

Incoming water standards for aquatic ecosystem protection: PFOS and PFOA



Environment
Protection
Authority Victoria

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* This replaces 1633.1, issued May 2017

Guideline

Purpose

This document provides guidance on the draft standards for PFOS and PFOA and their recommended application.

Legal Status

This Guideline is advisory.

Water environments such as rivers, lakes, bays and groundwater can become polluted when chemical or physical contaminants are present at levels that cause harm to aquatic ecosystems.

In Victoria, we use standards from the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* which are designed to protect aquatic ecosystems. These guidelines are currently being reviewed. As part of that review, draft standards for two chemicals – perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA) – are the first to have been finalised.

As the revised standards will not be part of legislation in Victoria until 2018, this document provides guidance on the draft standards for PFOS and PFOA and their recommended application.

This document will be particularly relevant to EPA-appointed environmental auditors and environmental assessors investigating potential contamination in surface water or groundwater.

Why are PFOS and PFOA problems?

Both PFOS and PFOA are types of per- and polyfluorinated alkyl substances (PFASs), also commonly known as PFCs (per- and polyfluorinated chemicals). This group of chemicals has been used for many decades in consumer and industrial products. PFOS and PFOA are persistent in the environment and have been shown to have adverse health effects on animals. In particular, PFOS has been found to accumulate in aquatic food chains and in other wildlife; it is generally the dominant PFAS found in biota tissues, regardless of the species or trophic level. The potential for adverse health effects in humans from PFOS and PFOA cannot be ruled out. For more information on these chemicals and health, see EPA publication 1611.1.

Existing Australian guidance

There are no pre-existing formal Australian standards to assess PFOS and PFOA for the protection of human health or ecosystems. The draft standards presented in this document are the first ever Australian standards for aquatic ecosystem protection. They will become part of statutory policy in 2018, but are recommended for immediate use.

There are currently no formally established Australian standards for the protection of human health. However, in June 2016, the Standing Committee on Environmental Health (enHealth) released interim guidance on human health for these compounds. Interim guidance numbers are provided for tolerable daily intake, drinking water quality and recreational water quality. EPA will continue to work with national and international colleagues to ensure appropriate standards are being applied to the investigation of sites that are impacted by PFASs.

Review of the national water quality guidelines

The *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* are commonly referred to as 'ANZECC' or 'the Guidelines'. The current Guidelines were published in 2000 and are currently under review. The review is expected to be finalised by mid-2017. The Guidelines provide standards that aim to protect aquatic ecosystems from the adverse effects of toxicants such as heavy metals, hydrocarbons, pesticides and other chemicals. As part of the review of the Guidelines, about 30 toxicants will either have a revised standard or be given a standard for the first time.

Draft standards for PFOS and PFOA

The development of draft standards for PFOS and PFOA have been fast-tracked due to a recent rise in investigations of sites impacted with these chemicals. The draft standards are shown in Table 1.

Table 1: Incoming draft standards for the protection of aquatic ecosystems

Levels of protection	PFOS (freshwater) toxicity guideline value (µg/L)	PFOA (freshwater) toxicity guideline value (µg/L)
Reliability	Very high	Low
High conservation value systems (99% species protection) (equivalent to largely unmodified aquatic ecosystems)	0.00023	19
Slightly to moderately disturbed systems (95% species protection)	0.13	220
Highly disturbed systems (90% species protection) (80% species protection)	2.0 31	632 1,824

Values are expressed as total PFOS and total PFOA.



These draft standards can only be applied to the protection of aquatic ecosystems. They should not be used to assess water for human drinking or primary contact recreation (such as swimming); or be applied to human health or soil assessments.

The current Victorian SEPPs refer to the same levels of protection as shown in Table 1 and will most likely continue to do so. As both PFOS and PFOA have been shown to bioaccumulate and biomagnify in wildlife, the draft national standards recommend that the 99 per cent level of protection be used for 'slightly to moderately disturbed systems'. This approach is generally adopted for chemicals that bioaccumulate and biomagnify in wildlife.

However, current Australian laboratory analytical procedures are only able to reliably detect PFOS at a concentration of 0.001 µg/L, which is well above that required to assess the 99 per cent standard for species protection. EPA expects that analytical procedures will continue to improve making an accurate measurement against this standard possible. Until then, EPA will use the current limit of detection (0.001 µg/L) as the practical standard for 'slightly to moderately disturbed' and 'high conservation value systems' until laboratory procedures are able to report on lower concentrations. The 95 per cent protection standard will apply for highly disturbed systems, as recommended by Warne et al. (2015).

New standards to become part of state environment protection policy

State environment protection policies are statutory policies that set standards, legal rules and statutory obligations to protect and improve the health of Victoria's environments. Policies such as SEPP (Waters of Victoria) and SEPP (Groundwaters of Victoria) refer to the Guidelines to provide the standards for toxicants; thereby incorporating the Guidelines as documents within statutory policies.

Both SEPPs are currently under review and will become a single policy called SEPP (Waters). Although the review is not due to be completed until late 2018, it is proposed that reference to the Guidelines will be retained. Once the review of SEPP (Waters) is completed, any new standards included in the Guidelines (and any subsequent updates) will be formally adopted by Victoria.

Early adoption of draft standards

EPA recommends that these draft standards be adopted for use in Victoria immediately. EPA encourages their application in situations where contamination of the environment with these compounds is suspected.

We note that until the formal release of the new national Guidelines (mid-2017) and the SEPP review (2018), these draft standards have limited statutory application. Once the Victorian policy review is completed and references the new national Guidelines, then the use of these new standards in any assessment will be formally required. Delaying the adoption of these draft standards until they become statutory increases the potential for misdiagnosis of contaminated sites.

Methods for deriving new criteria

These draft standards have been developed using the most up-to-date research on PFOS and PFOA. The method by which the draft standards have been derived is documented in the two publications listed below.

- G.E. Batley, R.A. van Dam, M.St.J. Warne, J.C. Chapman, D.R. Fox, C.W. Hickey and J.L. Stauber, June 2014. *Deriving Australian and New Zealand Water Quality Guideline Values for Toxicants*, Prepared for the Council of Australian Government's Standing Council on Environment and Water (SCEW)
- M.St.J. Warne, G.E. Batley, R.A. van Dam, J.C. Chapman, D.R. Fox, C.W. Hickey and J.L. Stauber August 2015. *Revised Method for Deriving Australian and New Zealand Water Quality Guideline Values for Toxicants*. Prepared for the Council of Australian Government's Standing Council on Environment and Water (SCEW).

EPA will make further information available regarding the derivation of the draft standards so that they can be considered as part of environmental assessments concerning PFOS and PFOA contamination.

Additional guidance on PFOS/PFOA

- Human Health Based Guidance Values for PFAS

Food Standards Australia New Zealand (FSANZ) released [Health based guidance values for per- and poly-fluoroalkyl substances \(PFAS\) in April 2017](#).