



NICNAS Alert No.8

December 2008

PERFLUOROCTANE SULFONATE (PFOS) AND PERFLUOROALKYL SULFONATE (PFAS)

Note: This Alert updates NICNAS Alert No. 5 and should be read in conjunction with Alerts 2 and 5.

Perfluorooctane sulfonate (PFOS) refers to fully fluorinated (eight-carbon chain length) sulfonate-containing substances. PFOS-related substances may be salts of PFOS eg. potassium, lithium, ammonium or diethanolamine, or polymers that contain the PFOS as a portion of the entire structure. A PFOS-related substance is any substance, which contains the PFOS moiety and may break down in the environment to give PFOS.

PFOS is a member of a large family of perfluoroalkyl sulfonate (PFAS) based chemicals. PFAS is a generic term used to describe any fully fluorinated carbon chain length sulfonate, including higher and lower homologues. PFAS-related substances may be salts of PFAS, or polymers that contain the PFAS as a portion of the entire polymer.

PFOS and PFAS chemicals have unique surfactant properties and many specialty applications including heat, chemical and abrasion resistance, and as dispersion, wetting and surface treatments.

Australian Data

In May 2008, NICNAS collected information, through a national survey, on production, importation, stocks held and use of PFOS, PFAS and their related substances, and products/mixtures containing these substances for the calendar years 2006 and 2007. Information provided to NICNAS indicates that:

PFOS

- PFOS or related chemicals and products are not manufactured in Australia.
- Importation of PFOS has increased since the 2006 survey but these are mainly for essential uses such as mist suppressants in the metal plating industry. Moreover the overall PFOS stocks held in Australia have decreased since the last survey.
- Approximately 760 kg and 1350 kg of PFOS as technical grade and in products were imported into Australia in the 2006 and 2007 respectively.
- PFOS products/mixtures were imported by the following industries: metal plating (mist suppressant - 99%), aviation (hydraulic fluid - 1%), photography and photolithography (surfactants - 0.002%). All these uses are reported in the survey as essential uses with no suitable alternatives identified.
- In comparison, the 2006 survey indicated that no PFOS or related chemicals were reported as being imported in 2004 and 2005, either as technical grade or as constituents of products or mixtures.
- PFOS stocks (approximately 7.8 tonnes) are held mostly by the fire fighting industry (97%) and to a lesser extent by the metal plating industry (3%). None of the major hazard facilities that responded reported any PFOS stocks.
- Approximately 160000 litres of class B fire fighting foam products containing between 0.1-7% PFOS formulations (7.6 tonnes) were held in stock in 2007. This is a decrease from those reported for 2005 (9.36 tonnes).

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- The PFOS fire-fighting foam products have been designated for emergency use only. It is reported that as these products reach the expiry date or are used up, alternative foams will replace them. Some organisations have arranged for safe disposal of these stocks.

PFAS

- PFAS products and related chemicals are not manufactured in Australia.
- The 2007 survey showed that there was a substantial increase in the import of PFAS products in 2006 and 2007. However the main bulk of the PFAS products imported contained perfluorobutanesulfonate (PFBS), a four carbon PFAS. NICNAS assessment has indicated that PFBS compounds are less toxic than PFOS compounds. The C9 and C10 PFAS products used for formulating floor sealers that were reported in the 2006 survey have been phased out and none were imported in 2006 or 2007.
- Approximately 7.4 tonnes and 13.6 tonnes of PFAS as technical grade and in products were reported imported into Australia in 2006 and 2007, respectively.
- PFAS products and related chemicals were imported for the following industrial uses – mist suppressants, fire fighting foams, carpet treatments, curatives, industrial coatings and printing inks.
- In comparison, the 2006 survey reported that the total volumes of PFAS and related substances imported in products in 2004 and 2005 were 1.6 tonnes and 1.7 tonnes, respectively. This was in industries such as metal plating, floor sealers, fire fighting foams, rubber mouldings and industrial coatings.
- Most of the PFAS imports and stocks are in fire fighting and metal plating industry.
- Approximately 60 tonnes of fire fighting foams containing 1 - 5% of PFAS substance were held in stock at sites around Australia.
- Many companies reported that they have discontinued using PFOS/PFAS related products and are now using alternatives to those substances.

Use of several low volume products containing PFAS substances, mostly in carpet treatment and printing ink, were also reported.

It is likely that some importers and users may not know if their products contain PFOS- and PFAS-based chemical ingredients because these chemicals may not be disclosed or listed on Material Safety Data Sheets (MSDSs).

Summary of PFOS and PFAS Imports and Stocks (in tonnes)

	Imports		Stocks	Imports		Stocks
	2004	2005	End of 2005	2006	2007	End of 2007
PFOS	0	0	9.36	0.76	1.35	7.8
PFAS	1.6	1.7	1.3	7.4	13.6	5.2

NICNAS recommendations

Because of concerns over PFOS and certain perfluorinated chemicals, NICNAS recommends that:

- PFOS-based and related PFAS-based chemicals continue to be restricted to only essential uses, for which no suitable and less hazardous alternatives are available.

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- Importers should ensure that the alternative chemicals used are less toxic and not persistent in the environment.
- Stocks be disposed off responsibly on expiry. For disposal options contact the relevant State and Territory environment authorities.
- All labels and MSDSs include details of the PFOS and PFAS chemicals in the product.
- Information on the safe use and handling of all these chemicals of concern be provided in the relevant and most recent MSDSs available from the suppliers of these chemicals.
- Importers of these chemicals should remain vigilant of the ongoing international regulatory activities related to PFOS /PFAS compounds.

Additional information is provided in Attachment 1.

Australian Activities

- Measures taken to date to reduce the importation and use of PFOS and related PFAS compounds and their salts and precursors have largely been through recommendations made by NICNAS since 2002 via publication of Alerts and subsequent voluntary action by Industry.
- NICNAS published three Alerts and recommended that because of concerns over PFOS and perfluorinated chemicals, PFOS- and related PFAS-based chemicals be restricted to only essential uses for which no suitable and less hazardous alternatives are available.
- Australia is currently preparing a risk management strategy for PFOS based on the findings of the 2007 survey.

International Activities

- PFOS is currently being considered for possible inclusion on the list of the Stockholm Convention on Persistent Organic Pollutants (POPs).
- The OECD hazard assessment of perfluorooctane sulfonate (PFOS) and its salts was published in 2002. The report concluded that the persistence of PFOS in the environment, as well as its toxicity and bioaccumulation potential, indicate a cause of concern for the environment and human health.
- The European Union (EU) adopted a resolution of restrictions on marketing and use of PFOS and related substances in 2006. The resolution set the maximum concentrations of 0.1% by mass for PFOS-containing semi-finished products or articles, 0.005% by mass for PFOS preparations, and 1 µg/m² PFOS for textiles or other coated materials. The Member States were to introduce regulations to comply with the Directive by 27 December 2007 and the measures were to be effective from 27 June 2008. All the EU countries have been requested to establish inventories for PFOS substances within 2 years and the use derogations will be reviewed when new information on uses and safer alternatives becomes available¹.
- Canada introduced regulations to prohibit production and use of PFOS and its salts and substances that contain one of the following groups: perfluorooctyl sulfonyl (C₈F₁₇SO₂-), sulfonate (C₈F₁₇SO₃) or sulfonamide (C₈F₁₇SO₂N-). These regulations would prohibit the manufacture, use, sale, offer for sale and import of PFOS or products containing these substances with certain exemptions. Importers of PFOS-based fume suppressants are required to submit annual reports detailing types, quantities, sales and end uses for the substances that are imported.
- Following the voluntary phase-out of PFOS by the principal worldwide manufacturer, the USEPA introduced a Significant New Use Rule (SNUR) in 2001 on PFOS chemicals, and 3 SNURs on PFAS chemicals in 2002, 2006 and 2007. These SNURs allowed the continuation of a few limited, highly technical uses of these chemicals for which no alternatives were available, and which were characterized by very low volume, low exposure, and low releases. Any other uses of these chemicals requires prior notice to and review by the Agency.
- PFOS is included on the list of Chemicals for Priority Action of the Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR).
- In Japan, PFOS was listed in the Rule of Regulation and Manufacture of Chemical Substances. The National Institute of Advanced Industrial Science and Technology (AIST) is conducting several national projects on global monitoring, local sources, waste material treatments and recycle of PFCs with the cooperation of major industry in Japan.

The OECD assessment report and other documents are available online and can be accessed via links on the NICNAS website at: <http://www.nicnas.gov.au/>. Additional information about all the perfluorinated chemicals discussed above will be added to this website as it becomes available.

¹ Directive 2006/122/EC of The European Parliament and of the Council of 12 December 2006.

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For more information

If you want to find out more about these issues or have information on PFOS and PFAS substances in Australia, you can contact NICNAS at: phone: 1800 638 528, fax: 02 8577 8888 or write to: GPO Box 58 Sydney NSW 2001 Australia.

Information on NICNAS assessment of chemicals is available at:

www.nicnas.gov.au/About_NICNAS/Our_Approach.asp