water & Sewer Department	Monmouth	GW-C	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ND
0705001	East Orange Water Commission	Morris	GW-U	<5	<5	<5	<5	9	<5	<5	<5	<5	<5	9
1424001	Southeast Morris County MUA	Morris	GW-U	<5	<5	<5	<5	<5	80	<5	<5	<5	<5	80
1429001	Parsippany Troy Hills Water Department	Morris	GW-U	<5	<5	<5	<5	<5	17	<5	<5	<5	<5	17
1507005	United Water Toms River	Ocean	GW-U	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ND
1514002	Lakewood MUA	Ocean	GW-U	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ND
1615001	West Milford MUA - Birch Hill	Passaic	GW-U	<5	74	<5	<5	<5	<5	<5	<5	<5	<5	74
1706305	Bondie & Sons	Salem	GW-U	<5	21	36	22	57	<5	<5	<5	9	<5	145
1713001	Handy's Mobile Park	Salem	GW-C	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ND
1713308	Salem Co. Sportsman Club	Salem	GW-U	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ND
1918004	Sparta Township Water Utility - Lake Mohawk	Sussex	GW-U	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ND
2004002	NJ American Elizabethtown - Netherwood Wellfield	Somerset	GW-U	<5	9	9	<5	31	<5	<5	<5	10	10	69
2102001	Alpha Municipal Water Works	Warren	GW-U	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ND
0102001	Atlantic City - Doughty Pond	Atlantic	SW	<5	10	17	8	32	<5	<5	6	44	25	142
0102001	Atlantic City - Kuehnle Pond	Atlantic	SW	<5	15	16	10	33	5	<5	6	46	43	174
0305001	Burlington City Water Department	Burlington	SW	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ND
0712001	NJ American Water - Short Hills	Essex	SW	<5	<5	<5	<5	9	<5	<5	<5	<5	<5	9
0714001	Newark Water Department	Essex	SW	<5	<5	<5	<5	6	9	<5	<5	<5	<5	15
1214001	New Brunswick Water Department	Middlesex	SW	<5	<5	<5	<5	11	<5	<5	<5	<5	7	18
1225001	Middlesex Water Company	Middlesex	SW	<5	<5	<5	<5	10	<5	<5	<5	<5	6	16
1345001	NJ American Water - Coastal, Northern System	Monmouth	SW	<5	<5	<5	<5	10	<5	<5	<5	<5	<5	10
1401001	Boonton Water Department	Morris	SW	<5	<5	<5	<5	12	19	<5	<5	<5	<5	31
1403001	Butler Water Department	Morris	SW	<5	<5	<5	<5	10	14	<5	<5	<5	<5	24
1506001	Brick Township MUA	Ocean	SW	<5	8	12	10	100	<5	<5	<5	<5	<5	130
2004002	NJ American Elizabethtown - Raritan River	Somerset	SW	<5	7	<5	<5	16	<5	<5	<5	<5	<5	23

Data are for raw water source (groundwater well or surface water intake) for listed public water supply.

GW-U = Unconfined groundwater

GW-C = Confined groundwater

SW = Surface Water

Reporting Level for all PFCs was 5 ng/L.

Totals are based on detected PFCs ($\geq$5 ng/L), with non-detects assumed to be zero.

ND - All PFCs were <5 ng/L.

EPA
United States
Environmental Protection
Agency

Emerging Contaminants – Perfluorooctane Sulfonate (PFOS) and Perfluorooctanoic Acid (PFOA)

December 2012

EMERGING CONTAMINANTS FACT SHEET – PFOS and PFOA

At a Glance

- Fully fluorinated compounds that are human-made substances and not naturally found in the environment.
- Used as a surface-active agent and in variety of products, such as fire fighting foams, coating additives, and cleaning products.
- Does not hydrolyze, photolyze, or biodegrade under environmental conditions and is extremely persistent in the environment.
- Studies have shown it has the potential to bioaccumulate and biomagnify in wildlife.
- Readily absorbed after oral exposure and accumulates primarily in the serum, kidney, and liver.
- Toxicological studies on animals indicate potential developmental, reproductive and systematic effects.
- Health-based advisories or screening levels for PFOS and PFOA have been developed by both the EPA and the states.
- Standard detection methods include high-performance liquid chromatography and tandem mass spectrometry (MS/MS).
- Common water treatment technologies include activated carbon filters and reverse osmosis units.

Introduction

An "emerging contaminant" is a chemical or material that is characterized by a perceived, potential or real threat to human health or the environment or by a lack of published health standards. A contaminant may also be "emerging" because a new source or a new pathway to humans has been discovered or a new detection method or treatment technology has been developed (DoD 2011). This fact sheet, developed by the U.S. Environmental Protection Agency's Federal Facilities Restoration and Reuse Office (FFRRO), provides a brief summary of the emerging contaminants perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA), including physical and chemical properties; environmental and health impacts; existing federal and state guidelines; detection and treatment methods; and additional sources of information.

PFOS and PFOA are extremely persistent in the environment and resistant to typical environmental degradation processes. As a result, they are widely distributed across the higher trophic levels and are found in soil, air, and groundwater at sites across the United States. The toxicity and bioaccumulation potential of PFOS and PFOA indicate a cause of concern for the environment and human health. This fact sheet is intended for use by site managers faced with addressing PFOS and PFOA at cleanup sites or in drinking water supplies and for those in a position to consider whether these chemicals should be added to the analytical suite for site investigations.

What are PFOS and PFOA?

- PFOS and PFOA are fully fluorinated, organic compounds and are the two perfluorinated chemicals (PFCs) made in the largest amounts within the United States (ATSDR 2009).
- PFOS is a perfluoralkyl sulfonate that is commonly used as a simple salt (such as potassium, sodium, or ammonium) or incorporated into larger polymers (EFSA 2008; EPA 2009a).
- PFOA is a perfluoralkyl carboxylate that is produced synthetically as its salts. Ammonium salt is the most widely produced form (EFSA 2008; EPA 2009a).
- PFOS synonyms include 1-octanesulfonic acid, 1-octanesulfonic acid, heptadecafluoro-, 1-perfluorooctanesulfonic acid, heptadecafluoro-1-octanesulfonic acid, perfluoro-n-octanesulfonic acid, perfluoroctanesulfonic acid, and perfluoroctylsulfonic acid (ATSDR 2009; UNEP 2005).
- PFOA synonyms include pentadecafluoro1-octanoic acid, pentadecafluoro-n-octanoic acid, pentadecafluorooctanoic acid, perfluorocaprylic perfluoroctanoic acid, perfluoroheptanecarboxylic acid, and octanoic acid (ATSDR 2009).

What are PFOS and PFOA? (continued)

- They are stable chemicals made of a long carbon chain that is both lipid- and water-repellent. Because of the unique amphiphilic character, PFOS and PFOA are used as surface-active agents in various high-temperature applications and for applications in contact with strong acids or bases (ATSDR 2009; UNEP 2005).
- They are used in a wide variety of industrial and commercial products such as textiles and leather products, fire fighting foams, metal plating, the photographic industry, photolithography, semi-conductors, paper and packaging, coating additives, cleaning products, and pesticides (OECD 2002; EFSA 2008).
- They are human-made compounds and do not naturally occur in the environment (ATSDR 2009; UNEP 2006).
- PFOS and PFOA can be formed by environmental microbial degradation or by metabolism in larger organisms from a large group of related substances or precursor compounds (ATSDR 2009; Condor et al. 2010; UNEP 2006).
- The 3M Company, the primary manufacturer of PFOS, completed a voluntary phase-out of PFOS production in 2002 (ATSDR 2009; UNEP 2007).
- PFOS chemicals are no longer manufactured in United States. However, they can be imported and used for specific limited uses (EPA 2009a).
- PFOA is primarily manufactured for use as an aqueous dispersion agent, as ammonium salt, in the manufacture of fluoropolymers, which are used in a wide variety of mechanical and industrial components. They are also produced unintentionally by the degradation of some fluorotelomers (EPA 2009a).
- As part of the EPA's PFOA stewardship program, eight companies committed to reduce global facility emission and product content of PFOA and related chemicals by 95 percent in 2010 and eliminating emission and product content by 2015 (ATSDR 2009; EPA 2012b).

Exhibit 1: Physical and Chemical Properties of PFOS and PFOA
(ATSDR 2009; Brooke et al. 2004; Cheng et al. 2008; EFSA 2008; EPA 2002; UNEP 2006)

Property	PFOS (Potassium Salt)	PFOA
CAS Number	2795-39-3	335-67-1
Physical Description (physical state at room temperature and atmospheric pressure)	White Powder	White powder/waxy white solid
Molecular weight (g/mol)	538 (potassium salt)	414
Water solubility (mg/L at 25^{o}C)	570 (purified), 370 (freshwater), 25 (filtered seawater)	9.5 X 10^{3}(purified)
Melting Point (^{o}C)	> 400	45 to 50
Boiling point (^{o}C)	Not measurable	188
Vapor pressure at 20 ^{o}C (mm Hg)	2.48 X10^{-6}	0.017
Air water partition coefficient (Pa.m^{3}/mol)	< 2 X10^{-6}	Not available
Octanol-water partition coefficient (log K_{ow})	Not measurable	Not measurable
Organic-carbon partition coefficient (log K_{oc})	2.57	2.06
Henry's law constant (atm m^{3}/mol)	3.05 × 10^{-9}	Not measurable
Half-Life	Atmospheric: 114 days Water: > 41 years (at 25º C) Photolytic: > 3.7 years Sonolysis: 20 to 63 minutes	Atmospheric: 90 days Water: > 92 years (at 25º C) Photolytic: > 349 days Sonolysis: 20 to 63 minutes

Notes: g/mol – grams per mole; mg/L – milligrams per liter; ^{o}C – degree Celsius; mm Hg – millimeters of mercury; Pa m^{3}/mol – pascal-cubic meters per mole; atm m^{3}/mol – atmosphere-cubic meters per mole.

What are the environmental impacts of PFOS and PFOA?

- During past manufacturing processes, large amounts of PFOS and PFOA were released to the air, water, and soil in and around fluorochemical facilities (ATSDR 2009).
- PFOS and PFOA have been detected in a number of U.S. cities in surface water and sediments downstream of former production facilities, wastewater treatment plant effluent, sewage sludge, and landfill leachate (EPA 2002; OECD 2002).
- Both PFOS and PFOA are the stable end products resulting from the degradation of precursor substances through a variety of abiotic and biotic transformation pathways (Conder et al. 2010).
- PFCs, including PFOS and PFOA, are chemically and biologically stable in the environment and resistant to biodegradation, atmospheric photooxidation, direct photolysis, and hydrolysis. As a result, these chemicals are extremely persistent in the environment (ATSDR 2009; EFSA 2008).
- Low acid dissociation constants (pKa) ranging from -3 to 4 suggest that PFOS and PFOA are strong acids and exist predominately in the anionic form in the environment (Conder et al. 2010).
- When released directly to the atmosphere, PFCs are expected to adsorb to particles and settle onto soil through wet or dry deposition (ATSDR 2009).
- PFOA and PFOS in anionic form are water-soluble and can migrate readily from soil to groundwater (Conder et al. 2010; Post et al. 2012).
- As a result of their chemical stability and low volatility in ionic form, PFCs are persistent in water and soil (ATSDR 2009).
- Monitoring data from the Arctic region and at sites remote from known point sources, have shown highly elevated levels of PFOS and PFOA in environmental media and biota, indicating that long-range transport has occurred (ATSDR 2009; Post et al. 2012; UNEP 2007).
- Long-range PFC transport sources include the atmospheric transport of precursor compounds, such as perfluoroalkyl sulfonamides, followed by photooxidation to form PFCs, and the direct long-range transport of PFCs via ocean current or in the form of marine aerosols (ATSDR 2009; Post et al. 2012).
- The wide distribution of PFCs in high trophic levels increases the potential for bioaccumulation and bioconcentration. Because of their persistence and long-term accumulation, higher trophic level wildlife such as fish, piscivorous birds, and Arctic biota can continue to be exposed to PFOS and PFOA (EPA 2006; UNEP 2006).
- PFOS exhibits a higher tendency to bind to organic matter and bioaccumulate compared to PFOA due to its longer perfluoroalkyl chain length (Conder et al. 2010).
- PFOS has been shown to bioaccumulate and biomagnify in wildlife species such as fish and piscivorous birds. The biomagnification factor ranges from 1.4 to 17 kilogram per kilogram (kg/kg) in predatory birds and mammals (Moermond et al. 2010; UNEP 2006).
- PFOS is the only PFC that has been shown to accumulate to levels of concern in fish tissue. The estimated kinetic bioconcentration factor in fish ranges from 1,000 to 4,000 (EFSA 2008; MDH 2011).
- High levels of PFCs, including PFOA and PFOS, have been reported at both the Oakdale Dump Superfund Site in Oakdale, Minnesota (MN) and Washington County Landfill Site in Lake Elmo, MN (EPA 2012 c, d).

What are the health effects of PFOS and PFOA?

- Studies have found small quantities of PFOS and PFOA in the blood samples of humans and wildlife nationwide, indicating that exposure to the chemicals is widespread (3M 2000; EPA 2006).
- Potential pathways, which may lead to widespread exposure, include ingestion of food and water, use of commercial products, or inhalation from long-range air transport (ATSDR 2009; EPA 2009a; MDH 2011).
- Based on the limited information available, fish and fishery products seem to be one of the primary sources of human exposure to PFOS. The maximum permissible concentration (MPC), based on consumption of fish by humans as the most critical route, is 0.65 nanograms per liter (ng/L) for freshwater (Moermond et al. 2010).

What are the health effects of PFOS and PFOA? (continued)

- Studies also indicate that continued exposure to low levels of PFOA in drinking water may result in adverse health effects (Post et al. 2012).
- Toxicology studies show that PFOS and PFOA are readily absorbed after oral exposure and accumulate primarily in the serum, kidney, and liver. No further metabolism is expected (EFSA 2008; EPA 2006; EPA 2009a).
- PFOS and PFOA have a long half-life of about 4 years in humans. This continued exposure could increase body burdens to levels that would result in adverse outcomes (ATSDR 2009; EPA 2009a).
- Acute- and intermediate- duration oral studies in rodents have raised concerns about potential developmental, reproductive, and other systematic effects of PFOS and PFOA (Austin et al. 2003; ATSDR 2009; EPA 2006).
- The ingestion of PFOA-contaminated water was found to cause adverse effects on mammary gland development in mice (Post et al. 2012).
- Results of a study indicate that exposure to PFOS can affect the neuroendocrine system in rats (Austin et al. 2003).
- Both PFOS and PFOA have a high affinity for binding to B-lipoproteins and liver fatty acid-binding protein. Several studies have shown that these compounds can interfere with fatty acid metabolism and may deregulate metabolism of lipids and lipoproteins (EFSA 2008; EPA 2009a).
- The EPA has not classified PFOS or PFOA as to carcinogenicity (ATSDR 2009).
- The chronic exposure to PFOS and PFOA can lead to the development of tumors in the liver of rats; however, more research is needed to determine if there are similar cancer risks for humans (ATSDR 2009; OECD 2002).
- Based on epidemiology studies on people with chronic drinking water exposure to PFOA in West Virginia and Ohio and other available data, the C8 Science panel concluded that there is a probable link between PFOA and both testicular and kidney cancer (C8 Science Panel 2012).
- Epidemiologic studies have shown an association between PFOS exposure and bladder cancer; however, further research is needed (EPA 2006; OECD 2002).
- The EPA removed PFOS and PFOA from the Integrated Risk Information System (IRIS) agenda in a Federal Register Notice released on October 18, 2010. At this time, EPA is not conducting an IRIS assessment for these chemicals (EPA 2010).

Are there any federal and state guidelines and health standards for PFOS and PFOA?

- The EPA has not established a minimal risk level (MRL) for PFOS or PFOA because human studies to date are insufficient to determine with a sufficient degree of certainty that the effects are either exposure-related or adverse (ATSDR 2009).
- The EPA finalized two Significant New Use Rules (SNURs) in 2002, requiring companies to inform the EPA 90 days before they manufacture or import 88 identified PFOS-related substances (EPA 2008; UNEP 2006).
- In 2007, the SNURs were amended to include 183 additional PFOS-related substances with carbon chain lengths of five carbons and higher (EPA 2006; UNEP 2007).
- The SNURs allow for the continuation of a few limited, highly technical uses of PFOS where there are no alternatives available, and which are characterized by very low volume, low exposure, and low releases (ATSDR 2009; EPA 2006).
- In January 2009, the EPA's Office of Water established a provisional health advisory (PHA) of 0.2 micrograms per liter (µg/L) for PFOS and 0.4 µg/L for PFOA to protect against the potential risk from exposure of these chemicals through drinking water (EPA 2009b; EPA 2011).
- EPA Region 4 recommended a residential soil screening level of 6 milligrams per kilogram (mg/kg) for PFOS and 16 mg/kg for PFOA (EPA 2009c).
- Minnesota has established a health risk limit of 0.3 µg/L for PFOS and PFOA in drinking water (MDH 2011).
- New Jersey has established a preliminary drinking-water guidance value of 0.04 µg/L for PFOA (NJDEP 2007).
- North Carolina has established an interim maximum allowable concentration of 2 µg//L for PFOA in drinking water (NCDENP 2008).

Are there any federal and state guidelines and health standards for PFOS and PFOA? (continued)

- Under the Toxic Substances Control Act (TSCA), EPA proposed a SNUR in August 2012 requiring companies to report all new uses of long-chain perfluoroalkyl carboxylic (LCPFAC) chemicals for use as part of carpets or to treat carpets, including the import of new carpet containing LCPFACs. The EPA is also proposing to amend the existing SNUR to add 7 additional PFOS-related substances and add "processing" in the definition of significant new use (EPA 2012a).

What detection and site characterization methods are available for PFOS and PFOA?

- Detection methods for environmental samples are primarily based on high-performance liquid chromatography (HPLC) coupled with tandem mass spectrometry (MS/MS) (ATSDR 2009).
- HPLC-MS/MS has allowed for more sensitive determination of individual PFOS and PFOA in air, water, and soil (ATSDR 2009).
- Both liquid chromatography (LC)-MS/MS and gas chromatography-mass spectrometry (GC-MS) can be used to identify the precursors of PFOS and PFOA (EFSA 2008).
- The development of LC – electrospray ionization (ESI) MS and LC-MS/MS has improved the analysis of PFOS and PFOA (EFSA 2008).
- Sample preparation methods include solvent extraction, ion-pair extraction, solid-phase extraction, and column-switching extraction (ATSDR 2009).
- Air samples may be collected using high-volume air samplers that employ sampling modules containing glass-fiber filters and glass columns with a polyurethane foam (EFSA 2008).
- Reported sensitivities for the available detection methods include low picograms (pg) per cubic meter (pg/m^3) levels in air, high pg/L to low nanogram (ng)/L levels in water, and high pg per gram (pg/g) to low ng/g levels in soil (ATSDR 2009).

What technologies are being used to treat PFOS and PFOA?

- Because of their unique physiochemical properties (strong fluorine-carbon bond and low vapor pressure), PFOS and PFOA resist most conventional treatment technologies such as direct oxidation and biodegradation (Hartten 2009; Vectis et al. 2009).
- The optimal treatment method depends on the concentration of PFOS and PFOA, background organic and metal concentration, available degradation time, and other site-specific conditions (Vectis et al. 2009).
- Both activated carbon filters and reverse osmosis units have been shown to be effective at reducing PFCs in water at levels typically found in drinking water (below 0.2 µg/L); however, incineration of the concentrated waste is required for complete destruction of PFOS and PFOA (Hartten 2009; MDH 2008; Vectis et al. 2009).
- Alternative technologies studied for PFOS and PFOA degradation include photochemical oxidation and thermally-induced reduction (Hartten 2009; Vectis et al. 2009).
- Studies have also evaluated the use of sonochemical degradation to treat PFOS and PFOA in groundwater (Cheng et al. 2008; Vectis et al. 2009).

Where can I find more information about PFOS and PFOA?

- 3M Company (3M). 2000. "Determination of serum half-lives of several fluorochemicals."
- Agency for Toxic Substance and Disease Registry (ATSDR). 2009. "Draft Toxicological Profile for Perfluoroalkyls." www.atsdr.cdc.gov/toxprofiles/tp200.pdf
- Austin, M.E., Kasturi, B.S., Barber, M., Kannan,K., MohanKumar, P.S., and MohanKumar, S.M. 2003. "Neuroendocrine effects of perfluorooctane sulfonate in rats." Environ Health Perspect. Volume 111(12). Pages 1485 to1489. www.ncbi.nlm.nih.gov/pmc/articles/PMC1241651/

Where can I find more information about PFOS and PFOA? (continued)

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- North Carolina Department of Environment and Natural Resources (NCDENP). 2008. Recommended Interim Maximum Allowable Concentration for Perfluorooctanoic Acid.
- Organization for Economic Cooperation and Development (OECD). Environment Directorate. 2002. ''Hazard Assessment of Perfluorooctane Sulfonate (PFOS) and its Salts.'' www.oecd.org/dataoecd/23/18/2382880.pdf
- United National Environment Programme (UNEP). 2005. "Perfluorooctane sulfonate proposal." Stockholm Convention on Persistent Organic Pollutants Review Committee. Geneva, 7-11 November 2005.
- UNEP. 2006. "Risk profile on perfluorooctane sulfonate." Stockholm Convention on Persistent Organic Pollutants Review Committee. Geneva, 21 November 2006.
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- EPA. 2006. PFAS-Proposed Significant New Use Rule, 40CFR721. U.S. Federal Register: Vol. 71 (No 47), March 10, 2006. www.gpo.gov/fdsys/pkg/FR-2006-03-10/pdf/E6-3444.pdf
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Where can I find more information about PFOS and PFOA? (continued)

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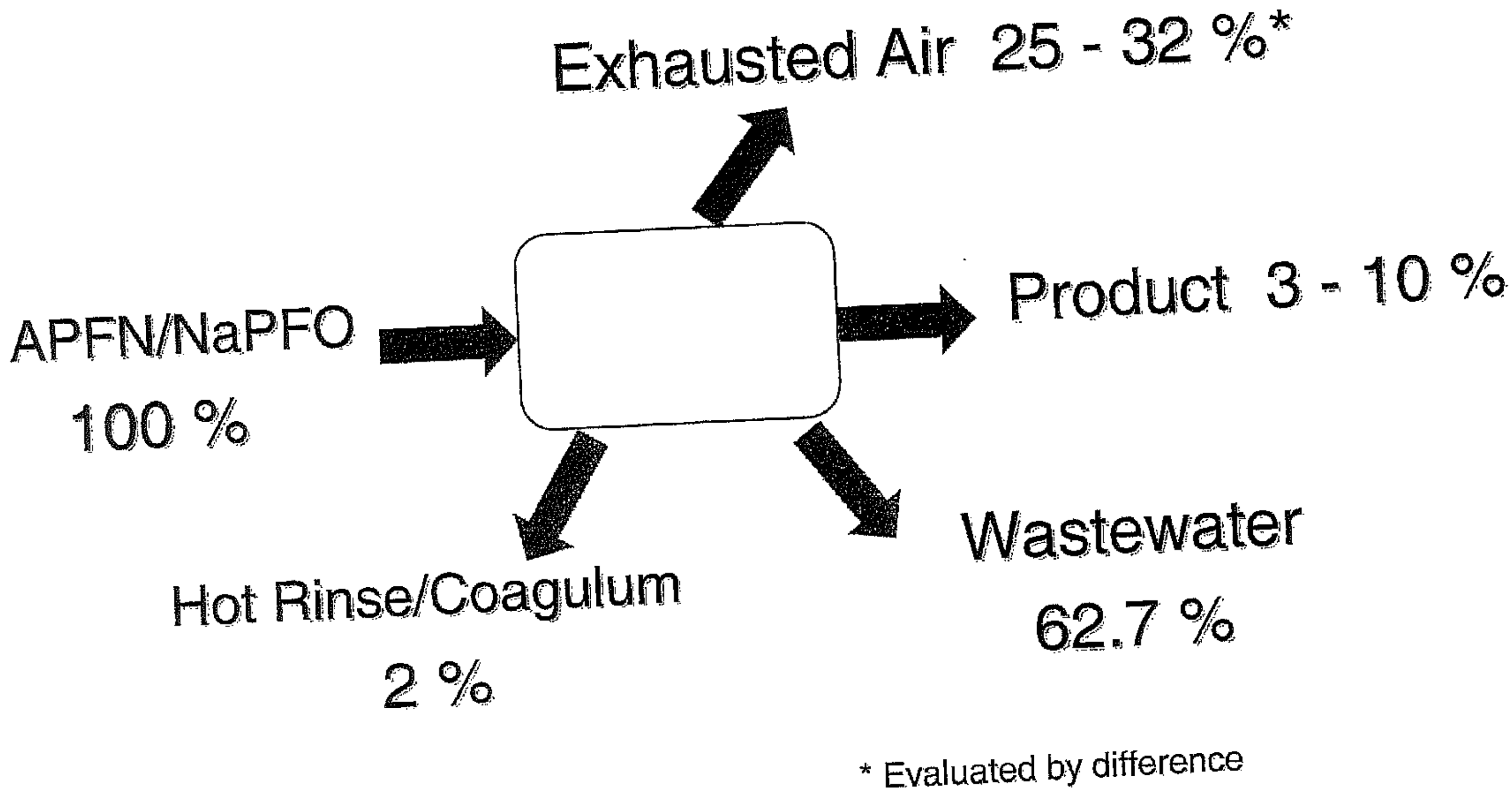
Contact Information

If you have any questions or comments on this fact sheet, please contact: Mary Cooke, FFRRO, by phone at (703) 603-8712 or by email at cooke.maryt@epa.gov.

APFN/NaPFO Mass Balance



Attachment 5 - Package of photos and news articles

Photos (6)*

1. Solvay Solexis Facility, Thorofare/West Deptford, NJ
2. Water towers Paulsboro NJ
3. NuStar Energy LLC: Refined petroleum products terminal (liquids); asphalt terminal and refinery
4. NuStar Energy LLC: Refined petroleum products terminal (liquids); asphalt terminal and refinery
5. Rail yard, Paulsboro NJ
6. Exxon-Mobil facility (Lube Plant, lubricating grease manufacture), Billingsport Rd., Paulsboro NJ

News Articles regarding vinyl chloride train derailment in Paulsboro NJ (2)

1. “NJ residents remain worried after rail car lifted from creek”, Phil Dunn, Gannett/The (Cherry Hill, N.J.) Courier-Post. December 12, 2012
2. “Investigation: Paulsboro derailments - Death Zone”, Action News, 6ABC.com. July 26, 2013
   Link to map: NATIONAL TRANSPORTATION SAFETY BOARD - Public Hearing Conrail Derailment in Paulsboro, NJ with Vinyl Chloride Release. Group 3 Exhibit BC. Interagency Modeling and Atmospheric, Assessment Center (IMAAC). Exposure Map Docket ID: DCA13MR002.
   http://dig.abclocal.go.com/wpvi/pdf/07262013paulsboro-derailment-map.pdf

*All photos by Tracy Carluccio