



August 2, 2013

Assistant Administrator, ATSDR (CHB)  
Agency for Toxic Substances and Disease Registry  
1600 Clifton Rd., NE (E28)  
Atlanta, GA 30333

**Re: Petition for a Public Health Assessment for Perfluorononanoate (PFNA) also known as C9 and other PFCs released at Solvay Solexis, Thorofare/West Deptford, NJ**

We are concerned about the Solvay Solexis Inc. facility which is located at 10 Leonard Lane, Thorofare, NJ 08086. There is a chemical release identified as perfluorononanoate (PFNA), also known as C9, related to the production of PVDF (polyvinylidene fluoride) at this facility from vinylidene fluoride monomers that are also made there.

Other important information about this release:

- PFNA is one of a group of perfluorinated chemicals (PFCs) that has been widely recognized as contaminants of concern. PFNA, along with other PFCs, has spread throughout the world, is persistent in the environment, concentrates in human blood, and has serious negative health effects. In recent years, USEPA has put in motion programs to phase out, control, and monitor PFCs. USEPA set a Provisional Health Advisory for short-term drinking water exposure to perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS), two of the most widely distributed PFCs, and is developing drinking water Health Advisories for PFOA and PFOS based on chronic long-term exposure using ongoing and new scientific findings. ATSDR published a draft Toxicological Profile for Perfluoroalkyls in 2009. The profile includes information on PFNA; scientific studies show that PFNA, a longer carbon chain PFC, is associated with health effects in humans, is more bioaccumulative and toxic than PFOA in rodents and in general causes similar toxic effects as PFOA, but at lower doses.
- The C8 Science Panel, a group of independent public health scientists, concluded in 2012 that there is a probable link between exposure to PFOA and testicular cancer, kidney cancer, and four other diseases, based on studies in these communities and other information. Other harmful health effects were also identified.

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- New Jersey Department of Environmental Protection (NJDEP) issued an Occurrence Study for PFOA in New Jersey public drinking water in 2007 and established a PFOA drinking water guidance level of 0.04 ppb based on lifetime health effects. In 2009 NJDEP conducted a second occurrence study on PFCs, including PFNA, but the report has not been released yet.
- Many scientific studies are underway or have been conducted on PFCs, their use, presence in the environment, toxic effects, and related health concerns. A recent report by Rockwell (April 2013), shows immunotoxic effects in mice from PFNA. As reviewed in the Rockwell paper, PFNA also causes other effects in animals including liver toxicity, decreased survival and developmental effects in pups, and male-specific reproductive toxicity. PFNA has been associated with increased cholesterol, including LDL (bad) cholesterol in humans. Another study published in 2007 found PFNA and several other PFCs in the blood serum of more than 98% of U.S. residents tested, and showed that the blood serum level of PFNA increased in the period studied while other perfluorinated compounds did not. Rockwell (April 2013) discusses concerns about those people with higher than average blood serum levels due to individual variations or occupational exposures.
- PFNA and other PFCs have been found at very high levels in the Delaware River starting from River Mile 88/90 through River Mile 50; PFNA was extraordinarily high, and was the PFC with the highest concentrations found in the surveys (DRBC 2012). Perfluoroundecanoic acid (PFUnA, C11) was also detected in the Delaware River at these locations. The DRBC survey found PFCs in fish flesh with the highest concentrations at River Mile 80 and 91 for PFNA and PFUnA. Graphics from the DRBC presentation are attached. (Attachment 1)
- PFNA was found at 96 ng/L in 2009 in a raw groundwater sample taken from Paulsboro Water Department water supply system by NJDEP for a PFC occurrence study. This is an extremely high level of PFNA. It is not only the highest level of PFNA found in New Jersey, but a literature search turned up no values as high as this in drinking water anywhere. A copy of the NJDEP data is attached. (Attachment 2) Another public water supply system in the vicinity also had very high levels of PFNA (up to 72 ng/L) in raw well water (Post 2012). These water samples were not tested for PFUnA.
- Solvay Solexis manufactures fluorocarbons and fluoroelstomers at its facility located in West Deptford/Thorofare New Jersey, about two miles from Paulsboro and near Delaware River Mile 90. Prior to Solvay Solexis, the plant was owned and operated by Pennwalt who began manufacturing fluorocarbons at this site in the 1970's, followed by two other firms before the Solvay Group bought it in 2002. In 1985, Pennwalt filed a patent (US Patent 4,569,978) as the original user of Surflon S111, a fluorinated surfactant. EPA's Region 2 Fact Sheet on Solvay Solexis Polymers USA LLC is attached. (Attachment 3) It states that new operations to manufacture vinylidene fluoride monomers, fluoropolymers, and fluorocarbons began in this same year, 1985. PFNA (also known as APFN or C9) is the main component of Surflon S111, with lesser amounts of longer chain perfluorinated compounds C11

and C13. PFNA is used to make PVDF (polyvinylidene fluoride) from vinylidene fluoride monomers, in the same way that PFOA is used to make PTFE (DuPont's Teflon). PFNA and PFOA act to "solubilize fluoromonomers to facilitate their aqueous polymerization". (Prevedouros 2006)

- The second highest production capacity for PVDF (2002) in the world was found at Solvay Solexis in Thorofare at 7.7 ktonne/year. Even if not operating at full capacity, PFNA was used extensively at the Solvay Solexis facility in West Deptford/Thorofare and thousands of metric tons of PVDF were produced. Of the three commercial PFCA products analyzed, only Surflon S111 contains a significant amount of PFNA. This results in up to several metric tons of PFNA emitted yearly at the Solvay facility, calculated at approximately 60% emitted during the manufacture of PVDF. (Prevedouros 2006) Attached is a graphic illustrating the Mass Balance of PFNA with 62.7% released as wastewater and 25-32% released as exhausted air; only 3-10% is released into the product. (USEPA, Report from Solvay Solexis, 2008) (Attachment 4)
- The extremely high levels of PFUnA (C11) found in fish flesh further point to Solvay Solexis as a source of the PFC contamination, because PFUnA is found in the Solvay Solexis' patented Surflon S111 manufactured and used at the West Deptford/Thorofare site. Further, the elevated levels of PFUnA in Delaware River water, in contrast to other locations where PFUnA was sampled for by the DRBC, also point to the Solvay Solexis site as a likely source. (DRBC 2012) This additional information can be considered to be another likely "marker" for Solvay's discharged chemicals. PFUnA was not tested in the drinking water wells in this vicinity where high levels of PFNA were found.
- Surface water results show extremely high levels of PFNA as you move downstream on the river from River Mile 90, the approximate location of the Solvay Solexis facility. PFCs used in manufacturing are emitted to both air and water, and PFOA has been shown to contaminate groundwater many miles away through air transport. Therefore, contamination of the environment could be through various pathways from the site -- air transport as well as release to water and soil.
- Even if less is emitted today due to recycling and release reduction efforts, the characteristic persistence of PFNA and all PFCs in the environment poses a substantial threat from historic and legacy pollution at the Solvay Solexis site. In other words, because PFNA does not degrade in the environment, the pollution is persistent in the soil and groundwater from years of use. This means aquifers that supply drinking water will remain contaminated, exposing those who consume their waters. Also, groundwater feeds the base flow of surface waterways so PFNA can continue to discharge from the Solvay site to nearby streams such as Mantua Creek and/or the Delaware River.

Other people who may be concerned about this issue include Environmental Justice advocates who are concerned about the overburdening of communities with environmental stresses. Thorofare, West Deptford, and Paulsboro are bearing a large burden due to the potential public health impacts of PFNA. EPA's environmental justice policy states "...no group of people,

including a racial, ethnic, or socioeconomic group, should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations ...”.

West Deptford/Thorofare, the areas surrounding the Solvay Solexis facility and neighboring Paulsboro where the PFNA-contaminated raw water sample was obtained by NJDEP are exposed to a large number of potential pollution sources. Paulsboro in particular is an industrialized borough with many refineries, manufacturing plants, port facilities and laboratory facilities. Paulsboro recently experienced a train derailment that released potentially deadly vinyl chloride to the air and water; a rail yard is housed nearby. These all combine to impose a disproportionately heavy environmental burden, with negative consequences. Photos of the facilities and neighborhoods in the area and news articles about the train derailment are attached. (Attachment 5—package of photos and articles)

Rockwell (April 2013) discusses concerns about those people with higher than average blood serum levels of PFNA. This would almost definitely include people with exposure to high levels of PFNA in drinking water. In particular, raw water from a well used by Paulsboro Water Department has been shown to contain an extremely high level of PFNA, raising a red flag for this Borough. Treatment to remove PFCs has been installed by New Jersey American Water at the water supply that is identified with 72 ng/L in raw water further downriver from Paulsboro, and PFCs are not detected in the finished water from that well (Post 2012). Other sources of drinking water, of which there are many near the Solvay Solexis facility and the known contaminated drinking water wells in the region, may also be contaminated but no other testing has been conducted.

The public health concerns expand throughout the region of the Delaware River Estuary, where PFNA has been found at remarkably high concentrations. Residents of this region are likely exposed to PFNA through other routes besides drinking water, including consumption of contaminated local fish. Other possible exposure sources such as air contamination, soil contamination, and consumption of fruits and vegetables grown in contaminated soil, have not been studied and need to be investigated. Infants and children may be at especially high risk because they have higher exposures than adults and they are a target for the developmental effects of these chemical. People with higher than average blood serum levels of PFNA due to occupational exposure (workers at the facility who live in communities in the region, first responders who may have been exposed during an accidental release, etc.) or other individual characteristics or exposures are also at higher risk. The evidence is clear that the public has been exposed and is likely still being exposed to dangerous levels of PFNA and is unaware of the potential health threats this poses, depriving them of the opportunity to take actions to protect themselves and their families.

Delaware Riverkeeper Network requests that the U.S. Agency for Toxic Substances and Disease Registry conducts a Public Health Assessment to evaluate the public health impacts of PFNA and other PFCs released from the Solvay Solexis site.

Sincerely,



Maya van Rossum  
the Delaware Riverkeeper



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#### Attachments (5)

#### References

Prevedouros K, Cousins IT, Buck RC, Korzeniowski SH (January 2006). "Sources, fate and transport of perfluorocarboxylates". *Environ Sci Technol*. 40 (1): 32–44. [doi:10.1021/es0512475](https://doi.org/10.1021/es0512475). [PMID 16433330](https://pubmed.ncbi.nlm.nih.gov/16433330/). [Supporting Information](#) (PDF)

Rockwell CE, Turley AE, Cheng X, Fields PE, Klaassen CD (April 2013) Acute Immunotoxic Effects of Perfluorononanoic Acid (PFNA) in C57BL/6 Mice. *Clin Exp Pharmacol S4*: 002. [doi:10.4172/2161-1459.S4-002](https://doi.org/10.4172/2161-1459.S4-002)

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

Antonia M. Calafat, Lee-Yang Wong, Zsuzsanna Kuklennyik, John A. Reidy, and Larry L. Needham (2007). "Polyfluoroalkyl Chemicals in the U.S. Population: Data from the National Health and Nutrition Examination Survey (NHANES) 2003–2004 and Comparisons with NHANES 1999–2000". *Environmental Health Perspectives*. VOLUME 115 | NUMBER 11 | November 2007

Gloria B. Post, Ph.D., D.A.B.T. NJDEP Office of Science (June 2013). "Perfluorinated Chemicals (PFCs), Emerging Drinking Water Contaminants" presentation to Delaware River Basin Commission Toxics Advisory Committee.

A. Ronald MacGillivray, Delaware River Basin Commission (July 2012). "Contaminants of Emerging Concern in the Tidal Delaware River, Pilot Monitoring Survey 2007-2009".

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.

#### Link locations

USEPA Stewardship Program: <http://www.epa.gov/epahome/pdf.html>

Solvay Solexis Report to USEPA Stewardship Program, 2008:  
[www.epa.gov/opptintr/pfoa/pubs/!Solvay%20Solexis%20report.pdf](http://www.epa.gov/opptintr/pfoa/pubs/!Solvay%20Solexis%20report.pdf)

ATSDR Toxicological Profile 2009

<http://www.atsdr.cdc.gov/toxprofiles/tp200.pdf>

C8 Science Panel Probable Link Report

[www.c8sciencepanel.org/pdfs/Probable\\_Link\\_C8\\_Cancer\\_16April2012\\_v2.pdf](http://www.c8sciencepanel.org/pdfs/Probable_Link_C8_Cancer_16April2012_v2.pdf)

Determination of Perfluorooctanoic Acid (PFOA) in Aqueous Samples 2007 (NJDEP Occurrence Study)

[http://www.state.nj.us/dep/watersupply/pdf/final\\_pfoa\\_report.pdf](http://www.state.nj.us/dep/watersupply/pdf/final_pfoa_report.pdf)

Gloria B. Post, Ph.D., D.A.B.T. NJDEP Office of Science (June 2013). "Perfluorinated Chemicals (PFCs), Emerging Drinking Water Contaminants" presentation to Delaware River Basin Commission Toxics Advisory Committee.

[www.state.nj.us/drbc/library/documents/toxics060513\\_post.pdf](http://www.state.nj.us/drbc/library/documents/toxics060513_post.pdf)

A. Ronald MacGillivray, Ph.D. Delaware River Basin Commission (July 2012). "Contaminants of Emerging Concern in the Tidal Delaware River, Pilot Monitoring Survey 2007-2009"

<http://www.state.nj.us/drbc/library/documents/contaminants-of-emerging-concernJuly2012.pdf>

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>