National Implementation Plan for the Stockholm Convention on Persistent Organic Pollutants

United Kingdom of Great Britain and Northern Ireland

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We are the Department for Environment, Food and Rural Affairs. We're responsible for improving and protecting the environment, growing the green economy and supporting our world-class food, farming and fishing industries.

We work closely with our 33 agencies and arm's length bodies on our ambition to make our air purer, our water cleaner, our land greener and our food more sustainable. Our mission is to restore and enhance the environment for the next generation, and to leave the environment in a better state than we found it.

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Executive summary

The Stockholm Convention is a global treaty with an objective to protect human health and the environment from Persistent Organic Pollutants (POPs). POPs are organic substances that remain intact in the environment for long periods (persist), accumulate in the fatty tissue of humans and wildlife (bioaccumulate) have harmful impacts on human health or on the environment (toxic) and become widely distributed geographically, deposited far from their place of manufacture / release (long-range transport). The Convention requires that Parties adopt and introduce measures to eliminate or reduce production, use and releases of POPs into the environment.

The UK was one of the original parties to the Convention in 2004 and produced a National Implementation Plan (NIP) for POPs in 2007. The UK provided updates to this plan in 2013 and 2017 to reflect decisions made at the Conferences of the Parties. Therefore this update should be read alongside earlier versions of the NIP that can be found at http://chm.pops.int/Implementation/NIPs/NIPTransmission/tabid/253/Default.aspx

This 2021 update covers the UK implementation of decisions made at the 8th Conference of the Parties (COP 8) to the Stockholm Convention held in 2017.

It provides baseline information on decabromodiphenyl ether (decaBDE) and short-chain chlorinated paraffins (SCCPs), which were listed in Annex A to the Convention as substances to be eliminated, and hexachlorobutadiene (HCBD), which has been added to Annex C to the Convention as a substance subject to release reduction. It details action plans to monitor, reduce and eliminate these substances from the environment.

We have also included available information on the implementation of decisions made at COP 9 in 2019, namely the addition of perfluorooctanoic acid (PFOA) its salts and PFOA related compounds, and dicofol, to Annex A. A further update on these substances will be provided in the next NIP update.

Good progress has been made on these and older POPs since our last update in 2017. All Stockholm Convention decisions to date have been included in domestic legislation. Our multi-media emissions inventory (MMEI), which was developed in 2007, continues to be added to and improved, providing us with valuable long-term trend data for a number of POPs listed in Annex C, which are unintentionally produced. These data are showing that estimates of emissions to air, land and water for all Stockholm Convention Annex C substances have declined significantly in the UK since 1990. This is largely due to policy actions targeting major UK point sources.

This update also reports on the outcomes and progress in delivering on commitments made in the 2017 NIP update. These have mostly been completed, with a few subject to ongoing action. Further actions planned for the next few years are set out below and summarised in Annex III. Since the last UK NIP update was prepared, England, Wales and Scotland have published environment strategies and Northern Ireland is currently developing its environment strategy. These, coupled with national clean air strategies,

include a focus for action on environmental chemical pollution. They set goals for managing exposure to harmful chemicals and provide additional drivers for our work to reduce the impact of POPs on the environment.

This updated UK NIP has been developed by the Department for Environment, Food and Rural Affairs (Defra) in agreement with the Scottish Government, the Welsh Government, the Department of Agriculture, Environment and Rural Affairs (DAERA), Northern Ireland and other relevant Government Departments and Agencies.

Introduction

What are Persistent Organic Pollutants?

Persistent Organic Pollutants (POPs) are organic[1] chemical substances that have been identified as meeting the four criteria set out in the Stockholm Convention, namely that they:

- Are **persistent** – they do not readily break down, so remain in the environment for long periods of time
- **Bioaccumulate** – they build up in the tissue of humans and wildlife
- Cause **adverse effects** – they have harmful impacts on human health or on the environment
- Are subject to **long-range environmental transport** – they become widely distributed geographically, being found far from where they were used or produced

POPs have been identified as priority substances for many years and the international community has called for actions to reduce and eliminate their production, use and release.

There are currently 30 POPs listed in the Convention. These fall into three broad categories: pesticides, industrial chemicals and unintentional by-products of combustion and some industrial and non-industrial processes. See Annex II for the full list of POP substances listed under the Convention.

Provisions of the Stockholm Convention

The Stockholm Convention on Persistent Organic Pollutants entered into force on 17 May 2004. The Convention's objective is to protect human health and the environment from chemicals which have a long-term, cumulative adverse impact on human and wildlife health. It establishes a strong international framework for promoting global action on POPs, which are divided into three groups according to their mechanism of production and level of restriction.

The POPs listed in Annex A and Annex B of the Convention are subject to measures to reduce or eliminate releases from international production and use. Time limited exemptions are available in some specific cases and some uses remain acceptable.

[1] Chemicals that are carbon based

The POPs listed in Annex C of the Convention are unintentionally produced and parties are required to take measures to reduce their release with the goal of ultimate elimination, where feasible. The main tool for this is the development of source inventories and release estimates as well as plans for release reductions. The use of Best Available Techniques (BAT) to limit releases of unintentionally produced POPs from the major sources, as categorised in the Convention, is also required.

There are special provisions for those Parties with regulatory assessment schemes both to review existing chemicals for POP characteristics and to take regulatory measures to prevent the development, production and marketing of new substances with POP characteristics.

The Convention also makes provision for the identification and safe management of stockpiles containing or consisting of POPs. Waste containing, consisting of, or contaminated with, POPs should be disposed of in such a way that the POP content is destroyed or irreversibly transformed. Where this does not represent the environmentally preferable option or where the POP content is low, waste shall be otherwise disposed of in an environmentally sound manner. Disposal operations that may lead to the recovery or re-use of POPs are forbidden.

Purpose of this 2021 update to the UK National Implementation Plan

All Parties to the Stockholm Convention are required to develop and endeavour to put into practice, a National Implementation Plan (NIP) setting out how they will implement their obligations under the Convention, within two years of the Convention's entry into force. The UK ratified the Stockholm Convention on 17 April 2005 and submitted its initial NIP in 2007.

The Stockholm Convention is dynamic and there is a requirement to periodically update the NIP in response to new decisions, such as the listing of new substances as POPs. Parties are expected to update their NIPs within two years of any changes to the Convention coming into force (normally 18 months after the decision is taken).

The 2007 NIP was updated in 2013 and 2017 to reflect decisions made at earlier COPs.

This update:

- Describes the steps taken in the UK to implement decisions taken in 2017 (COP 8) to list decabromodiphenyl ether (decaBDE) and short chained chlorinated paraffins (SCCPs) in Annex A and hexachlorobutadiene (HCBD) in Annex C.
- Describes the steps taken to date, to implement decisions taken in 2019 (COP 9) to list dicofol and perfluorooctanoic acid (PFOA) its salts and PFOA related compounds.
- Provides an update on strategies and plans described in the 2017 NIP and sets out new strategies and plans.

- Summarises work done to update the UK POPs multimedia emissions inventory (MMEI).
- Updates on monitoring arrangements.
- Provides a short update on progress to eliminate older POPs.

This update is an addendum and should be read alongside the 2007, 2013 and 2017 versions of the UK NIP, which remain relevant.

Table 1 the POPs that were added to the lists in the Annexes of the Convention in 2017 (COP 8) and in 2019 (COP 9):

	COP Decision	Listed in Annex	CAS RN	Main use	Listing in force in UK
Decabromodiphenyl ether (decaBDE)	SC-8/10	A	1163-19-5	Flame retardant	July 2019
Short chain chlorinated paraffins (SCCPs)	SC-8/11	A	85535-84-8 and others	Lubricants, waterproofing, metal working fluids, flame retardants in paint and plasticisers and flame retardants in polymers	July 2019
Hexachlorobutadiene (HCBD)	SC-8/12	C	87-68-3	n/a	July 2019
Dicofol	SC-9/11	A	115-32-2 1606-46-9	Pesticide	Sept 2020
Perfluorooctanoic acid (PFOA) its salts and PFOA related compounds	SC-9/12	A	335-67-1 and others	Surfactants (compounds that lower the surface tension between two liquids) in textiles, paper, paints and firefighting foams	July 2020

Development of the UK National Implementation Plan

This updated UK NIP has been developed by the Department for Environment, Food and Rural Affairs (Defra) in agreement with the Scottish Government, the Welsh Government, the Department of Agriculture, Environment and Rural Affairs (DAERA), Northern Ireland and other relevant Government Departments and Agencies. It has also been supported by other non-government agencies and bodies, including the competent authorities responsible for the enforcement of POPs regulations.

The UK Government Departments and devolved administrations with an implementation and/or enforcement role for the Stockholm Convention include:

- Department for Environment, Food and Rural Affairs (Defra)
- Scottish Government
- Welsh Government
- Northern Ireland Department of Agriculture, Environment and Rural Affairs (DAERA)

In England, Wales, Scotland and Northern Ireland the responsibility for enforcing environmental chemicals legislation rests with the following bodies, known as the Competent Authorities:

- The Environment Agency (EA)
- The Scottish Environment Protection Agency (SEPA)
- Natural Resources Wales (NRW)
- Northern Ireland Environment Agency (NIEA) (an executive agency of the Department of Agriculture, Environment and Rural Affairs NI)

There are also a number of other UK Departments and agencies with specific responsibilities for the management of chemicals. These include:

- Health and Safety Executive (HSE)
- Health and Safety Executive for Northern Ireland (HSENI)
- UK Health Departments
- Food Standards Agency (FSA) for England, Wales and Northern Ireland and Food Standards Scotland
- Centre for Environment, Fisheries and Aquaculture Science (Cefas)
- UK Health Security Agency

Country baseline

Regulation of POPs

POPs Regulations

The Stockholm Convention is implemented in Great Britain by the retained EU Regulation 2019/1021, as amended by The Persistent Organic Pollutants (Amendment) (EU Exit) Regulations 2020 (henceforth 2020 Regulations) and in Northern Ireland, by Regulation EC No 2019/1021, which still applies by virtue of the Protocol on Ireland / Northern Ireland to the EU withdrawal agreement (all hereinafter referred to as 'the POPs legislation').

The POPs legislation regulates and restricts all POPs listed under the Convention and includes listings of the POPs which are the subject of this update to the National Implementation Plan.

The POPs legislation also includes a requirement to report to the Stockholm Convention secretariat on progress towards meeting our obligations every four years, which is published on the Stockholm Convention website. This is in addition to the legal requirement to publish a report every three years on progress towards meeting our Stockholm Convention objectives, which includes similar data. This report will be published on an appropriate website.

Implementing legislation[2] sets out provisions on enforcement; including provisions relating to offences, penalties and powers to set fees and serve notices. It further designates the Environment Agency (EA) as the 'Competent Authority' and enforcement agency in England, Natural Resources Wales in Wales; the Department for Agriculture, Environment and Rural Affairs (DAERA) in Northern Ireland and the Scottish Environment Protection Agency (SEPA) in Scotland.

Recently, further amendments were made to the Polychlorinated Biphenyls (PCB) Regulations in order to implement the Stockholm Convention requirement to remove from use, all transformer equipment contaminated with set levels of PCBs by 31 December 2025:

-The Environmental Protection (Disposal of Polychlorinated Biphenyls and other Dangerous Substances) (England and Wales) (Amendment) Regulations 2020[3] amends

[2] The Persistent Organic Pollutants Regulation 2007 as amended by the Persistent Organic Pollutants (Amendment) (EU Exit) Regulations 2020

[3] https://www.legislation.gov.uk/uksi/2020/489/made

the Environmental Protection (Disposal of Polychlorinated Biphenyls and other Dangerous Substances) (England and Wales) Regulations 2000.

-The Environmental Protection (Disposal of Polychlorinated Biphenyls and other Dangerous Substances) (Scotland) Amendment Regulations 2020 amends the Environmental Protection (Disposal of Polychlorinated Biphenyls and other Dangerous Substances) (Scotland) Regulations 2000 (SSI 2000/95)[4].

Northern Ireland is planning similar legislation, with a view to meeting the 2025 Stockholm Convention deadline to remove from use all transformer equipment contaminated with set levels of PCBs by 31 December 2025.

Exemptions from bans and restrictions on production and use

The Stockholm Convention allows Parties to register exemptions to the prohibitions set out in Annex A of the Convention. These exemptions are time-limited to a maximum of 5 years and, in accordance with Article 4 of the Convention, review dates can be agreed to consider the continued need for exemptions.

Registrations were previously agreed at EU level and implemented through the EU POPs Regulation. Exemptions in force on 31 December 2020 have been retained in the 2020 Regulations.

A Party may, at any time, withdraw an entry from the Register for a specific exemption, so in the coming year we plan to review the exemptions we have registered in the 2020 Regulations to determine whether they are still required by Great Britain.

Movement of POPs

Following the UK's exit from the EU, we have established in Great Britain (GB) an independent Prior Informed Consent (PIC) regulatory regime for the export and import of certain hazardous chemicals. Businesses exporting or importing PIC-listed chemicals from GB are required to comply with the new GB PIC regime. The new GB PIC procedures and notification arrangements apply to exports of PIC-listed chemicals to other countries and movements from GB to Northern Ireland. POPs listed in Part 4 of the GB PIC List are banned for export and can only be exported in small quantities, not exceeding 10kg per year, from each exporter to any importing country, including Northern Ireland, for the purpose of research and analysis.

[4] https://www.legislation.gov.uk/ssi/2020/434/made?view=plain

The new GB PIC regime is similar to the existing EU regime. The two regimes operate independently of each other and there are different procedures for notifying exports under GB PIC.

The GB PIC regime is operated by the Health and Safety Executive (HSE) as the PIC Designated National Authority (DNA). Guidance on GB PIC is available on the HSE website https://www.hse.gov.uk/pic/1-jan-changes.htm .

Under the Northern Ireland Protocol, the EU PIC Regulation will continue to apply to Northern Ireland.

Movement of POPs waste

The export and import of waste is subject to the controls set out in the retained Regulation (EC) No 1013/2006 on shipments of waste, as amended by The International Waste Shipments (Amendment) (EU Exit) Regulations 2019, in respect of GB. Regulation EC No 1013/2006 still applies by virtue of the Protocol on Ireland / Northern Ireland in the EU withdrawal agreement, in respect of Northern Ireland. These regulations apply from the point of loading the waste until it has been fully recovered or disposed of at the destination facility. The controls that apply to a waste shipment from GB or Northern Ireland will depend on the:

- treatment planned for the waste when it reaches its destination
- country of destination and the transport route
- waste type

There are new controls on the movement of waste plastic, which are particularly relevant to POPs waste. From the 1 January 2021 waste plastic can only be shipped under Article 18 controls (also known as ‘green list’) if it meets the requirements of the Basel Convention waste code B3011. This means all the following apply. The waste plastic must be:

- a single polymer plastic
- almost free from contamination and other types of waste, including other waste plastics
- recycled by R3 – recycling or reclaiming organic substances that are not used as solvents in an environmentally sound manner

Basel code B3011 covers the following waste plastics:

- non-halogenated polymers
- cured resins or condensation products

- fluorinated polymers – but only those specifically named and excluding post-consumer wastes

Decabromodiphenyl ether (decaBDE)

Production and use

Decabromodiphenyl ether (decaBDE or BDE-209) is a synthetic substance with no known natural occurrence. It has been widely used as a flame retardant in a wide variety of applications such as plastics, polymers, composites, textiles, adhesives, sealants, coatings and inks.

Articles known to have used decaBDE include car seats, computers, soft furnishings, coated textiles, televisions, window blinds, curtains, polymers, wire and cable, plastics, construction materials (roofing, insulation, piping, ducting, hoses, cables), car and aircraft parts. Mattresses may also contain decaBDE but, as large quantities would reduce the functionality of the mattress, other flame retardants are likely to have been favoured.

It was decided to add decaBDE to the Stockholm Convention at the eighth conference of the parties (COP 8) in May 2017. This places decaBDE in Annex A (banned) with some specific (time limited) exemptions allowed.

Production of decaBDE in the UK ceased in 1996 and growing concerns regarding the effects of decaBDE on human health and the environment meant that UK industry began to phase-out its use from 2006 onwards, when it was included as a substance requiring restriction in electrical and electronic equipment under the Restriction of Hazardous Substances Directive (RoHS). Under Registration, Evaluation, Authorisation of Chemicals (REACH), it was added to the Candidate List of substances of very high concern (SVHC) in December 2012 and restricted in 2017, with that restriction coming into force in March 2019.

Imports into the EU were reduced to 4,133 tonnes by 2012 (UNEP, 2017). Based on Eurostat data, the UK imported 2,000 tonnes of decaBDE in the year 2000, which thereafter declined, falling to 100 tonnes per annum in 2012 and ceasing shortly thereafter (Wood, unpublished c).

Articles containing decaBDE, already in use before 15 July 2019 can continue to be used but must be destroyed appropriately at the end of their life.

There are currently no specific exemptions that allow for the manufacturing, supply and use of decaBDE in Great Britain (GB). We will work with stakeholders to review the ongoing need for exemptions, for all POPs, in the UK over the next year.

Legislation

Parties to the Stockholm Convention made the decision to ban the use of decaBDE in all articles under Annex A with specific exemptions (listed above) at COP 8 in May 2017.

DecaBDE was banned from use in the UK through relevant regulations[5].

This is in addition to the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012 which were amended by the Hazardous Substances and Packaging (Legislative Functions and Amendment) (EU Exit) Regulations 2020[6], which restricts the concentration of PBDEs (Polybrominated diphenyl ethers, of which decaBDE is one) in polymers used in electrical and electronic equipment (EEE) to a maximum of 0.1%, with some exemptions. A derogation that aligns the ban on decaBDE with this RoHS legislation was removed from the GB POPs legislation in 2020. We are discussing this issue with stakeholders as part of a wider review on the use of exemptions under the Convention.

Going forward, the Government in England has also committed to review and consult on measures such as Extended Producer Responsibility and product standards for five new waste streams, with 'bulky waste' (which comprises furniture, mattresses, bedding and carpets) and certain materials in the construction and demolition sector identified along with other potential priorities. Both these waste streams contain decaBDE to some extent.

Stockpiles and waste and contaminated sites

There are no stockpiles or sites contaminated with decaBDE identified in the UK. However, the lifespan of goods treated with decaBDE and quantities used, mean that a significant legacy issue exists and represents a concern for waste which needs to be managed carefully. Further work has been undertaken to identify the different waste streams, the likelihood of decaBDE being present and the length of time we are likely to see this substance in waste streams. Studies conducted in Ireland, the UK and the EU suggest that the quantities in which decaBDE was originally present in specific products and the quantities released during product use and end-of-life management leads to variable concentrations of decaBDE in waste articles. An EU literature review study (Ramboll 2019) suggested that decaBDE concentrations found in waste range from 0.021 – 200.000 mg/kg, making it difficult to manage decaBDE effectively and efficiently.

[5] Annex I in the EU POPs regulations (2019/1021 for Northern Ireland). In Great Britain it is implemented through the retained EU regulation (2019/1021) as amended by the Persistent Organic Pollutants (Amendment) (EU Exit) Regulations 2020.

[6] https://www.legislation.gov.uk/ukdsi/2020/9780348213607

In the UK the Industry Council for Electronic Equipment Recycling (ICER), in cooperation with Defra and EA, published a report in 2020 on an investigation into the presence of chemicals used as flame retardants in more than 2000 items of waste electrical and electronic equipment (WEEE). The analysis confirmed that there are often high levels of hazardous chemicals, including PBDEs, in many items of WEEE. DecaBDE was found to be present in many types of WEEE including small mixed WEEE, display devices and refrigerators (Keeley-Lopez et al, 2020). Further information on this report can be found on page 27 below.

Monitoring

The EA currently does not routinely monitor for decaBDE in the water column. No Environment Quality Standards (EQSs) have been set for decaBDE in the water environment. DecaBDE is very insoluble in water, making monitoring the water column less relevant. It is more likely to exist in non-aqueous media such as sediments and biota, and methods capable of providing analysis to environmentally significant levels, in these media, are not currently available to the EA. However, a recently published study detailing a European 8-year (2005-2012) monitoring programme on birds, sewage sludge and sediments from seven countries, did measure concentrations of decaBDE. The UK samples in this study included sparrowhawk eggs, sewage sludge and sediment. DecaBDE was found in sparrowhawk eggs, with concentrations neither increasing nor decreasing. Concentrations of decaBDE in sediment varied from very low ng/g to very high µg/g. These concentrations were not found to be decreasing over time. In the UK the concentrations of decaBDE detected in sewage sludge increased between 2006 and 2011 (Leslie et al., 2021).

The Scottish Environment Protection Agency (SEPA) has undertaken monitoring of decaBDE in biota and sediment in the past. This was using a sub-contracted laboratory as SEPA does not currently have the capability internally. SEPA sediment monitoring in 2009 identified all positive detects in the range of 3.61 ug/kg DW to 123 ug/kg DW, which are above the background assessment criteria (BACs) for sediment. Further assessment would be required to determine if the detected concentrations for specific congeners were above the Canadian Federal Environmental Quality Guidelines (FEQGs) used as a benchmark for assessing environmental significance in the absence of an OSPAR agreed Environmental Assessment Criteria (EAC).

For several years under OSPAR, the Clean Safe Seas Environmental Monitoring programme (CSEMP) has collected data on the concentration of PBDEs, including decaBDE in UK marine waters. Results of this can be found https://ocean.ices.dk/OHAT/. The monitoring carried out in UK marine waters is conducted on an annual basis. However, the sampling programme is designed so that East and West coasts are sampled on alternate years, resulting in samples being taken from individual stations every 2 years. For the CSEMP monitoring programme, decaBDE is analysed for in sediments only. The sample numbers vary from the different coasts, but there are approximately 35 samples analysed on the Irish and Celtic seas and Western Channel survey, and approximately 45 samples analysed on the North Sea and Eastern Channel survey. In general,

concentrations of PBDEs, including decaBDE in sediments, were low and frequently below the levels of detection, with a decreasing trend over the years. However, data was limited to determine trend analysis for all sampling locations. There were a limited number of sampling stations for determining PBDEs in biota, but the results indicate a decreasing trend (UK Marine Monitoring and Assessment Strategy, 2020).

Short-chain chlorinated paraffins (SCCPs)

Production and use

Short-chain chlorinated paraffins (SCCPs) are chlorinated derivatives of n-alkanes with carbon length of 10 to 13 carbon atoms (CAS RN 85535-84-8).

SCCPs have not been produced in the UK since 2012. They were used in metal working fluids, plasticisers in paints, coating and sealants, as a flame retardant in rubber and textiles and in leather processing. They were widely used in paints, adhesives and sealants, leather fat liquors, plastics, and as flame retardants in rubber, textiles and polymeric materials. They are numerous in technology, domestic and PVC products. Other sources also report SCCPs contents in everyday products, including microwave dishes, lamps, electronic items, such as cables, adapters, keyboards, memory media, photo frames, headphones and detergent (BiPRO, 2015). In 2010, the use of SCCPs in the European Union was estimated to be about 530 tonnes (RIVM, 2010).

SCCPs are also thought to be minor constituents of some chlorinated paraffin products that remain on the market. The major constituents of these products are medium-chain chlorinated paraffins (MCCPs). The UK has submitted a proposal to nominate a group of chlorinated paraffins, including some constituents of MCCPs, as a POP. If this proposal leads to a further listing of chlorinated paraffins, this may further reduce SCCPs in articles and releases to the environment (Defra, 2021) (see page 29).

Legislation

The Stockholm Convention banned the use of SCCPs under Annex A with specific exemptions. The UK, through the POPs legislation[7] has implemented this ban. The legislation does not allow for any ongoing use of SCCPs in new articles, but it allows continued use in:

[7] Annex I in the EU POPs regulations (2019/1021 for Northern Ireland). In Great Britain it is implemented through the retained EU regulation (2019/1021) as amended by the Persistent Organic Pollutants (Amendment) (EU Exit) Regulations 2020.

- conveyor belts in the mining industry and dam sealants containing SCCPs already in use before or on 4 December 2015; and
- articles containing SCCPs other than those referred to in point (a) already in use before or on 10 July 2012.

The POPs legislation allows for substances and mixtures containing up to 1% and for articles containing up to 0.15% to be placed on the market. It should be noted that, under UK hazardous waste controls, wastes containing both MCCP and SCCP above 0.25% are classified as hazardous waste. That status is very relevant to the regulation requirements and fate of materials when they become waste.

Stockpiles, waste and contaminated sites

The UK has no known stockpiles of SCCPs substances or mixtures. Some of the historic uses have long lifetimes e.g. conveyor belts and sealants and adhesives, so are likely to continue to be present in some wastes generated for many years. However, a report commissioned by the European Union suggests that the relatively short life cycles of most other products and the fact that the use of SCCPs has now either been banned or voluntarily ended several years ago, most of the SCCP containing waste has been already disposed of (Ramboll, 2019).

Monitoring

In 2018, 15 river sites were monitored for SCCPs by the EA. Site selection ensured that all River Basin Districts (RBD) had at least one sample point, and these were positioned at the bottom of catchments in areas most likely to have elevated levels of these chemicals. All of the results were below the minimum reporting value (MRV[8]) for the test. This MRV is significantly higher than the water Environmental Quality Standards (EQS), so it is not possible to conclude whether or not it was exceeded to accurately determine water measurements at or below the SCCPs EQS. SCCPs are not manufactured in the UK, nor have they been for many years. The main source is considered likely to be imported goods from Asia, which use a different chlorinated paraffin product that has relatively high levels of SCCP chain lengths. Therefore, there are no UK manufacturing sites to target surface water monitoring specifically for SCCPs.

Follow-on surveillance monitoring has not been undertaken as the methods available are not sufficiently sensitive and are unlikely to provide further information on environmentally relevant levels in water. The challenges of determining the concentration of chlorinated paraffins in the environment and biota are recognised and in many cases

[8] The minimum reporting value (MRV) are derived statistically by the Environment Agency's National Laboratory Service (NLS). The derivation of the MRVs are part of NLS's analytical quality assurance.

the concentrations reported are considered to be qualitative indicators. However, improved detection methods for chlorinated paraffins, including analytical standards and efficient sample clean-up procedures, have been recently reported in the literature. A number of new techniques have shown increased sensitivity and differentiate between the varying carbon chain lengths and degrees of chlorination within this group of chemicals (Defra, 2021). We will consider the need to review monitoring arrangements in light of these developments.

SEPA has not undertaken any monitoring of SCCPs.

Hexachlorobutadiene (HCBD)

Production and use

Hexachlorobutadiene (HCBD) (CAS RN: 87-68-3) is a halogenated aliphatic compound which has had several technical and agricultural uses.

Previously it was intentionally produced and used, for example: as a solvent (for rubber and other polymers); in the recovery of chlorine-containing gas or in the removal of volatile organic components from gas; as hydraulic, heat transfer or transformer fluid; in gyroscopes; in the production of aluminium and graphite rods; and as a plant protection product. It is not known to be currently intentionally produced or used in Europe, or in any other United Nations Economic Commission for Europe (UNECE) country but continued production elsewhere is unknown (UNEP, 2012).

Information on production, which ceased in the UK in 1993, and use, can be found in the UK 2017 NIP update. This confirms that although HCBD is no longer used in manufacturing processes and does not occur naturally, it is unintentionally released from certain chemical and industrial processes. These sources include: the manufacture of chlorinated hydrocarbons such as perchloroethylene, trichloroethylene and carbon tetrachloride, production of magnesium; and incineration processes. According to industry estimates, emissions of HCBD to air from European chlor-alkali production sites, are close to zero (EuroChlor, 2004).

Legislation

In 2015, at COP 7, HCBD was added to Annex A of the Stockholm Convention without any specific exemptions. The Stockholm Convention added HCBD to Annex C of the

Convention in 2017, at COP 8. HCBD has been added to the POPs legislation[9], which lists substances subject to release reduction provisions requiring regular assessment of the need for the mandatory monitoring of this substance.

Stockpiles, waste and contaminated sites

There are no known stockpiles of HCBD in the UK. There have been significant reductions in emissions from waste management, although some releases are still reported. It is expected that these unintentional releases will continue to decline in the UK.

Monitoring

As a result of the cessation of the commercial use of HCBD in the UK in 1993, it is apparent that alternatives have been identified and substitution has taken place. Therefore, the only potential remaining source of HCBD to the environment is via emission from residues from the production of chlorinated hydrocarbons.

HCBD is classed as a priority hazardous substance and therefore releases to the aquatic environment are addressed in England and Wales under the Water Environment (Water Framework Directive) (England & Wales) Regulations 2017[10]. EQS have been set for HCBD in both freshwater and marine environments.

The EA has analysed HCBD as part of their fish monitoring programme at 20 freshwater sites over the years 2014 to 2019. The analysis has a minimum reporting value (MRV) of 0.1 µg/kg and the biota EQS is 55 µg/kg. All results were well below the EQS, and the vast majority were less than the MRV.

In Scotland, SEPA has monitored for HCBD in freshwater biota between 2004 and 2014 at around 20 freshwater sites. HCBD was detected at very low levels relative to the EQS, or not detected at all (similar MRV to EA). No time trend is evident, partly because levels are so low or not detectable.

NRW monitoring of biota at four freshwater sites in Wales indicated concentrations well below the EQS. Monitoring results from saline biota are similarly low.

[9] Annex III in the EU POPs regulations (2019/1021 for Northern Ireland). In Great Britain it is implemented through the retained EU regulation (2019/1021) as amended by the Persistent Organic Pollutants (Amendment) (EU Exit) Regulations 2020.

[10] https://www.legislation.gov.uk/uksi/2017/407/contents/made

The EA has also analysed HCBD in blue mussels and saline fish from estuarine and coastal waters. Since 2012, samples from 36 different blue mussel sites have been monitored with 98% of results less than the MRV (0.1 µg/kg).

Results from sampling of saline fish (around 20 sites), since 2018, has also shown that the majority of results (90%) are less than the MRV (0.1 µg/kg), with the remaining samples just above the MRV.

Cefas monitors HCBD in marine sediments as part of the OSPAR Clean Safe Seas Environmental Monitoring programme (CSEMP), however it is rarely detected above the limit of quantification (LOQ).

Unintentional production

Releases of HCBD can be effectively minimised by using alternative processes, improved process control, emission control measures, or by substituting the relevant chlorinated chemicals (UNEP, 2016). Following this listing the UK use of best available techniques (BAT) and new sources of HCBD must be identified, with the promotion of the use Best Environmental Practices (BEP) for these sources (UNEP, 2016a).

The production of chlorinated solvents has been identified as a possible source, as HCBD is formed as an unintentional by-product. Industry estimates from EuroChlor suggest this has decreased to negligible levels (EuroChlor, 2004). For example, data from 76 European chlor-alkali production sites show that HCBD emissions to water have decreased from 100 kg/year in 1997 to 2.4 kg/year in 2002. Atmospheric emissions have decreased from 2 kg/year to close to zero over the same period. This represents a reduction of more than 99% compared to 1985. A table of estimated unintentional global releases of HCBD was included in the last NIP update in 2017.

Waste streams containing HCBD from the on-going production of certain chlorinated hydrocarbon may still have to be considered. Wastes are currently disposed of to landfill and incineration, with the latter becoming more significant, achieving greater than 99.9% destruction efficiency of HCBD (EuroChlor, 2004).

As reported in the 2016 NIP update, permits for all sites require the use of BAT and these permits are reviewed when new guidance is introduced.

PFOA

Production and use

Perfluorooctanoic acid (PFOA), its salts and PFOA-related compounds (CAS RN 206-397-9) is a perfluorinated carboxylic acid, sometimes referred to as C8 (for example, by firefighters). PFOA, its salts and PFOA-related compounds falls within a family of perfluoroalkyl and polyfluoroalkyl substances (together, PFAS), and is resistant to environmental degradation.

PFOA its salts and PFOA-related compounds were used widely:

- as processing aids in the production of fluoroelastomers and fluoropolymers, with polytetrafluoroethylene (PTFE) being an important fluoropolymer
- in the production of non-stick kitchenware and food processing equipment
- for the manufacture of side-chain fluorinated polymers as surfactants (compounds that lower the surface tension between two liquids) in textiles, paper, paints and fire-fighting foams

PFOA has also been detected in industrial waste, stain resistant carpets, carpet cleaning liquids, house dust, microwave popcorn bags, water, food and Teflon.

In 2006, the main manufacturers in the US, Europe and Japan agreed on a global phase out of PFOA, and related long-chain substances, by the end of 2015. In July 2020 the manufacture, placing on the market and use (including import) of PFOA, its salts and PFOA-related compounds as well as articles containing these substances were prohibited in the POPs regulation. There are exemptions for certain uses.

There is very little current direct use of PFOA, but a much larger use in polymers that can contain it as an impurity and derivatives which can transform to it. A report on POPs in waste suggests that by 2012, before the restriction, the EU was only importing 20 tonnes per annum (Ramboll, 2019).

Legislation

The Stockholm Convention listed PFOA, its salts and PFOA compounds in Annex A with exemptions. The UK prohibits the use of this substance with a number of time limited exemptions that are set out in the POPs legislation[11].

This restriction is subject to various unintentional trace contaminant levels below which the restrictions do not apply.

Stockpiles, waste and contaminated sites

There are a number of waste streams that may contain PFOA. Defra funded a report in April 2019 on phasing out PFOA containing firefighting foams in the UK. It reported that stockpiles of fire-fighting foam containing PFOA are declining and likely to be zero by 2034 without the regulation detailed above. It also states that there are suitable non-fluorinated

[11] Annex I in the EU POPs regulations (2019/1021 for Northern Ireland). In Great Britain it is implemented through the retained EU regulation (2019/1021) as amended by the Persistent Organic Pollutants (Amendment) (EU Exit) Regulations 2020.

alternatives available in sufficient supply to replace existing stockpiles of PFOA-containing fire-fighting foams (Eftec, 2019, unpublished).

Other long-term waste streams include textiles, semi-conductors, medical devices, printing inks, automotive parts and photo-imaging.

Monitoring

The EA included PFOA in routine surveillance monitoring of surface water (fresh, estuarine and coastal waters) from 2016 to 2019. During this time, approximately 470 freshwater sites and approximately 55 estuarine and coastal locations in England have been sampled monthly for PFOA. Mean measured concentrations of PFOA range from <MRV up to 0.073 µg/l in fresh surface waters, and from <MRV to 0.0076 µg/l in estuarine in coastal waters. The maximum reported concentrations of PFOA are 0.17 µg/l in fresh surface waters, and 0.018 µg/l in estuarine and coastal waters.

Prior to routine monitoring, PFOA was measured in groundwater and surface waters as part of a monitoring study in 2006 to investigate the occurrence of PFOS and related compounds in the environment (Environment Agency, 2007). For PFOA, a range of concentrations were reported from 0.1 µg/l up to a maximum of 0.34 µg/l.

Additional semi-quantitative sampling of PFOA has been conducted across surface water (fresh, estuarine and coastal waters) and groundwater sites as part of emerging substances contaminant monitoring between 2014 and 2019. Results from this semi-quantitative method are only an indication of presence and absence. The positive detection rate reported for PFOA is 28% of samples in groundwater (1093 samples total), 48% in saline water (277 samples total), and 91% of samples in fresh surface water (2740 samples total).

The EA also included PFOA in fish monitoring at 78 freshwater sites between 2015 and 2019, but PFOA was not detected above the limit of quantification in any fish sampled.

Since 2018, PFOA analysis has been included in the EA's saline fish programme. Of the samples, 98% were less than the MRV (1 µg/kg).

The EA and Cefas completed a sampling project to investigate PFAS, including PFOA in estuarine sediments from around the English coasts (ca. 100 sediment samples). Results can be found at: 15201_ME52342021PFASsedfinalreport.pdf

In Scotland, SEPA has run two monitoring investigations that included levels of PFOA in freshwater biota and freshwaters in 2018 and 2019 respectively. Levels found were generally lower than those found in England. SEPA has also monitored PFOA in groundwater for a number of years, with results generally below the method's MRV. However, monitoring data are currently not available to report here.

Dicofol

Production and use

Dicofol (CAS RN 115-32-2) is an organochlorine pesticide used as a plant protection product, miticidal pesticide and acaricide which was widely used on fruits, vegetables, ornamentals and field crops (OSPAR, 2002). It is synthesised from DDT and is therefore structurally similar with similar properties to DDT. DDT was included in the first twelve POPs listed in the Stockholm Convention.

Dicofol was first marketed in 1955. Between 2000 and 2007 global production was estimated to have been between 2700 to 5500 tonnes per year but then production declined steeply (UNEP, 2017).

Production of dicofol rapidly declined from 2007 as many countries began to phase out its production and use (UNEP, 2017). Use of dicofol in the European Union (EU) came to an end in 2010.

As dicofol has not been produced by, or used in, the UK for many years, no significant additional work was required to implement the listing.

Legislation

At COP 9 in 2019 it was agreed that dicofol should be listed on Annex A of the Stockholm Convention, and there were no exemptions required. The UK has therefore, through the POPs legislation[12], banned the use of dicofol, with no exemptions.

Stockpiles, waste and contaminated sites

As the production and use of dicofol ended some years ago, there is no ongoing waste production and no waste disposal actions are required. There are no known stockpiles in the UK.

Monitoring

The EA currently does not routinely monitor for dicofol in England as it does not have an analytical method capable of accurately quantifying the amount of dicofol present in either

[12] Annex I in the EU POPs regulations (2019/1021 for Northern Ireland). In Great Britain it is implemented through the retained EU regulation (2019/1021) as amended by the Persistent Organic Pollutants (Amendment) (EU Exit) Regulations 2020.

biota or water column. This is because Dicofol is hydrolytically unstable in water at neutral and alkaline pH.

All dicofol in biota and water samples results, previously reported by the EA, have retrospectively been found to be the breakdown product, dichlorobenzophenone (DCBP). The EA currently monitors for DCBP in the water column only. As more than one substance breaks down to DCBP this allows them only to infer the potential presence or absence of dicofol.

A review of EA monitoring data for dicofol / DCBP collected to date indicates that:

- there is very little detection of DCBP in freshwaters/freshwater biota (low concentrations in <1% of freshwater sites), and
- elevated concentrations of DCBP have been recorded in a number of locations in coastal and estuarine water column samples, and also in mussels (*Mytilus*) sampled from the River Tees in 2015.

SEPA has not undertaken any monitoring of Dicofol.

Strategies and action plans

Overarching environmental policies

Environment Plans

In 2018, Defra published a 25 Year Environment plan for England with the aim of creating a greener, healthier, more sustainable future for the next generation. This included a focus on managing exposure to harmful chemicals and set out three targets related to POPs and the Stockholm Convention:

- Seeking in particular to eliminate the use of Polychlorinated Biphenyls (PCBs) by 2025, in line with our commitments under the Stockholm Convention.
- Substantially increasing the amount of Persistent Organic Pollutants (POPs) material being destroyed or irreversibly transformed by 2030, to make sure there are negligible emissions to the environment.
- Fulfilling our commitments under the Stockholm Convention as outlined in the UK's most recent National Implementation Plan.

We report annually against our 25 Year Environment Plan targets. Links to these reports can be found at: https://www.gov.uk/government/publications/25-year-environment-plan-progress-reports

In addition, two other strategies support our objectives to eliminate the use and emissions from POPs. England's Clean Air Strategy 2019 sets out our plans for dealing with all sources of air pollution, making our air healthier to breathe, protecting nature and boosting the economy (Defra, 2019). England's Resources and Waste Strategy 2018 seeks a more circular economy, using resources efficiently and reducing the amount of waste we create as a society (Defra, 2018).

The Welsh Government published its first statutory Natural Resources Policy (NRP) in 2018 (Wales, 2018). Its aims include moving towards a more circular economy and accelerating green growth to increase efficiency, reduce pollution and increase profitability. The Environment (Wales) Act 2016 requires each incoming administration to publish a new NRP.

The Welsh Government adopted a Clean Air Plan for Wales in 2020, which includes a number of commitments relating to indoor as well as outdoor air pollution, domestic burning and bonfires. It also published Beyond Recycling, the circular economy strategy for Wales in March 2021. This builds on the 2010 waste strategy, Towards Zero Waste, and sets out actions on a pathway towards a zero waste, net zero carbon Wales, which uses its fair share of resources and grows the circular economy. The circular economy strategy states that they want to ensure that hazardous chemicals are reduced in the

products consumed in Wales, and that any wastes containing hazardous chemicals are appropriately managed. It says they will strive to eliminate the use of chemical additives which can cause harm or prevent recycling at end of life including through improved labelling.

The Scottish Government's Environment Strategy (Scotland, 2020) sets out a long-term vision for Scotland's natural environment and its role in tackling the global climate and nature crises, with a set of supporting outcomes. Pathways for achieving the outcomes will be developed during 2021, identifying strategic priorities and opportunities across government. These will explore the transformative economic and social changes needed to achieve the Strategy's vision – in turn, helping to improve health and wellbeing and build a stronger, fairer and greener economy. An Initial Monitoring Framework (Scotland, 2021) published in February 2021, sets out a high-level dashboard of indicators to track progress. The document can be viewed here:

https://www.gov.scot/publications/environment-strategy-scotland-initial-monitoring-framework/

A new air quality strategy that replaces Cleaner Air for Scotland - The Road to a Healthier Future, was published on 15 July 2021. Cleaner Air for Scotland 2 – Towards a Better Place for Everyone sets out the Scottish Government's air quality policy framework for the next five years and a series of actions to deliver further air quality improvements. There is an enhanced focus on non-transport emissions sources, particularly agriculture and domestic fuel burning. The document can be viewed here:

Cleaner Air for Scotland 2 - Towards a Better Place for Everyone - gov.scot (www.gov.scot)

Northern Ireland is developing it's Environment Strategy and it's first Clean Air Strategy. A Clean Air Strategy Discussion Document, published in November 2020, presents an in-depth analysis of air quality in Northern Ireland and sets out current policy and evidence (DAERA, 2020).

The Chemicals Strategy

Defra is working with the devolved administrations to develop a Chemicals Strategy as outlined in England's 25 Year Environment Plan. The Chemicals Strategy will look to set out our immediate priorities alongside any actions we will need to take to achieve safer and more environmentally sustainable management of chemicals for present and future generations.

International engagement

The UK is actively engaged in negotiations to agree a Beyond 2020 framework for chemicals and waste and is supportive of developing ambitious, measurable and time-limited targets. There are strong synergies between the Multilateral Environment Agreements for chemicals and waste, such as the Stockholm Convention, and others

including the Convention for Biological Diversity. The UK stands ready to prioritise actions and ramp up efforts for the delivery against these future targets.

The UK is the third largest donor to the Global Environment Facility (GEF). The UK contribution is up to £250 million during the period 2018-2022, delivering projects on the ground in support of the objectives of the Stockholm Convention. We are fully engaged in negotiations for the 8th replenishment of this fund, and also support voluntary funds such as the UN Special Programme.

The Stockholm Convention also makes important contributions to support implementation of the 2030 Agenda for Sustainable Development and the achievement of the relevant Sustainable Development Goals and associated targets. Alignment is key to ensuring effective delivery against all of our international obligations. We support strong synergies between the Basel, Rotterdam and Stockholm Conventions.

Action on new POPs

“New POPs” are those listed under the Convention in 2017 (at COP 8) and 2019 (COP 9).

Measures to reduce or eliminate releases of decabromodiphenyl ether (decaBDE)

Brominated flame retardants in electric and electronic items

The Industry Council for Electronic Equipment Recycling (ICER), with input and guidance from Defra, the EA, NRW, SEPA and an industry group, led an investigation to determine the extent of the presence of polybrominated diphenyl ethers (PBDE) chemicals in waste electrical and electronic equipment (WEEE). The results from a sampling study showed that both the PBDEs banned in 2009 and decaBDE (listed as a POP in 2017 but restricted in the UK under RoHS from July 2006) are still present in various WEEE collection streams (Keeley-Lopez et al., 2020).

The study found PBDE POPs at concentrations above the maximum concentration levels (MCL) in components for several WEEE categories;

- **Printed circuit boards**
- **Cables**
- **Cathode-ray tube displays (CRTs)**. POPs PBDEs were found at levels above the MCL in the plastic casings of some CRT displays.
- **Flat panel displays (FPDs).** POPs PBDE levels exceed the MCL in plastic casings of some FPDs.
- **Fridges and large domestic appliances**.

The presence of antimony, assumed to be present as the hazardous substance antimony trioxide, was also determined. This is relevant, as the presence of this substance will need to be taken into consideration when classifying waste as hazardous or non-hazardous.

This study has also helped to identify the need for further work in other areas, such as concerns that analytical methods may underestimate concentrations.

Our regulators have published guidance and engaged with the waste industry to inform them of this study. It provides further advice on restrictions on re-use and export of WEEE containing POPs and their obligations to identify and destroy articles with a POPs level above the legal limit. The study supports their work to undertake characterisation of their waste to better understand the presence of POPs, including decaBDE, in different sub-streams and to destroy the POPs content, preventing its use in recycled materials. This study was heavily referenced by the authors of two recent draft reports for the Stockholm Convention. Both reports were items for discussion at the 16th POPs Review Committee (POPRC) meeting in January 2021 (UNEP, 2021a and UNEP, 2021b).

Brominated flame retardants in soft furnishings

A report was funded by Defra to provide further information on the past use of two brominated POPs flame-retardants, decaBDE and hexabromocyclododecane (HBCDD), in a range of soft furnishings.

The study aimed to provide data that would allow the identification of articles likely to be contaminated with these substances. This information will support early intervention to prevent those articles, with POPs above the legal thresholds, from entering landfill or being recycled.

In addition, the report looked at where materials currently go at end of life and how they are treated and disposed of. This is particularly important when trying to prevent unintentional recycling of decaBDE and HBCDD into new applications.

The report concluded that decaBDE and HBCDD were used in the back coatings of textile coverings for a range of soft furniture applications. Where this is the case the textile coverings for sofas are likely to have the highest concentrations, with foam and fibre cushioned seating acting as a sink for the decaBDE/ HBCDD, which has leached from the textile covering.

The research concluded that domestic seating (such as sofas) should be a priority area for working with the waste handling industry to investigate current waste handling practices and identifying appropriate actions required to ensure that the POPs in waste items are dealt with correctly (Wood, unpublished c).

Soft furnishings working group

Following on from the report above, a Soft Furnishings Waste Working Group was set up to consider appropriate actions and next steps for identifying and managing POPs in soft furnishings waste.

The group includes membership from Defra, EA, the Devolved Administrations and their regulators, Environmental Services Association, British Furniture Confederation, SATRA

Technology Centre, Chartered Institution of Wastes Management, National Association of Waste Disposal Officers, Local Government Associations and the Re-use sector.

We are working with the group to gather evidence and data to:

- better understand current soft furnishings waste management practices and
- identify appropriate actions for changes to methods of waste handling that will ensure that items of soft furnishings are safely dealt with in future according to international obligations and POPs legislation

This programme of work includes developing guidance for waste handlers. We are planning to complete the programme of work in 2022.

Future work on waste management in other sectors.

The UK recognises that waste from construction and demolition and end-of-life vehicle (ELV) treatment may contain POPs and will explore the handling of waste from these sectors to determine if further work is required. An industry funded project to collect and test samples from ELV treatment facilities is currently on hold due to Covid-19.

Measures to reduce or eliminate releases of SCCPs

Further assessment of chlorinated paraffins

The UK has been at the forefront of assessment of chlorinated paraffins and further studies have identified chlorinated paraffins with carbon chain lengths in the range of C_{14} to C_{17} and chlorination levels ≥45% chlorine by weight as a possible candidate for listing as a POP. This includes constituents of the substance known as medium-chain chlorinated paraffins (MCCPs) in Europe, North America and Australia. A draft proposal to list has been prepared and was published for comment on 18 January 2021 (Defra, 2021). After considering the comments received, the Secretary of State asked the EA to complete a proposal which was submitted to the POPs Review Committee on 27 April 2021.

This work is relevant to SCCPs because some chlorinated paraffin products that remain on the market, which are manufactured in other countries, may contain SCCPs as minor constituents. This is due to the use of different approaches to substance definition in different parts of the world (Defra, 2021). A new listing of this additional group of chlorinated paraffins could, therefore, reduce emissions of SCCPs.

Measures to reduce or eliminate releases of Hexachlorobutadiene (HCBD)

According to industry estimates of HCBD, emissions to air from European chlor-alkali production sites are close to zero (EuroChlor, 2004). We consider that no new measures are required but we will continue to review this.

Measures to reduce or eliminate releases of Dicofol

Dicofol is no longer produced or used in the UK. We consider that no measures are required.

Measures to reduce or eliminate releases of PFOA

In early 2019 the UK undertook a literature study into PFOA in fire-fighting foams. The report considered the cost of phasing out PFOA containing firefighting foams in the UK, and the availability of suitable alternatives in April 2019. It looked at:

- Uses of PFOA-containing firefighting foams
- Current stockpiles of PFOA-containing firefighting foams in the United Kingdom
- Availability of suitable alternatives
- Disposal cost and capacity

The study results indicate there are suitable alternatives available in sufficient supply to replace existing stockpiles of PFOA-containing Fire Fighting Foams (FFF). The main two types of alternative FFFs are referred to as C6 AFFFs (aqueous film-forming foams based on substances with perfluorinated carbon chain lengths of 6 atoms) and fluorine-free foams. Further information on the alternatives to PFOA can be found on the Stockholm Convention website: http://chm.pops.int/Implementation/Alternatives/AlternativestoPOPs/ChemicalslistedinAnnexA/PFOA/tabid/8292/Default.aspx

The main barriers for affected users, substituting to these alternative FFFs, appears to be the costs of replacing existing stockpiles and the capacity constraints of high temperature incineration in the UK, as this is one of the few ways of safely disposing of these foams (Eftec, 2019, unpublished).

The UK competent authorities will work with suppliers and users of FFF ahead of the 2023 and 2025 deadlines to ensure that stockpiles and waste are managed as required by the regulations.

In 2020 the UK completed initial development of a multi-media emission source inventory for PFOA, its salts and PFOA-related compounds. The UK will report on this further in the next NIP update.

Defra and the EA have set up a coordinated programme of work that will help us to assess levels of PFAS occurring in the environment, to identify sources and potential risks, and to inform future policy and regulatory approaches. This work will include the development of new analytical methods, mapping of legacy uses, and water company investigations to understand removal of PFAS during wastewater treatment. The EA has already been progressively adding PFAS chemicals to its surveillance monitoring programmes.

Further work on PFOA will be covered in more depth in the next update.

Action on existing POPs

“Existing POPs” are those listed under the Convention before 2017 (COP 8).

This section includes an update on commitments made in the 2017 NIP along with any other action on existing POPs. All actions from the last NIP have been completed or are necessarily ongoing, apart from the sampling for landfill leachate, which has been delayed (see page 38) and POPs in sludge (page 41) which is an ongoing activity.

Awareness raising to help mitigate emissions from diffuse sources

As mentioned in the strategy section above, in January 2019 the UK government published a Clean Air Strategy for England (Defra, 2019). This includes commitments to reduce the level of emissions in the home, in industry and agriculture, which will complement our objectives to reduce POPs emissions in the environment. Equivalent plans and strategies exist, or are being developed, in Scotland, Wales and Northern Ireland.

England’s Clean Air Strategy was accompanied by a number of guidance updates as part of the UK clean air strategy objectives that have potential benefits for reducing POPs emissions:

- Revised guidance on the use of open fires and woodburning stoves was published in January 2019[13].
- Further guidance on burning waste in the open was updated by the EA in September 2019 and published on the government website[14].
- An updated regulatory position statement on the burning waste on bonfires and campfires was also produced by the EA in November 2020, reminding the public that they should not burn unsuitable wastes such as plastic, rubber, glass, oils or metal, as burning these wastes is likely to produce dark smoke and harmful chemicals[15].

Addressing PCBs in electrical equipment

For polychlorinated biphenyls (PCBs), the major source of emissions to air and land continues to be PCB based di-electric heat transfer fluids from old electrical equipment

[13] https://uk-air.defra.gov.uk/library/reports?report_id=948

[14] https://www.gov.uk/guidance/d7-waste-exemption-burning-waste-in-the-open

[15] https://www.gov.uk/government/publications/burning-of-waste-on-campfires-and-bonfires/burning-waste-on-campfires-and-bonfires-rps-50

(e.g. capacitors, transformers, electrical switching gear). The PCB regulations were updated in 2020 to require all such equipment with PCB contamination over a certain level to be removed from use by the end of 2025. This also supports the 25 Year Environment Plan objective to eliminate the use of PCBs by 2025.

The UK competent authorities maintain inventories of equipment that has or may have been contaminated with PCBs. The England and Wales inventories require a precautionary approach, listing not only equipment known to contain PCBs but also those where it cannot be confirmed that they are free of PCBs.

The England / Wales annual report for 2020 states that there has been a decrease of 17% in number of registrants compared to this point last year and the total number of registered items decreased by 6%. This equates to the removal of nearly 20,000 pieces of equipment, either because they have been removed from use or are no longer considered a risk.

The EA and NRW have been working with the energy distribution networks to better understand which equipment is not contaminated, by considering equipment cohorts. Equipment that is part of a clean cohort does not need to be replaced by 2025.

Scotland has revised its PCB legislation and SEPA is planning to use the same cohort approach to testing and categorising equipment for the largest holders of registrations. Northern Ireland also plan to meet the requirement to remove all PCB contaminated equipment as set out in the Stockholm Convention by the end of 2025.

Further work to establish clean cohorts across the UK will continue over the next few years and the competent authorities will continue to support the removal of all contaminated equipment by the 2025 deadline.

Review of methods for the pre-treatment and destruction of POPs

In 2020 Defra published an evidence statement on Methods for the Pre-Treatment and Destruction of Persistent Organic Pollutants (Defra, 2020). This summarised established and emerging waste separation and POPs destruction technologies, split into:

- Thermal Destruction
- Chemical Destruction
- Mechanochemical Destruction

The research supports the England 25 Year Environment Plan objective of increasing the amount of POPs destroyed or irreversibly transformed. It includes discussion of the temperature required to destroy POPs and likely waste tonnage for the most commonly found POPs. It will inform policy decisions and further work on effective and environmentally sustainable methods of POPs waste treatment.

Assessment of the contribution of PCB emissions from open sources

The UK has been measuring the emission of PCBs since the creation of the Multi-Media Emissions Inventory in 2007. This inventory for PCBs primarily focussed on emission to air from 'closed systems', such as heat transfer fluids in electrical equipment (e.g. transformers, capacitors). However, from the data available, it is estimated that approximately 25% of the total PCBs that were produced globally were used in 'open applications' (UNEP, 2019 referenced in the MMEI 2019 Annual Report).

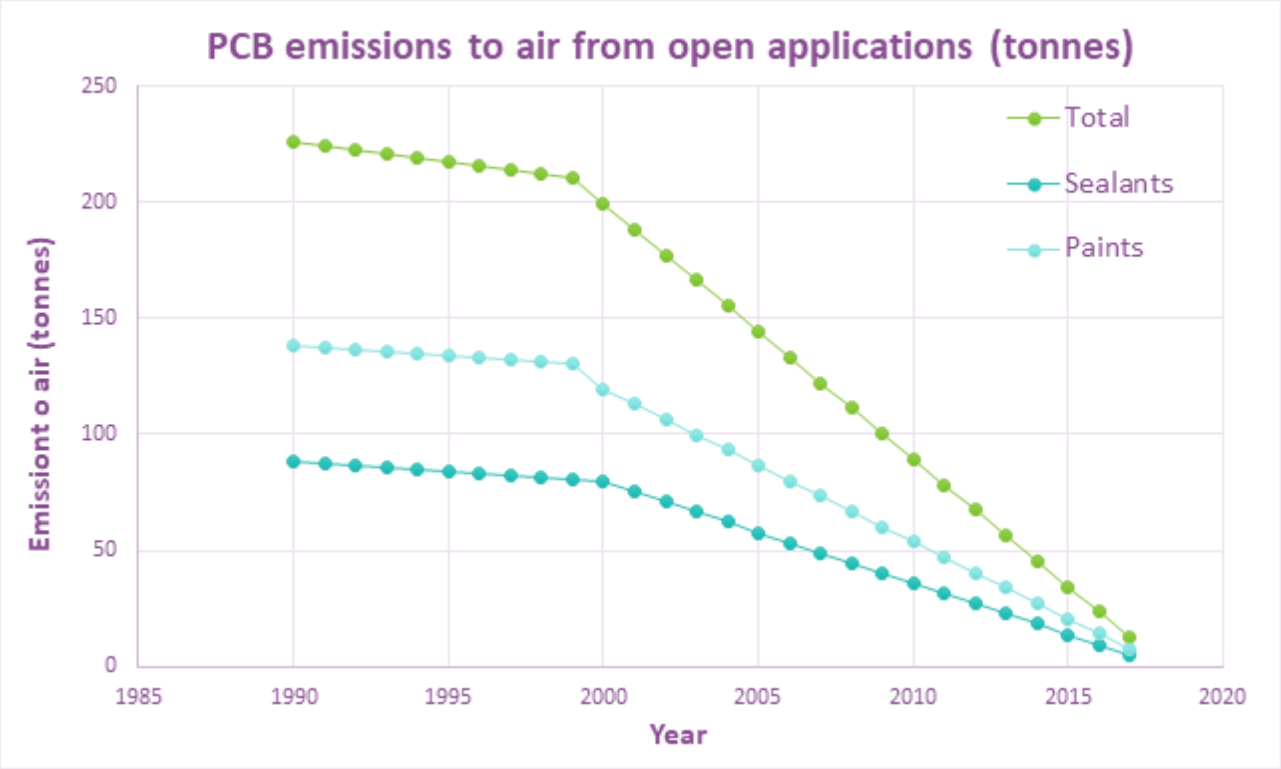
It is reported that open applications of PCBs included use in plasticisers, carbonless copy paper, anti-corrosion coatings, lubricating oils, inks, laminating and impregnating agents, paints, adhesives, sealants, fire retardants, immersion oils and pesticide extenders.

PCBs have been used in many of these open applications in buildings and infrastructure, especially between the 1950s and the early 1980s. As many of these buildings etc. are still in use today, it is understood that they could still be a source of PCBs to the environment. Also, these open applications are not easy to identify and are not considered as hazardous waste, meaning that at the end of useful life, or during renovations, the waste generated could again become a source of PCBs to the environment.

With the elimination of PCBs in closed sources, open-source PCBs could become the dominant source of PCBs to the environment. The UK PCB emission inventory did not include PCBs from open applications. The update to the inventory undertaken in 2019 incorporated PCBs from open applications, and an estimate of this source to the multi-media PCBs inventory in the UK.

The estimated emissions of PCBs to air in the UK from open applications (anti-corrosion paints, joint sealants and combined total) and the estimated trend from 1990 to 2017, is shown in Figure 1. In 2017, the combined emissions from the two open application sources are estimated to be approximately 12.4 tonnes, demonstrating a decline of approximately 95% from the estimated emission in 1977.

Figure 1 – Graph: PCB emissions to air from open applications of sealants and paints between 1990 and 2017



As a comparison, in 1990 the emission of PCBs from closed sources (di-electric) were estimated to be 5.7 tonnes to air (total release to air and land was estimated to be 62.1 tonnes). These emissions have been estimated to have declined. In 2017 the emission for di-electric to air were 0.3 tonnes (total release to air and land was estimated to be 1.2 tonnes).

These improvements have highlighted that, with the elimination of closed source PCBs, the emissions from open applications have become the dominant source of PCBs to air in the UK and that previous emission inventories may have underestimated the total PCBs emission to air in the UK.

It is important to note that there is a degree of uncertainty with these estimates. It is difficult to retrieve and estimate the quantities used in open application and there is a lack of available data. The amount of PCBs used has been estimated, taking account of the pattern of use and release in an inventory produced in Switzerland. Therefore, there could be some country variations.

There is also uncertainty over the emission factors used for open application because of the complex nature of the process of PCBs evaporation from various formulations in which they were used. The emission factors have been based on a study involving emissions from sealants.

Review of historical lindane found in railway sleepers

The 2017 NIP committed to a review of lindane in railway sleepers. The EA collected 50 samples and had them sent for analysis. No lindane was detected and no further action is required from a POPs perspective.

Assessment of PBDEs in plastics

The EA worked with the ICER to investigate the extent of the presence of PBDE chemicals in WEEE. More details can be found on page 27 above.

Our regulators continue to engage with the waste industry to inform and remind them of this study and their obligations to identify and destroy articles with a POPs level above the legal limit. The EA has published guidance[16] on how to classify some WEEE wastes that are likely to contain POPs.

Competent authorities continue to support the industry to undertake characterisation of their waste to better understand the presence of POPs in different sub-streams and destroy the POPs content, preventing its use in recycled materials.

The competent authorities are now focussing on domestic and commercial seating, carpet, residue from treatment of End-of-Life Vehicles and non-WEEE cables.

Assessment of POPs in consumer products

In 2017 a study (Wood, unpublished a) was undertaken to assess the presence and concentrations of PBDEs (including decaBDE) within plastics on sale in the UK, focussing on products which had been manufactured outside the EU. The plastic products examined were both electrical and non-electrical, and a small number of packaging plastics were also examined.

The results were variable, with a number of samples containing either very low concentrations of PBDEs or no presence of PBDE above the limits of detection. In other cases, for a small number of samples, very high concentrations of PBDEs were found, with the highest concentration detected at 500 mg/kg in plastic.

Combined, these results indicate that even though PBDEs have been banned for several years, concentrations found in some items available on the market are exceeding the legal limit.

For tetra and penta, concentrations were low in both electrical and non-electrical plastics. For hexa, hepta and octa, concentrations were found to be higher, with electrical goods having higher concentrations than non-electrical.

[16] https://www.gov.uk/guidance/classify-some-waste-electrical-devices-components-and-wastes-from-their-treatment

The decaBDE concentrations measured were higher than the other PDBEs, with concentrations significantly higher than the lower concentrations in the same goods (see table 2 below). The highest concentration identified for decaBDE, within the non-EU plastics sampled, was 550 mg/kg (or 550,000 ng/g). The highest concentration is above both the legal limits for decaBDE present in substances and PBDEs (tetra-, penta-, hexa-, hepta- and decaBDE) where they are present in mixtures or articles of equal to or below 10 mg/kg (10,000 ng/g) and 500 m/kg (500,000 ng/g), respectively.

The groups c-pentaBDE and c-octaBDE were found in 11 out of 15 samples for electrical goods and 7 out of the 15 samples for non-electricals goods. This indicates that these materials are still present within the waste and recycling streams. This is despite the fact they have been banned in Europe for over 12 years and banned under the Stockholm Convention for over 8 years.

The study also examined a small number of packaging plastics for the presence of PBDEs. The only presence reported was at or around the limits of detection in two samples and not for all homologue groups.

Table 2 Results from a 2017 study (Wood, unpublished a) to assess the presence and concentrations of PBDEs within plastics on sale in the UK, focussing on products which had been manufactured outside the EU - Summary of aggregated data (ng/g)

PBDE	Homologue group	Mean average total	Mean average plastics in electrical	Mean average plastics in non electrical	Range		Range-Plastics in electrical		Range-plastics in non-electrical	
					Min	Max	Min	Max	Min	Max
47	Tetra	13	8	18	0.5	250	0.5	28	1	250
85	Penta	3	5	1	0.5	43	0.5	43	1	14
99	Penta	14	7	20	1	290	1	42	1	290
100	Penta	3	1	4	1.5	61	1.5	6	2.5	61
153	Hexa	178	327	29	2	2700	2	2700	2	240
154	Hexa	20	35	4	1	290	1	290	6	32
183	Hepta	1296	2402	189	7.3	21000	7.3	21000	15	1700
197	Octa	556	1023	88	5	8800	5	8800	9	780
209	Deca	33447	58590	8305	250	550000	250	550000	640	96000

Assessment of PCP and PeCB in finished articles

In 2018, a small-scale study (Wood, unpublished b) was carried out to determine the presence of pentachlorophenol (PCP) and pentachlorobenzene (PeCB) in leather and suede goods placed on the UK market. PCP has been used previously as anti-mould agent in leather and PeCB has been found as a contaminant of PCP.

This work was carried out in collaboration from the British Retail Consortium (BRC). Thirty leather samples were collected from UK high street retailers (10 samples from furniture, 10 samples from clothing, accessories and bags, 6 samples from gloves and boots and 4 samples from mobile phone cases, tablet and laptop cases). The samples were analysed for PCP and PeCB. The analysis was challenging due to the low concentrations of both

target chemicals and the large number of other chemicals within the samples collected. However, a novel method was used; a sonification approach was taken as an additional clean-up step which was then followed by Gas Chromatography-Mass Spectrometry (GC-MS) Analysis. Following the analysis of all 30 samples no PCP or PeCB were detected in any of the samples.

This relatively small study was only intended to be a scoping study. The results do indicate that PCP may no longer be an issue for goods found on the UK high street. Limitations were highlighted, including that all the products tested were sourced from outside the EU, mainly India and China. Therefore, it was not possible to comment on any specific difference between EU regulatory regimes and non-EU regulatory regimes. Also, the small sample size means the results should be treated with caution.

Analysis of landfill leachate

In the previous update to the UK NIP a commitment was made to measure POPs in landfill leachate chlorinated paraffins in the environment. The project was split into two phases. The first phase was completed in 2019 and phase 2 is underway.

Phase 1 (Landfill Leachate Survey for Persistent Organic Pollutants (POPs)) was a desk-based study and aimed to inform the subsequent monitoring and sampling phase. Phase 1 surveyed the literature to determine the current state of knowledge regarding the presence and analysis of POPs in landfill leachate as well as practical aspects of how analysis may be carried out in the future. The report includes a table summarising POPs prioritisation for assessment. Briefly, the prioritisation was based on detection frequency of the different POPs and maximum and mean concentrations measured for each of the POPs. For each POP a recommended analytical method is suggested. Recommendations are also included on the wider sampling (Arcadis, 2019).

Phase 2 aims to give an overview of POPs in landfill leachate, and their potential impact pathways on the terrestrial, freshwater and marine environments. This project will complete a landfill survey across England. Most of the sites have mainly received inputs from household / municipal solid waste, with some also receiving industrial and commercial non-hazard waste and with a small number of sites receiving hazardous wastes. The sites are varied in size and age, but samples will cover the site age from the 1970s to the present decade. The results of this project will be used in conjunction with previous projects performed by both the EA and Defra in England, in addition to the study carried out by Harrad et al. (2019) in Ireland.

The project will therefore build an overall picture of landfill leachate substances that are known to be, or that we suspect to be, harmful to the environment (covering POPs and some PFAS chemicals) and explore their potential exposure pathways. This second phase of work commenced in November 2020, with sampling due to start in February 2021. However, work was currently paused due to the national Covid-19 lockdowns in England and health and safety concerns. It is hoped this work will be fully resumed when safe to do so. Landfills have been highlighted as a potential source of HCBD, which is both a POP

and is listed a priority hazardous substance. Therefore, it is included in the suite of chemicals being analysed in phase 2 of the landfill leachate project.

Digital waste tracking

The governments and regulators across England, Northern Ireland, Scotland and Wales, are looking at how we can digitise waste tracking processes; in particular, how we record what happens to waste as it moves from production to recovery or disposal. Work is ongoing to develop an IT solution and a consultation on our proposals for implementation opened in January 2022. We intend the system to cover all commercial, household and industrial waste, including waste containing POPs.

Investigation of use of former waste materials in agricultural applications

The Food Standards Agency commissioned large projects led by Fera and Imperial College to investigate the possible transfer of POPs from recycled materials to livestock. The findings of this project are published in the open scientific literature, but a brief summary is below.

The first project investigated the potential of recycled materials used in agriculture to contaminate food through uptake by livestock. The study examined broiler chickens, laying chickens and pigs, and evaluated six types of commercially available recycled materials used for either bedding for chickens or as fertiliser for cropland that later housed outdoor reared pigs. The different beddings used in chicken study were recycled wood, recycled shredded cardboard and dried paper sludge / pulp. The contaminants measured included some POPs namely, PCDD / Fs dioxins, PCBs, PBDEs, HBCDD, PCNs, PBDD / Fs and PFASs (Fernandes et al., 2019).

There were no elevated levels of the contaminants measured in the recycled wood compared to that of the control (virgin wood shavings) whilst, in the other two materials there were moderately elevated levels of the contaminants. The elevated levels of contaminants were reflected in raised levels in the meat and eggs of broilers and egg-laying hens reared on these beddings. However, concentrations of PCBs and / or dioxins did not exceed the regulatory limits set for eggs or meat in these particular conditions (Fernandes et al., 2019).

In the pig study different plots of land were treated with a single application of either biosolids or ash products, such as poultry litter ash. Pigs were reared on the treated land, and meat and liver samples were then analysed for contaminants and compared to those of the control samples. It was reported that concentrations of all contaminants (except for HBCDD and tetrabromobisphenol-A (TBBPA) which is not a POP, were below the limit of quantification) were greater than the concentrations measured in the muscle tissue. All measured contaminants were found present in both muscle tissue and liver samples except for HBCDD. There were high incidences of PBDEs and PFASs (excluding PFOS and PFOA) in the biosolids (Fernandes et al., 2019).

It was reported that PCBs, PBDEs, PCDD / Fs, PCNs and PFAS were observed to have the highest transfer potential, with the greatest effects being observed in laying chickens. It was considered likely that laying chickens had higher levels of the measured contaminants present compared to those measured in broiler chickens because laying chickens are in contact with the recycled material for longer (Fernandes et al., 2019).

Uptake of the contaminants measured was observed in all studies but the extent it occurred varied depending on the species tested and the material used. It was concluded that levels of contaminants measured in the eggs and meat of both chickens and pigs were within the regulatory safe levels. The authors did highlight that there is the potential for contaminants to build up in soil following repeated application of recycled materials. It was also highlighted that these recycled products are made in batches, and therefore there could be a degree of variation between batches (Fernandes et al., 2019).

In a further study representative types of industrial and municipal bioresources were used to determine the presence of organic chemical contamination. The materials investigated were land applied materials including treated sewage sludge (biosolids), meat and bone meal ash (MBMA), poultry litter ash (PLA), paper sludge ash (PSA) and compost-like-output (CLO), and bedding materials including recycled waste wood (RWW), dried paper sludge (DPS), paper sludge ash (PSA) and shredded cardboard. It was reported that these materials used in the study were found to have generally lower concentration of PCDD / Fs and dioxin-like PCBs compared to that of earlier studies, indicating decreasing environmental emissions of these specific contaminants. PBDD / Fs were found at larger concentrations in bio-solids and CLO compared to that of the chlorinated contaminants. PCBs were found to be present in DPS which was reported to be likely due to non-legacy sources of PCBs in paper production. DecaBDE was found to be most abundant PBDE detected in the bio-resource material tested. Replacement flame retardants, namely decabomodiphenylethane (DBDPE) and organophosphate flame retardants were also detected in several of the materials tested. PFASs were also detected, including PFOS particularly in biosolids and CLO (Rigby, et al., 2021)

Measures under River Basin management Plans

The current English river basin management plans are under review. An update on this process and how it will consider POPs in the water environment, is provided below on page 45.

To further our body of work and understanding of how POPs are entering the environment, and in which environmental compartments they reside, the EA will undertake a series of compliance activities on a number of POPs substances including PFOS and PBDE substances. This includes considering risks from run-off from outside storage of shredded WEEE plastics.

Analysis of sludge for POPs

In July 2020 the EA published a strategy for safe and sustainable sludge use (Environment Agency, 2020a).

The UK government and EA are working with water companies to investigating a wide range of chemicals including a number of POPs and a range of PFAS chemicals, namely PBDEs including DecaBDE, SCCPs, total dioxin, furans and dioxin-like PCB, HBCDD, non-dioxin-like PCBs, polychlorinated naphthalenes, PFOS and PFOA, as part of the Chemicals Investigation Programme in 2021/22. The work will examine sources of emissions to sewer, mechanisms of removal during treatment and levels in effluent and sewage sludge. The EA will continue to develop analytical methods and include certain POPs and potential POPs within its surveillance monitoring programmes, with a particular focus on PFAS chemicals. This work will be used to investigate sources of environmental exposure of the POPs measured.

SEPA are involved in the UK wide Chemicals Investigation Programme (UKWIR's CIP 3 project) referenced on p41 of the report.

Measures under the UK Marine Strategy

The Marine Strategy Regulations 2010 set out a framework to assess, monitor and put in place measures to achieve or maintain Good Environmental Status (GES) in UK seas. We do this through the UK Marine Strategy which is made up of three parts. Each part of the strategy is reviewed and updated every six years. The overall objective of the UK Marine Strategy is consistent with the UK's vision for 'clean, healthy, safe, productive and biologically diverse ocean and seas' and is consistent with our commitments in the 25 Year Environment Plan. It covers a comprehensive range of biodiversity and marine environmental indicators including contaminants.

In October 2019 we published the updated UK Marine Strategy Part One, which sets out our assessment of the status of UK seas and our targets and indicators for period up to 2024. The UK Marine Strategy Part Two, which sets out the monitoring programmes we will use to assess our progress towards these updated GES targets was published in March 2021 (UK Marine, 2021). The next step is to update Part Three, which sets out the programme of measures we will implement in order to achieve or maintain GES for UK seas. We aim to publish the UK Marine Strategy Part Three by the end of 2021 / early 2022.

The 2019 UK Marine Strategy Part One assessments show that concentrations of hazardous substances in the Celtic Seas and the Greater North Sea and their biological effects are generally meeting agreed target thresholds which means they are at levels that should not cause harm to sea life (89% for contaminant concentrations and 96% for biological effects). The few failures are caused by highly persistent legacy chemicals, such as PCBs, in biota and marine sediments mainly in coastal waters and often close to polluted sources. PCBs have also been detected in significant concentrations in orcas in UK seas.

Trends for PCBs and PAHs in biota and sediment are stable, with 74-92% and 83-92% of targets on contaminant concentrations being met respectively. For PBDEs there are currently no assessment criteria available but limited trend analysis suggests that the concentrations are decreasing, partly because usage is decreasing. Further information can be found at: https://moat.cefas.co.uk/pressures-from-human-activities/contaminants/

Information exchange

Published research conducted on POPs is available on a number of government websites and a list of the most relevant references is included in Annex IV of this document.

As a Party to the Stockholm Convention the UK plays an active role in the development of the convention and the sharing of knowledge on POPs, responding to calls for information and contributing to discussion. Representatives of the UK are currently:

- contributing to annual meetings of the POP Review Committee, as observers
- members of the small intersessional working group (SIWG) on the technical guidelines on the environmentally sound management of persistent organic pollutants (which sits under the Basel Convention)
- a member of the small intersessional working group on PCBs

Update of the UK MMEI

The UK POPs multi-media emissions inventory

In 2007, the UK developed the UK POPs Multi-media Emissions Inventory (MMEI), a multi-vector inventory of POPs emissions (MMEI). This inventory has been expanded through the inclusion of additional POPs and it is updated and improved annually. Due to the availability of the relevant datasets there is a 2-year delay but it currently consists of data from 1990 to 2019 on POPs which are released unintentionally from anthropogenic sources (listed in Annex C of the Convention). This has built on the existing UK National Atmospheric Emissions Inventory (NAEI) and now reflects better knowledge of emissions from non-air vector emission sources that is used to measure progress, prioritise action and fulfil several reporting requirements.

The MMEI shows that estimates of emissions to air, land and water for all Stockholm Convention Annex C substances have declined significantly in the UK between the period 1990 to 2019. This is largely due to policy actions targeting major UK point sources. The magnitude of diffuse sources such as accidental house fires, use of solid fuels in domestic properties and backyard burning have also declined since 1990, but represent a more challenging set of sources to control and further minimise.

A project to update the inventory is ongoing. Work has included the addition of a first set of emission estimates for open-sources of PCBs from paints and sealants. This programme also included a new tailored approach for the dioxin-like PCB emission inventory to take

the existing approach from European Monitoring and Evaluation Programme (EMEP) tier I (basic) to EMEP tier II (intermediate). Targeted improvement of the existing inventories and expansion of the time-series to include data for 2017 has also been completed, along with further review and update of emission factors for fly-ash associated with municipal solid waste (MSW) incineration from energy-from-waste plant.

The second objective of the project is to develop and establish a multi-media release inventory for POPs added to the Stockholm Convention during COP 8 and COP 9. This led to the development of a multi-media emission inventory for PFOA, its salts and PFOA-related compounds. This inventory includes the management of PFOA-related compounds which degrade to form PFOA under natural processes. A novel approach has been used to create this new inventory, whereby PFOA and its salts has been considered as one item and PFOA-related as the second item. Data from the UK Chemicals Investigation Programme (CIP) have been used to assist in validation of the estimates produced for water.

Reports on this project will be published in 2022.

Waste tool

The third objective of the current project is to develop a waste tool to enhance predictions of future waste flows of POPs against assumed bank supplies of in-use goods. The POPs included so far in the waste tool are PCBs, decaBDE and HBCDD. The PCB tool was developed initially to corroborate the elimination of PCB from in-use sources (di-electric). To complete this, contractors undertook stakeholder engagement with both the energy networks and UK hazardous waste sector. Data was gathered to improve the methodology for assessing the emissions from the equipment still in use.

The primary driver for the creation of the waste tool was the commitments made in the 25 Year Environment Plan to substantially increase the amount of POP material being destroyed or irreversibly transformed by 2030. There was a need to understand the current rate of destruction of POPs and where action could be targeted to best meet the commitment of destroying more of them.

The methodology used to create the waste tool for these three POPs has used data from inventories and additional data and intelligence gathering from both trade association and published literature. The data for PCBs has been validated through consultation with industry, however the estimates made for HBCDD and decaBDE are based solely on the inventory reporting. The next steps will be to validate these estimates and sense check further, following future inventory updates and consultation with industry.

We will include further outputs of this work in separate published reports.

Update on monitoring

Further development and maintenance of TOMPS Monitoring network (Air)

The Toxic Organic Micro-Pollutants (TOMPS) network measures ambient air concentrations for a range of pollutants at rural and urban locations in the UK. The network was set up in 1990 and aims:

- To identify sources of a range of POPs in the UK atmosphere.
- To quantify sources that are regarded as potentially significant.
- To measure concentrations of a range of POPs in ambient air in UK cities and rural locations, to assess both human exposure and the relationship between source emissions and levels in the ambient atmosphere.

Monitoring takes place at two urban and four rural sites. It provides quarterly data for 37 PCB congeners, four co-planar PCB congeners, ten furans congeners (PCDFs), seven dioxin congeners (PCDDs), and 22 PBDE congeners. The network has provided 30 years of data and as such comprises a considerable and important dataset which can be used to provide estimates of the change in atmospheric concentrations over time. Annual results are published here https://uk-air.defra.gov.uk/library/reports?section_id=13&sort=title

For PCDD / Fs the seasonal pattern, as shown by the quarterly data, shows that the highest concentrations were generally measured in quarters 1 and 4 with lower values reported for quarters 2 and 3. Generally, concentrations across the sites are very low and getting close to limits of detection.

For PCBs the urban site at London showed a decrease in the PCB concentrations compared with previous average values over the last five years (2012-2017) of 54%, whilst the urban site at Manchester showed a decrease of 58%, over the same period. The annual average concentration for the other rural sites also showed a decrease compared to the previous 5-year average, between 40-70%. The quarterly data showed a distinct seasonal pattern with higher levels in Q2 and Q3, which are characteristic of temperature driven diffusive sources.

With the addition of the data up to 2019, the clearance rates (time taken for a 50% decline in concentration) provided by the TOMPs network for urban sites averaged 15 years. For the rural sites it is difficult to determine a trend with any certainty.

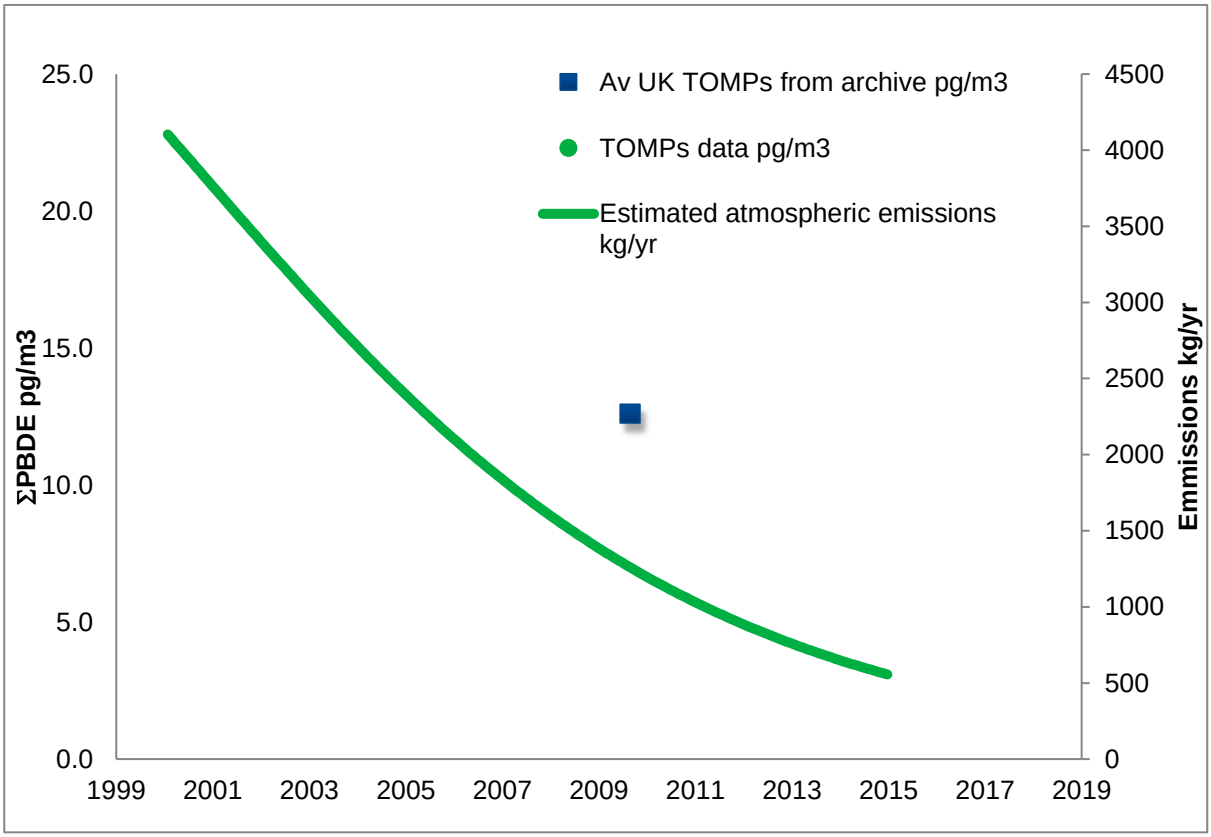
When examining the long-term trends since 2000 none of the sites shows a downward trend over that period. This suggests that the environment has potentially reached a steady state with environmental cycling and secondary sources controlling ambient concentrations.

The TOMPS network is now automated which will improve the sampling rate. The network is also reviewed periodically to consider whether there is capacity to expand data to include newer POPs.

A summary of the data along with an interpretation of temporal and spatial trends may be found in Graf et al. (2016).

TOMPS has been developing methods to analyse for brominated flame retardants in air. For PBDEs, 2018 was the eighth complete year for the inclusion of PBDEs in the TOMPs network. Results from urban sites saw higher levels initially but the difference between urban and rural sites appears to be diminishing. If the consumption data (data including production, use and disposal of products containing decaBDE) are reliable then decaBDE emissions related to consumption should have decreased significantly from 2010 to 2020. Figure 2 compares the ambient air data from the TOMPs archive and the recent TOMPs data from 2011-2018, along with an estimate of emissions to the UK atmosphere. These data are similar, indicating that the sources are largely captured in the emission inventory and that ambient air concentrations are declining at a predictable rate. Data provided by TOMPs should be able to provide important information on long-term emissions.

Figure 2 – Total of PBDE data at the TOMPs sites over the period 2011 to 2018 (PBDEs have been included in the TOMPs network since 2010/11, data from 2000 produced from archived samples – Birgul et al., 2021).



Water

The UK reported on the chemical status of English surface water bodies in 2020. Whilst no surface water bodies meet good chemical status and this shows an apparent sudden decline in status compared to the last report (2015), this is due to our improved approach to classifying chemical status. This builds on recent improvements in our biota monitoring (monitoring for the presence of these substances in fish and shellfish as well as in water) and provides a more comprehensive assessment of the prevalence of certain persistent and bio-accumulative and toxic substances (uPBTs) in the environment. It is these substances which are causing the widespread failures. They account for a relatively small number of the 52 chemicals assessed in our surface waters. In practice there has been little underlying change in chemical status for other substances with about 97% achieving good chemical status.

The changed approach to classification means that it is not possible to directly compare results between the 2019 and 2015 classifications. Four groups of chemicals cause the apparent significant change in chemical classification. This included two POPs:

- polybrominated diphenyl ethers (PBDEs–currently excluding decaBDE) - all surface waters fail the assessment of good chemical status. All biota sampled are significantly higher than the environmental quality standard of 8.5 ng/kg or parts per trillion.

- perfluorooctane sulfonate (PFOS). - About 25% of surface waters fail the assessment for good chemical status.

These analyses of status provide us with a better understanding of the scale of the challenge ahead. This is an important and positive step towards improving the health of our water environment.

Last year the EA sought views through a consultation on the challenges and choices we face to improve our water and achieve a balance between people and nature. The consultation included a focus on chemicals in the water environment and detailed background information was provided on a number of areas, including PFOS and PBDEs (Environment Agency, 2020b).

The consultation was extended for 5 months due to the coronavirus pandemic. Six hundred and six responses were received and a report on the consultation outcome was published in January 2021 https://www.gov.uk/government/consultations/river-basin-planning-challenges-and-choices

The consultation findings will inform the ongoing update of the current river basin management plans including measures to help to manage chemicals.

The current monitoring carried out by the EA in River Basin Districts (RBS) is a surveillance network of sites and not targeted to high-risk sites for individual substances. From 2021, the EA is moving their surveillance sampling to a different approach using a

GRTS design. GRTS design is Generalised, Random, Tessellation, Stratified; a method for selecting monitoring points which will collectively represent a defined space of interest (in this instance the river network). Over time it will provide a network of sites on which we gain a representative picture of pressures including chemicals. Biota sampling is very much constrained by sites with availability of fish of a suitable size and quantity.

The EA's wider PFAS sampling (substances other than PFOS and EA PFOA) is only currently carried out in water. From 2021 and beyond the plan is to enhance this monitoring capability to include biota.

NRW published a risk assessment of chemicals in surface waters in 2020, as part of the draft River Basin Management Plans, which included two POPs: PBDEs and PFOS. Limited data show PBDEs are a concern for Wales, potentially affecting all surface waters in Wales. PFOS is only considered a risk from wastewater discharges in a small number of water bodies with a low dilution. The classification, which will be released in 2021, shows that these risk assessments are broadly correct for those water bodies for which there is monitoring data. The consultation on the draft River Basin Management Plans and additional engagement events have enabled NRW to gather input from stakeholders, which will inform their strategic approach for managing chemicals, in particular PBDEs and PFOS.

Wildlife

Under the UK National Action Plan on the Sustainable Use of Pesticides required under the Plant Protection Products (Sustainable Use) Regulations 2012, wildlife poisoning incidents suspected to be due to pesticides are monitored. In addition, a 25 Year Environment Plan indicator of change is being developed to collate and report on the exposure and effects of chemicals on wildlife (including predatory birds, otters and others). This includes exposure to POPs.

The Centre for Environment, Fisheries and Aquaculture (Cefas) undertakes monitoring for some POPs in the marine environment. A range of organic contaminants including PCBs, PBDEs, organochlorine pesticides, HBCDDs and PFASs including PFOS, have been determined in marine mammal tissues.

Additionally, the Cetacean Stranding Investigation Programme (CSIP) is established and funded by Defra and the Devolved Administrations of Scotland and Wales. This toxicology monitoring programme is the largest of its kind and has been running since 1990. It has data on over 12,000 stranded cetaceans recorded in the UK and has carried out nearly 3,500 necropsies producing one of the world's largest research datasets on strandings and causes of cetacean mortality (ZSL, date unknown). These data are not routinely reported; however papers are frequently in the scientific literature using data from this programme (including Williams et al., 2020a, Williams et al., 2020b, Williams et al., 2021).

Cefas also undertakes analysis as part of the Clean Safe Seas Environmental Monitoring Program (CSEMP) programme. This includes samples measuring PCBs, PBDEs, HBCDDs in fish (dab livers) and sediment and PFAS including PFOA in fish (dab liver).

Further data are collected in sediments on some of the organochlorine pesticides of interest, including DDTs, HCB, HCHs and dieldrin. More information can be found online at https://ocean.ices.dk/OHAT/

Horizon scanning

The competent authorities are each responsible for the monitoring of POPs in the environment. The UK Government maintains and updates the multimedia emissions database covering all listed POPs (Annex II) and coordinates work on horizon scanning for potential POPs.

The EA has developed a prioritisation and early warning system (PEWS) and reviews monitoring evidence gathered to identify substances that may require further action including monitoring, or risk management as part of an agreed UK chemicals work programme with the competent authorities in Scotland, Wales and Northern Ireland. One of the risk management options available is the development and submission of a proposal to list a substance as a POP. The power to submit a proposal rests with the Secretary of State. Any substance identified as having persistent, bio-accumulative and toxic (PBT) properties is a potential POP candidate, though evidence would be required that demonstrates potential for long range transport.

Indicators

Since COP 8 and the publication of the 2017 NIP update, progress has been made in developing the England 25 Year Environment Plan (see page 25) and the supporting Outcome Indicator Framework [17], which includes three indicators relevant to POPs. The first is “H3”, an indicator on emissions of mercury and persistent organic pollutants to the environment, the second is “H4” on exposure and adverse effects of chemicals on wildlife in the environment. Wildlife included in the indicator are fish, otters, cetaceans and predatory birds. The third is “J5” on the destruction and irreversible transformation of POPs. To monitor progress an annual progress report will be published on the indicators[18].

[17] UK Measuring environmental change: Outcome Indicator Framework for the 25 Year Environment Plan https://www.gov.uk/government/publications/25-year-environment-plan

[18] 25 Year Environment Plan Progress Report April 2019 to March 2020, https://www.gov.uk/government/publications/25-year-environment-plan-progress-reports

Annex I: Glossary of abbreviations and units

Term	Meaning / full term
Anthropogenic	Caused / originated by human activity
BAT	Best Available Technique
BEP	Best Environmental Practices
BFRs	Brominated flame retardants
BREFs	Best available technique reference documents
CAS RN	Chemical Abstracts Number Registry Number. A unique numeric identifier given to chemicals
Cefas	Centre for Environment, Fisheries and Aquaculture Science, a UK executive agency sponsored by Defra
CEFIC	European Chemical Industry Council
Cetacean	A marine mammal of the order: whale, dolphin, porpoise
CIP	Chemicals Investigation Programme
CLO	Compost-like output
CLRTAP	Convention on Long-Range Transboundary Air Pollution, a United Nations Economic Commission for Europe (UNECE) multi-lateral environmental agreement (MEA) to improve air quality
COMAH	Control of Major Accident Hazards Regulations 2015
Congener	In chemistry, congeners are chemical substances related to each other by origin, structure or function. As an example, a polychlorinated biphenyl (PCB) congener is a well-defined chemical compound in the PCB category. The name of a PCB congener is associated with the total number of chlorine substituents and the position of each chlorine

COP	Conference of the Parties
COSHH	Control of Substances Hazardous to Health Regulations 2002, UK law that requires employers to control substances that are hazardous to human health
COT	Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment, an independent scientific committee that provides advice to UK Government bodies on matters concerning toxicity of chemicals
CRT	Cathode-ray tube, a type of display unit
CSEMP	Clean Safe Seas Environmental Monitoring Programme, a coordinated approach to environmental monitoring in the UK's coastal and estuarine areas
CSIP	Cetacean Strandings Investigation Programme, a Defra-funded programme coordinating the investigation of cetaceans stranding around the UK coastline
DAERA	Department of Agriculture, Environment & Rural Affairs, a Government Department in the Northern Ireland Executive, the devolved administration for Northern Ireland
DBDPE	decabomodiphenylethane
DCBP	Dichlorobenzophenone
DDT	Dichlorodiphenyltrichloroethane. The compound's structure permits several different isomers. Commercial DDT consists of a mixture of isomers, but predominantly consists of para, para-DDT, full name: 1,1,1-trichloro-2,2-bis(*p*-chlorophenyl) ethane
decaBDE	Decabromodiphenyl ether
Defra	Department for Environment, Food and Rural Affairs, a ministerial UK Government Department
Dioxins	A group of polychlorinated dibenzo-p-dioxins (PCDDs), commonly referred to as just 'dioxins'. There are 75 PCDD congeners, 7 of

	them being toxic, the most toxic being 2,3,7,8-tetrachlorodibenzo-p-dioxin, (TCDD)
Dioxin-like PCBs	Some PCBs share structural similarities and toxic modes of action with dioxins. PCB congeners which have the same toxic action as the most toxic dioxin congener (2,3,7,8-tetrachlorodibenzo-p-dioxin, TCDD) but at a different level of potency on the basis of which it is assigned a TEF value
DNA	Designated National Authority
DPS	Dried paper sludge
EA	Environment Agency, an executive agency and the environmental regulator for the UK government
EC	European Commission, the European Union's politically-independent executive arm
ECHA	European Chemicals Agency, an EU regulatory agency
EFSA	European Food Safety Authority, an independent agency funded by the EU
Eftec	Economics for the Environment Consultancy
ELV	Emission limit value
ELV	End-of-Life vehicle
EMEP	European Monitoring & Evaluation Programme, a cooperative programme for monitoring and evaluation for the long-range transmission of air pollutants in Europe
EPA	Environmental Protection Act 1990, an act of the UK Parliament that defines the structure and authority of waste management and control of emissions to the environment
E-PRTR	European Pollutant Release and Transfer Register, a Europe-wide register that provides key environmental data from industrial facilities in EU member states and some non-EU countries

EQS	Environmental Quality Standard, a general concept for standards that when set in legislation, provide legally binding limits for concentrations of individual substances
EU	European Union, a political and economic union of 27 member states in Europe
Fera	Fera Science Ltd. National and international centre for interdisciplinary investigation and problem solving across plant and bee health, crop protection, sustainable agriculture, food and feed quality and chemical safety in the environment.
FFF	Fire-fighting foams
FPD	Flat panel display
FSA	Food Standards Agency, a non-ministerial government department responsible for food safety and food hygiene in England, Wales and Northern Ireland
FSS	Food Standards Scotland, the public sector food standards body for Scotland
GB	Great Britain. The countries of England, Wales and Scotland
GC-MS	Gas Chromatography- Mass Spectrometry
GEF	Global Environment Facility, a global partnership that addresses global environmental issues and supports sustainable development initiatives
GES	Good Environmental Status
GRTS	Generalised, Random, Tessellation, Stratified design
HBCDD	Hexabromocyclododecane
HCB	Hexachlorobenzene
HCBD	Hexachlorobutadiene
HCE	Hexachloroethane

HCH	Hexachlorocyclohexane
HMRC	Her Majesty's Revenue and Customs, a non-ministerial department of the UK Government
HSE	Health and Safety Executive, an executive non-departmental public body sponsored by Department for Work and Pensions, and is the UK's chemical agency
HSENI	The Health and Safety Executive for Northern Ireland, an executive non-departmental public body sponsored by the Department for the Economy
ICER	Industry Council for Electronic Equipment Recycling
IED	Industrial Emissions Directive, an EU directive that commits member states to control and reduce the impact of industrial emissions on the environment
Inter alia	'among other things'……
IPPC	Integrated Pollution Prevention and Control, an EU directive about minimising pollution from industrial sources
Isomer	Isomers are chemicals with the same number and types of atoms as another chemicals (so have the same chemical formula) but differ in chemical and physical properties. There are structural isomers, geometric isomers, optical isomers and stereoisomers
I-TEQ	International Toxic Equivalent Quotient is the Nato (1989) based system of toxic equivalents used to present a quantity of dioxin and furan congeners as a single value based on the relative toxicity of all congeners to the most harmful congener – TCDD
LCCPs	Long chain chlorinated paraffins
LOD	Limit of detection
LOQ	Limit of quantification

LRTAP	Long-Range Transboundary Air Pollution. The LRTAP Convention limits, reduces and prevents air pollution, including long-range transboundary air pollution
MBMA	Meat and bone meal ash
MCCPs	Medium chain chlorinated paraffins
MCL	Maximum concentration level
µg/kg	micrograms per kilogram, units used for expressing concentration
µg/l	Micrograms per litre, units used for expressing concentration
mg/g	milligrams per gram, units used for expressing concentration
mg/kg	milligrams per kilogram, units used for expressing concentration
mg/m^3	milligrams per metre cubed, units used for expressing concentration
MMEI	Multi-Media Emissions Inventory
MMO	Marine Management Organisation
MRV	Minimum Reporting Value
MSW	Municipal Solid Waste
NAEI	National Atmospheric Emissions Inventory
NDPB	Non-departmental public body, a body which has a role in the processes of national government, but is not a government department or part of one.
ng/g	Nanograms per gram, units used for expressing concentration
NIEA	Northern Ireland Environment Agency, an executive agency of the Department of Agriculture, Environment & Rural Affairs in Northern Ireland

NIP	National Implementation Plan
NIP	Northern Ireland Protocol, a protocol to the EU Exit Withdrawal Agreement for the island of Ireland
NRW	Natural Resources Wales, an executive agency and the environmental regulator of the Welsh Government
OECD	Organisation for Economic Cooperation & Development
OSPAR	Named from the Oslo and Paris Conventions, a mechanism by which 15 governments and the EU cooperate to protect the marine environment of the North East Atlantic
PAH	Polycyclic aromatic hydrocarbon, compounds containing only Hydrogen and Carbon and containing multiple aromatic rings
PBDD/Fs	Polybrominated dibenzo-p-dioxins and dibenzofurans
PBDEs	Polybrominated diphenyl ethers. Includes the following banned bromodiphenyl ether substances - tetra, penta, hexa, hepta, deca
PBT	Persistent, bio-accumulative and toxic
PCBs	Polychlorinated biphenyls
PCDDs	Polychlorinated dibenzo-p-dioxins (also known as ‘dioxins’)
PCDD/Fs	Mixture of congeners of PCDD and PCDF (referred to collectively as ‘dioxins’)
PCDF	Polychlorinated dibenzofurans (also known as ‘furans’)
PCNs	Polychlorinated naphthalenes
PCP	Pentachlorophenol
PCTs	Polychlorinated terphenyls
PeCB	Pentachlorobenzene

PERC	Perchloroethylene
PEWS	Prioritisation and Early Warning System
PFAS	Per and poly fluoroalkyl substances
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctane sulfonate
PFOS-F	Perfluorooctane sulfonyl fluoride
pH	Quantitative measure of acidity or basicity on a scale of 0 to 14
PHE	Public Health England, an executive agency of the Department of Health and Social Care
PI	Pollution Inventory
PIC	Prior Informed Consent
PLA	Poultry litter ash
POPs	Persistent Organic Pollutants
POPRC	Persistent Organic Pollutant Review Committee
PPC	Pollution Prevention and Control Regulations
PRTR	Pollutant Release and Transfer Registers
PSA	Paper sludge ash
PTFE	Polytetrafluoroethylene
PVC	Polyvinyl chloride
REACH	Registration, Evaluation, Authorisation and restriction of Chemicals
RoHS	Restriction of Hazardous Substances Directive, a European Union directive to restrict substances in electric and electronic equipment

RWW	Recycled waste wood
SAICM	Strategic Approach to International Chemical Management
SCCPs	Short chain chlorinated paraffins
SEPA	Scottish Environment Protection Agency, an executive agency and the environmental regulator of the Scottish Government
SIWG	Small intersessional working group
SPRI	Scottish Pollutant Release Inventory
SVHC	Substances of very high concern, a chemical substance proposed that use within the European Union is subject to authorisation under REACH regulations.
TBBPA	Tetrabromobisphenol-A
TCDD	2,3,7,8-tetrachlorodibenzo-p-dioxin, the most toxic of all dioxin compounds
TDI	Tolerable daily intake
TDS	Total Diet Study
TEF	Toxic Equivalency Factor, a system that expresses the toxicity of Dioxins, Furans and PCBs in terms of the most toxic form of dioxin 2,3,7,8- tetrachlorodibenzo-p-dioxin
TEQ	Toxic Equivalent Quotient, used to express the toxicity of a mixture of dioxins and dioxin-like compounds
TOMPs	Toxic Organic Micro-Pollutants
UK	United Kingdom
UKMMAS	United Kingdom Marine Monitoring and Assessment Strategy
UNECE	United Nations Economic Commission for Europe

UNEP	United Nations Environment Programme
uPBT	Ubiquitous, persistent, bio-accumulative and toxic
WEEE	Waste Electrical & Electronic Equipment
WFD	Water Framework Directive
WHO	World Health Organisation

Annex II: List of POPs

Different POPs have multiple uses and are categorised by the Convention as being either industrial chemicals, pesticides or unintentionally produced. Once identified as meeting the POP criteria, the POP is listed on one three Annexes of the Convention, Annex A, B and / or C. Annex A substances are those which the production, use, stockpiles and waste must be eliminated. To allow suitable alternatives to be sought or developed by industry there are often specific time-limited exemptions, which allows the chemical's continued specific use.

Annex B substances are also restricted but have acceptable purposes without time limits, very often along with specific time-limited exemptions. These acceptable purposes are reviewed regularly by the Convention to ensure they are still valid and there are still no suitable alternatives available.

Annex C substances are those chemicals that are unintentionally produced, such as dioxins and furans. The release of these substances must be monitored and reduced as much as possible.

Table 1 The 30 POPs listed in the Stockholm Convention

POP	CAS RN[1].	Category[2]	Year of the COP[3] listing	Annex[4]
Aldrin	309-00-2	P	2004[5]	A
Chlordane	57-74-9	P	2004[5]	A
Chlordecone	143-50-0	P	2009	A
Decabromodiphenyl ether (commercial mixture, c-decaBDE)	1163-19-5	I	2017	A
Dichlorodiphenyltrichloroethane (DDT)	50-29-3	P	2004[5]	B
Dicofol[6]		P	2019	A
Dieldrin	60-57-1	P	2004[5]	A
Endrin	72-20-8	P	2004[5]	A
Heptachlor	76-44-8	P	2004[5]	A

Hexabromobiphenyl	36355-01-8	I	2009	A
Hexabromocyclododecane (HBCDD)	25637-99-4; 3194-55-6	I	2013	A
Hexa- and hepta- bromodiphenyl ether (commercial octabromodiphenyl ether) (hexaBDE and heptaBDE)	68631-49-2; 207122-15-4; 446255-22-7; 207122-16-5	I	2009	A
Hexachlorobenzene (HCB)	118-74-1	P, I	2004[5]	A, C
Hexachlorobutadiene (HCBD)	87-68-3	I	2015, 2017	A, C
Alpha hexachlorocyclohexane (alpha-HCH)	319-84-6	P	2009	A
Beta hexachlorocyclohexane (beta-HCH)	319-85-7	P	2009	A
Lindane (gamma hexachlorocyclohexane; (gamma-HCH)	58-89-9	P	2009	A
Mirex	2385-85-5	P	2004[5]	A
Pentachlorobenzene (PeCB; PCBz))	608-93-5	P, I, U	2009	A, C
Pentachlorophenol (PCP) and its salts and esters	87-86-5; 131-52-2; 27735-64-4; 3772-94-9; 1825-21-4	P	2015	A
Perfluorooctane sulfonic acid (PFOS), its salts and perfluorooctane sulfonyl fluoride (PFOS-F)	1763-23-1; 307-35-7	I, P	2009	B
Perfluorooctanoic acid (PFOA), its salts and PFOA related compounds [6]	335-67-1	I	2019	A

Polychlorinated biphenyls (PCBs)	various	I, U	2004[5]	A, C
Polychlorinated dibenzo-p-dioxins (PCDD) (dioxins)	various	U	2004[5]	C
Polychlorinated dibenzofurans (PCDF) (furans)	various	U	2004[5]	C
Polychlorinated naphthalenes (PCNs)	70776-03-3	I, U	2015	A, C
Short-chain chlorinated paraffins (SCCPs)	85535-84-8	I	2017	A
Technical endosulfan and its related isomers	115-29-7; 959-98-8; 33213-65-9	P	2011	A
Tetra- and penta-bromodiphenyl ether (commercial pentabromodiphenyl ether)	5436-43-1; 60348-60-9	I	2009	A
Toxaphene (camphechlor)	8001-35-2	P	2004[5]	A

[1]CAS RN: CAS Registration Number

[2]Category: P: Pesticide; I: Industrial chemical; U: Unintentionally produced

[3]COP: Conference of the Parties

[4]Annex: A: Elimination; B: Restriction; C: Unintentionally produced

[5]The Stockholm Convention entered into force in 2004, and there were initially twelve substances listed as POPs, these were referred to as the “dirty dozen”. The new listings are not usually enforced until approximately 18 months following the COP, therefore these dates are the date a decision was made, and not the formal listing.

[6] Added at the ninth COP (COP9) therefore the chemical has been listed for completeness but has not be considered fully in this update.

Annex III: Summary of future actions

No.	Action	Page No.	Actor	Timing
1	Review ongoing need for specific exemptions for existing and newly listed POPs	11	UK Government	2021-2022
2	Investigate the availability, reliability and feasibility of current and emerging analytical techniques for measuring chlorinated paraffins in the environment	17	Defra	2021-2022
3	Review the need for the addition of HCBD to the UK emissions inventory	28	Defra	2021-2022
4	In partnership with the Soft Furnishing Working Group develop guidance for waste handlers on decaBDE and HBCDD in soft furnishings	28	Competent Authorities	2021-2022
5	End-of-life vehicles – assess industry project on POPs	28	Defra/ Environment Agency	2022-23
6	Effective removal of PFOA-containing fire-fighting foam from stockpiles and waste. To satisfy the specific exemptions for the PFOA POPs listing.	29	Competent Authorities	2021-2023 2021-2025
7	Assess levels of PFAS (including PFOS and PFOA) in the environment	29	Environment Agency	2022

8	Remove all equipment from use in the UK with PCB contaminant levels above legal limits	31	Owners of relevant equipment supported by the Competent Authorities	By end of 2025
9	Further assessment of PBDEs in non-plastic articles	34	Defra/ Environment Agency	Ongoing
10	Complete second phase of the landfill leachate project, sampling and interpretation.	36	Defra	March 2022
11	Development and maintenance of multimedia emissions inventory for new and existing POPs	41	Defra	On-going
12	Review, verify and improve the POPs waste tool	41	Defra	May 2022
13	Further development and maintenance of TOMPs Monitoring network (Air)	42	Environment Agency/Defra	On-going
14	Compliance activities on PFOA and PBDEs in water	44	Environment Agency	Ongoing

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