

Frequently asked questions (FAQ)

Chemical status of water bodies: uPBT substances and 'new' priority substances

Sustainability at the heart of a living, working, active landscape valued by everyone.

Introduction

There are 571 water bodies in Northern Ireland, of these 496 are surface water bodies: including 450 rivers, 21 lakes, and 25 transitional & coastal water bodies (Marine); the remaining 75 are groundwater bodies.

For surface waters, ecology and chemistry status of water bodies are assessed using the specifications set out in the [Water Environment \(Water Framework Directive\) Regulations \(Northern Ireland\) 2017](#) as well as the [Water Framework Directive \(Classification, Priority Substances and Shellfish Waters\) Regulations \(Northern Ireland\) 2015](#). Ecology and chemistry status combine to an overall surface water status. The ecological status ([green box](#)) reflects the key pressures acting upon our water environment: excess nutrients and organic pollution resulting from agricultural and urban (sewage) land use.

In 2018, new priority substances were introduced to the monitoring programme. For the first time the presence of ubiquitous, persistent, bioaccumulative, toxic (uPBT) substances, so-called 'forever' chemicals, have been assessed as part of chemical status ([pink box](#)). Due to their bioaccumulative and persistent nature, uPBT substances have been detected at all monitored stations and resulted in failures of all of those stations. These failures were extrapolated to all water bodies and hence no surface water body achieved good chemical status in 2021 by default as explained in the [WFD statistics report](#). The report presents ecological and chemical status as well as overall surface water status to provide more detailed information.

Caution is advised when comparing results from different regions and countries as well as different River Basin Management Plan cycles. Results are affected by the methods used to collect data and hence cannot often be directly compared. The major contribution to variability seems to arise from the approach taken to monitoring and extrapolating results as well as from the choice of monitoring matrix: water, sediment or biota (e.g. fish). Some countries extrapolated failure to meet the standard at monitoring sites to all water bodies, while others reported failure only where failure was confirmed.¹

¹ <https://www.eea.europa.eu/themes/water/european-waters/water-quality-and-water-assessment/water-assessments/chemical-status-of-surface-water-bodies>

FAQ – chemical status of water bodies: uPBT substances

No	Question and Answer
1	What are uPBT substances?
	Ubiquitous, persistent, bioaccumulative and toxic substances (uPBT substances) are long lived in the aquatic environment and will bioaccumulate up through the food chain. Different groups of substances sit under the umbrella term of uPBT or PBT substances.
2	Where do uPBT substances come from?
	<p>Many of the uPBT substances such as the Polybrominated Diphenyl Ethers, the most widely used flame retardants in the world until banned, had widespread commercial use for decades across the globe. Others are the byproducts of industrial and commercial processes. When these products were first registered for use, the full extent of their toxicity was not understood. However subsequent research confirmed their uPBT properties resulting in many of them being banned or their use severely restricted. As a result of their widespread use in past decades and multiple sources of entry into the aquatic environment a pollution burden already existed before formal monitoring programmes began.</p> <p>Supporting information and documentation on uPBT substances can be found online, for example https://ec.europa.eu/environment/water/water-dangersub/lib_pri_substances.htm#prop_2011_docs ; section on 'Directive2013/39/EU amending the WFD and EQSD'.</p>
3	Where could I find out more about ubiquitous persistent bioaccumulative toxic (uPBT) substances?
	<p>There are several webpages that provide information on uPBT substances or PBT substances and selection is included:</p> <ol style="list-style-type: none"> <li data-bbox="240 1666 1463 1756">https://www.hse.gov.uk/reach/index.htm PBT substances are included under 'substances of very high concern (SVHC)' <li data-bbox="240 1778 1463 1868">https://ec.europa.eu/environment/water/water-dangersub/pri_substances.htm section on 'Directive 2013/39/EU amending the WFD and EQSD' <li data-bbox="240 1890 1463 1935">https://echa.europa.eu/understanding-pbt-assessment

No	Question and Answer
	<p>d. https://saferchemicals.org/get-the-facts/toxic-chemicals/persistent-bioaccumulative-and-toxic-chemicals-pbts/</p> <p>this webpage is US based and illustrates that uPBT substances are a world-wide issue that is not limited to Northern Ireland.</p>
4	<p>How long have uPBT substances, and the dangers they pose, been known about?</p>
	<p>A number of different groups of substances are uPBT substances making it difficult to generalise. Polybrominated Diphenyl Ethers (PBDEs) are one example group. The PBDEs were the most widely used flame retardants in the world for several decades, because they are stable at high temperatures. They were coated onto the surface of a vast range of commercial products including but not limited to: the foam backing of carpets and soft furnishings; plastics used in computers, televisions and a wide range of consumer products; insulation used for electrical cables, etc. PBDEs abrade during the lifecycle of products and were subsequently identified in house dust, in waste water from private and commercial premises, etc and are also readily released into the environment during the disposal of products to which they were added. Pollution from the PBDEs has therefore built up over a period of several decades, because as flame retardants they were designed to be stable in the advent of a fire and so are highly resistant to normal degradative processes.</p> <p>After a pollution burden was discovered in North America, parts of Europe and South East Asia during the 2nd half of the 90s, further research was conducted into their toxicity in the late 90s and early 2000s. As a result the EU banned the use of PBDEs and monitoring requirements in the aquatic environment were added to the Water Framework Directive (WFD). During the first River Basin Management Planning cycle (2009 to 2015) the Environmental Quality Standard (EQS) was based in the water column. An extensive monitoring programme was conducted in Northern Ireland and whilst they were detected in over 90 % of samples, the EQS was seldom breached. PDBEs are readily sequestered by biota with lower amounts remaining in the water column. For the second cycle (2015-2021) the EU refined the EQS and derived one for biota. The results of this monitoring are included for the first time in the 2021 WFD statistics publication.</p>
5	<p>How many waterbodies were tested?</p>
	<p>A number surface water bodies were tested for uPBT substances:</p>

No	Question and Answer
	<p>a) Thirty-five (6.3%) of over 550 river monitoring stations were monitored for uPBTs. The monitoring stations were selected on a risk based approach for screening purposes.</p> <p>b) Eight (38 %) of twenty-one lake monitoring stations were monitored for uPBTs. The monitoring stations were selected on a risk based approach for screening purposes.</p> <p>c) Twelve (20 %) of twenty-five coastal and transitional water bodies were assessed using contaminants in biota (primarily blue mussels).</p>
6	What measures/ actions are available?
	<p>These substances are termed ‘forever chemicals’ as they are extremely persistent in the aquatic environment. Some group of substances under the uPBT umbrella have been in use since the 1940s. Although some of these substances are now banned others are still in use. The only measure available is to limit or stop their use and to monitor their presence.</p>
7	How can the degradation of our water bodies be reversed?
	<p>With regards to chemicals status subgroup (c) caused by uPBT substances: uPBT substances are persistent in the environment, so-called forever chemicals. Hence the only measures are limiting or stopping their use, which is often achieved through international agreements.</p> <p>However, measures to improve ecology status and chemical status subgroup (b) status for surface waters as well as chemical status and quantitative status for groundwater exist and have been outlined in the draft River Basin Management Plan.</p>
8	What is the critical threshold for uPBT substances in terms of the water environment and public health?
	<p>Environmental Quality Standards (EQS) have been set at a European level for chemical substances to achieve in order to protect the ecology, which includes the plants and animals that live in the water. For uPBTs, the standards are set for either substances in the water column or for substances monitored in biota. If these standards are passed, the status for that substance is assessed as ‘Good’. If the</p>

No	Question and Answer																				
	<p>standards are exceeded, the status for that substance is assessed as 'Failing to achieve Good'.</p> <p>The EQS for the uPBTs monitored are shown in the table below</p> <table border="1" data-bbox="296 472 1431 925"> <thead> <tr> <th data-bbox="296 472 628 584">Name of substance</th> <th data-bbox="628 472 810 584">Medium</th> <th data-bbox="810 472 995 584">AA-EQS µg/L</th> <th data-bbox="995 472 1198 584">MAC-EQS µg/L</th> <th data-bbox="1198 472 1431 584">Biota EQS µg/Kg</th> </tr> </thead> <tbody> <tr> <td data-bbox="296 584 628 696">Mercury and its compounds</td> <td data-bbox="628 584 810 696">Biota</td> <td data-bbox="810 584 995 696"></td> <td data-bbox="995 584 1198 696"></td> <td data-bbox="1198 584 1431 696">20</td> </tr> <tr> <td data-bbox="296 696 628 808">Brominated diphenylether</td> <td data-bbox="628 696 810 808">Biota</td> <td data-bbox="810 696 995 808"></td> <td data-bbox="995 696 1198 808"></td> <td data-bbox="1198 696 1431 808">0.0085</td> </tr> <tr> <td data-bbox="296 808 628 925">Benzo(a)pyrene</td> <td data-bbox="628 808 810 925">Water Column</td> <td data-bbox="810 808 995 925">0.00017</td> <td data-bbox="995 808 1198 925">0.27</td> <td data-bbox="1198 808 1431 925"></td> </tr> </tbody> </table> <p>AA – annual average MAC – maximum allowable concentration</p> <p>Standards set to protect the ecology (EQS) take account of bioaccumulation up through the food chain to also protect human health.</p>	Name of substance	Medium	AA-EQS µg/L	MAC-EQS µg/L	Biota EQS µg/Kg	Mercury and its compounds	Biota			20	Brominated diphenylether	Biota			0.0085	Benzo(a)pyrene	Water Column	0.00017	0.27	
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9	Is there evidence that uPBTs is linked to any particular substance, activity or industry?																				
	<p>There are many groups of substances under the uPBT umbrella. These include Polybrominated Diphenyl Ethers (PBDEs, flame retardants) as well as by-products of industrial and commercial processes. When these products were first registered for use, the full extent of their toxicity was not understood. However subsequent research confirmed their uPBT properties resulting in many of them being banned or their use severely restricted. As a result of their widespread use in past decades and multiple sources of entry into the aquatic environment a pollution burden already existed before formal monitoring programmes began.</p>																				
10	What do the findings of this WFD statistics report mean for our environment in Northern Ireland?																				
	<p>The uPBTs included in the latest classification published in the WFD statistics report are substances that have either been in use for many decades before being banned</p>																				

No	Question and Answer
	or are the products of the combustion of waste/ fossil fuels. Their detection in Northern Ireland is in keeping with other jurisdictions on these islands and across the world.

FAQ – chemical status of water bodies: 'new' priority substances

No	Question and Answer
11	Where do the 'new' priority substances come from?
	<p>The Water Framework Directive (Classification, Priority Substances and Shellfish Waters) Regulations (Northern Ireland) 2015 transposed directive 2013/39/EU into Northern Ireland law. The Water (Amendment) (Northern Ireland) (EU Exit) Regulations 2019 ensure that the Water Framework Directive (as transposed) and the supporting legislation continue to operate. The EU has been operating a watchlist of substances of concern, which are monitored over a number of years and reviewed, before being included in a revised list of priority substances (please see reference to point 2 above). The priority substances are set out in Table 47 of Part 2 of Schedule 1 of the regulations. For priority substances numbered 34 to 45 in Table 47, environmental quality standards (EQS) had to be applied from 22 December 2018 onwards in status assessment and are therefore referred to as 'new priority substances'. The new priority substances are assessed for the first time as part of the water body classification and status determination, which is summarized in the WFD statistics report.</p> <p>In December 2018 cypermethrin was designated as a Priority Substance under the Environmental Quality Standards Directive (2013/39/EU), a daughter Directive of the Water Framework Directive (WFD) (2000/60/EC). All lakes were reported as High Chemical status in 2015 and 2018. The 2020 published status found that 47.6 % NI surveillance lakes had deteriorated to Moderate due to these lakes failing the standard for Cypermethrin. It should be noted that Cypermethrin was not analysed at every lake but that it failed (Moderate) for every lake for which it was tested.</p>



For further information:

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