

1 **Implementation of the Stockholm Convention on Persistent Organic**
2 **Pollutants (POPs) in Africa – Progress, Challenges, and Recommendations**
3 **after 20 Years**

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12 **Table S1** Overview of the currently listed Persistent Organic Pollutants (POPs) in the Stockholm Convention on Persistent Organic
 13 Pollutants^{1,2,3}

POPs	Annex*	Year of listing	Uses	Current specific exemption for use	*Current specific exemption for production	Country on exemption	Expiry date
Dieldrin ^(p)	A	2001	-to control termites, textile pests, insects living in agricultural soils & insect-borne diseases	None	None	-	-
Aldrin ^(p)	A	2001	- to control termites, grasshoppers, corn rootworm, and other insect pests	None	None	-	-
Chlordane ^(p)	A	2001	- to control termites and insect pests of agricultural crops	None	None	-	-
Chlordecone ^(p)	A	2009	- mainly used as agricultural pesticide	None	None	-	-
Dicofol ^(p)	A	2019	- to control mites and also as acaricide for cotton, citrus and apple crops	None	None	-	-
Endrin ^(p)	A	2001	- as insecticide and also to control rodents	None	None	-	-

			such as mice and voles.				
Heptachlor ^(p)	A	2001	- to control insects, crop pest, termites, and malaria-carrying mosquitoes.	none	None	-	-
α -hexachlorocyclohexane (HCH) ^(p)	A	2009	- as an insecticide	none	None	-	-
β -hexachlorocyclohexane (HCH) ^(p)	A	2009	- as an insecticide	none	None	-	-
Lindane ^(p)	A	2009	- as broad-spectrum pest control of crops and ectoparasites in both veterinary and human applications.	none	None	-	-
Technical endosulfan and its related isomers ^(p)	A	2011	- to control crop pests, tsetse flies and ectoparasites of cattle	none	None	-	-
Toxaphene ^(p)	A	2001	- used as insecticide and to control ticks and mites in livestock.	none	None	-	-
Mirex ^(p)	A	2001	- mainly to combat fire ants; and to control termites and other ants. Also used as a fire retardant in plastics, rubber, and	none	None	-	-

			electrical goods.				
Pentachlorophenol (PCP) and its salts and esters ^(p)	A	2015	- used as herbicide, insecticide, fungicide, algacide, disinfectant and as an ingredient in antifouling paint.	Utility poles and cross-arms ^a	None	-	-
Hexabromobiphenyl (HBB) ⁽ⁱ⁾	A	2009	- used as a flame retardant additive mainly in the 1970s.	none	None	-	-
Hexabromocyclododecane (HBCD or HBCDD) ⁽ⁱ⁾	A	2013	- mainly used as flame retardant additive mainly in expanded and extruded polystyrene foam insulation; and also in textile applications and electric and electronic appliances	Expanded polystyrene and extruded polystyrene in building ^a	None	none	-
Commercial pentabromodiphenyl ether (BDE) (tetra-BDE/penta-BDE)	A	2009	- used as additive flame retardant	Recycling, use and disposal of articles	None	Brazil, Cambodia, Japan, Republic of Korea, Turkiye, Vietnam,	2030
Commercial octabromodiphenyl ether (BDE) (hexa-BDE/hepta-BDE) ⁽ⁱ⁾	A	2009	- used as additive flame retardant	Recycling, use and disposal of articles	None	Brazil, Cambodia, Japan, Republic of Korea, Turkiye, Vietnam,	2030

Commercial decabromodiphenyl ether (deca-BDE) ⁽ⁱ⁾	A	2017	used mainly as an additive flame retardant in commercial products and electronics such as housings of computers and TVs, wires and cables, pipes and carpets.	Vehicles, aircraft, textile, additives in plastic housing etc, & Polyurethane foam for building insulation	Vehicles, aircraft, textile, additives in plastic housing etc, & Polyurethane foam for building insulation	Use -Argentina, Brazil, European Union, Iran, New Zealand, Norway, Switzerland, United Kingdom, Vietnam Production - European Union, Republic of Korea, Switzerland, United Kingdom	2036
Hexachlorobenzene (HCB) ^(p,i,u)	A + C	2001	- as fungicide in crops. It is also a byproduct of the manufacture of some industrial chemicals and exists as an impurity in several pesticide formulations.	none (But use still possible according with note (iii) of part 1 of Annex A of the Convention)	None	-	-
Hexachlorobutadiene(HCBD) ^(i,u)	A + C	2015	- mostly used as a solvent for chloring containing compounds	none	None	-	-
Pentachlorobenzene(PeCB) ^(p,l,u)	A + C	2009	- used in PCB products, in dyestuff carriers, as a fungicide, a flame	none	None	-	-

			retardant and as a chemical intermediate e.g. previously for the production of quitozene.				
Polychlorinated biphenyls (PCBs) ^(i,u)	A + C	2001	- used as heat exchange fluids, in electric transformers and capacitors, and as additives in paint, carbonless copy paper, and plastics.	- use in close system equipment such as transformers, capacitors or other receptacles containing liquid stocks as specified ^a	None	-	2025 (Subject to review by COP)
Perfluorohexane sulfonic acid (PFHxS), its salts and PFHxS-related compounds ⁽ⁱ⁾	A	2022	- used in (1) Aqueous Film-Forming Foams (AFFFs) for fire-fighting; (2) metal plating; (3) textiles, leather and upholstery; (4) polishing agents and cleaning/washing agents; (5) coatings, impregnation/proofing (for protection from damp, fungus etc.); and (6) within the manufacturing of electronics and semiconductors. Other	none	None	-	-

			potential uses include pesticides, flame retardants, paper and packaging, in the oil industry, and hydraulic fluids.				
Perfluorooctanoic acid (PFOA), its salts and PFOA -related compounds ⁽ⁱ⁾	A	2019	- used widely in the production of fluoroelastomers and fluoropolymers, for the production of non-stick kitchen ware, food processing equipment. PFOA-related compounds are used as surfactants and surface treatment agents in textiles, paper and paints, firefighting foams.	Photolithography or etch processes in semiconductor manufacturing, invasive implantable medical devices, fire-fighting foams, manufacture of fluoroelastomers for the production of O-ring, v-belts and plastic accessories for car interiors, photographic coatings applied to films, textile for oil and water repellents for the protection workers, production of perfluorooctyl bromide for the production of pharmaceutical products, manufacture of	None	Argentina, European Union, New Zealand, Norway, Republic of Korea, Switzerland, United Kingdom, Vietnam,	2036

				<p>polytetrafluoroethylene (PTFE) and polyvinylidene fluoride (PVDF) for specified productions, use of perfluorooctyl iodide for the production of perfluorooctyl bromide, manufacture of polyfluoroethylene propylene (FEP) for the production of high-voltage electrical wire and cables for power transmission</p>			
<p>Polychlorinated naphthalenes (PCNs)^(i,u)</p>	A + C	2015	<p>- used as insulating coatings for electrical wires. Also as wood preservatives, as well as rubber and plastic additives, for capacitor dielectrics and in lubricants.</p>	<p>Production of polyfluorinated naphthalenes including octafluoronaphthalene</p>	<p>Production of polyfluorinated naphthalenes including octafluoronaphthalene</p>	Russian Federation	<p>not stipulated</p>

Short-chain chlorinated paraffins (SCCPs) ⁽ⁱ⁾ (C ₁₀₋₁₃ ; chlorine content > 48%)	A	2017	- used as a plasticizer in rubber, paints, and adhesives. Also as flame retardants for plastics as well as an extreme pressure lubricant in metal working fluids.	Production of transmission belts, rubber conveyor belts, leather industry, lubricant additives, tubes for outdoor decoration bulbs, waterproofing and fire retardant paints, adhesives, metal processing, secondary plasticizers in polyvinyl chloride except in toys and children's products	None	Vietnam	2023
Dichlorodiphenyltrichloroethane (DDT) ^(p)	B	2001	- mostly used to control malaria vector. Also as pesticide	Malaria vector control ^a	Malaria vector control ^a	none	-
Perfluorooctane sulfonic acid (PFOS), its salts and perfluorooctane sulfonyl fluoride (PFOSF) ^(p,i)	B	2009	-used as additives in electric and electronic parts, fire fighting foam, photo imaging, hydraulic fluids and textiles.	Photo imaging, photoresist and anti-reflective coatings for semi-conductors, etching agent for compound semi-conductors and ceramic filters,	None	-	-

				aviation hydraulic fluids, metal plating (hard metal plating) only in closed-loop systems, certain medical devices as specified, fire fighting foam & insect baits for control of leaf-cutting ants from <i>Atta spp.</i> and <i>Acromyrmex spp.</i> ^a			
Polychlorinated dibenzo-p-dioxins (PCDDs) ^(u)	C	2001	-	-	-	-	-
Polychlorinated dibenzofurans (PCDFs) ^(u)	C	2001	-	-	-	-	-

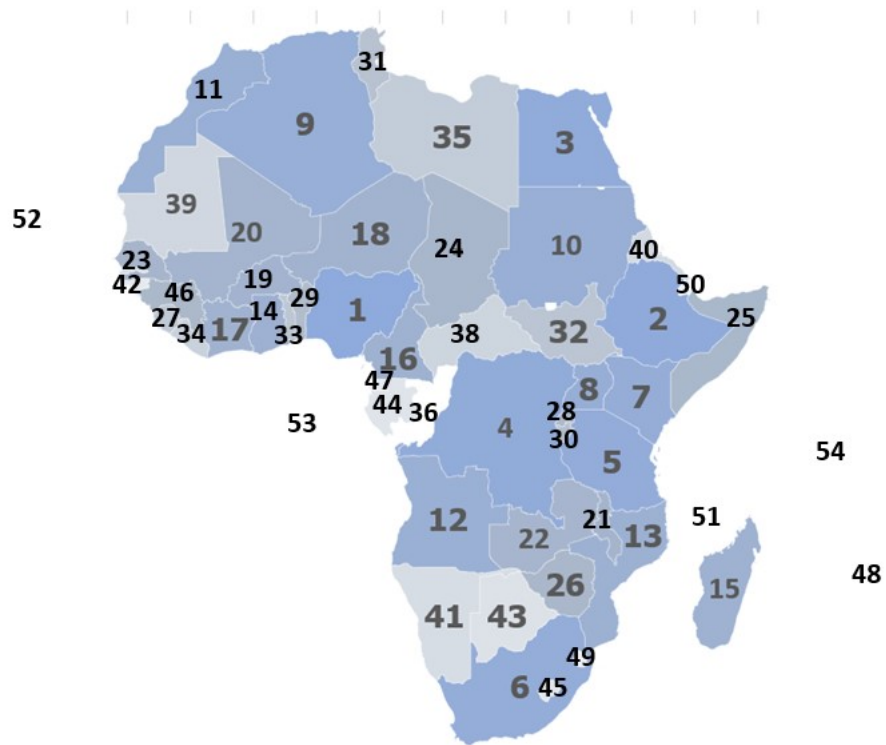
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15 p – pesticidal uses, i – industrial uses, u – unintentional production

16 *Annex A – POPs targeted for elimination; Annex B - POPs targeted for restriction; Annex C – Unintentional POPs targeted for reduction

17 #as permitted for the parties listed in the Register

18 ^a – Acceptable purpose: No country is currently in the register of exemption for DDT, HBCDD, PCP and its salts and esters

19 Chemicals proposed for listing under the Convention: Chlorinated paraffins, long chain perfluorocarxylic acids (LC-PFCAs), UV-328,
20 dechlorane plus, methoxychlor, chlorpyrifo



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23 **Figure S1:** African countries (number ranked in order of population. The name,
24 corresponding with the number, and the population of individual country are indicated in
25 Table S2)

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Table S2: African countries, their subregions and populations

S/N	Country	Subregion	Population^a
1	Nigeria	Western Africa	223,804,632
2	Ethiopia	Eastern Africa	126,527,060
3	Egypt	Northern Africa	112,716,598
4	DR Congo	Middle Africa	102,262,808
5	Tanzania	Eastern Africa	67,438,106
6	South Africa	Southern Africa	60,414,495
7	Kenya	Eastern Africa	55,100,586
8	Sudan	Eastern Africa	48,109,006
9	Uganda	Northern Africa	48,582,334
10	Algeria	Northern Africa	45,606,480
11	Morocco	Northern Africa	37,840,044
12	Angola	Middle Africa	36,684,202
13	Ghana	Eastern Africa	34,121,985
14	Mozambique	Western Africa	33,897,354
15	Madagascar	Eastern Africa	30,325,732
16	Côte d'Ivoire	Middle Africa	28,873,034
17	Cameroon	Western Africa	28,647,293
18	Niger	Western Africa	27,202,843
19	Burkina Faso	Western Africa	23,251,485
20	Mali	Western Africa	23,293,698
21	Malawi	Eastern Africa	20,931,751
22	Zambia	Eastern Africa	20,569,737
23	Chad	Western Africa	18,278,568
24	Senegal	Middle Africa	17,763,163
25	Somalia	Eastern Africa	18,143,378
26	Zimbabwe	Eastern Africa	16,665,409
27	Guinea	Western Africa	14,190,612
28	Rwanda	Eastern Africa	14,094,683

29	Benin	Western Africa	13,712,828
30	Tunisia	Eastern Africa	12,458,223
31	Burundi	Northern Africa	13,238,559
32	South Sudan	Eastern Africa	11,088,796
33	Togo	Western Africa	9,053,799
34	Sierra Leone	Western Africa	8,791,092
35	Libya	Northern Africa	6,888,388
36	Congo	Middle Africa	6,106,869
37	Central African Republic	Western Africa	5,742,315
38	Liberia	Middle Africa	5,418,377
39	Mauritania	Western Africa	4,862,989
40	Eritrea	Eastern Africa	3,748,901
41	Gambia	Southern Africa	2,773,168
42	Botswana	Western Africa	2,675,352
43	Namibia	Southern Africa	2,604,172
44	Gabon	Middle Africa	2,436,566
45	Lesotho	Southern Africa	2,330,318
46	Guinea-Bissau	Western Africa	2,150,842
47	Equatorial Guinea	Middle Africa	1,714,671
48	Mauritius	Eastern Africa	1,300,557
49	Eswatini	Southern Africa	1,210,822
50	Djibouti	Eastern Africa	1,136,455
51	Comoros	Eastern Africa	852,075
52	Cabo Verde	Western Africa	598,682
53	Sao Tome & Principe	Middle Africa	231,856
54	Seychelles	Eastern Africa	107,660

^aWorldometer⁴

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44 **Table S3:** List of African countries that are signatories or have acceded to the Stockholm
 45 Convention on Persistent Organic Pollutants including their latest round of Party reports^{5,6}

S/ N	Participant	Signature, Succession to Signature (d)	Ratification, Accession (a)	Entry into force	Latest national report as at 27th January 2024
1	Algeria	05/09/2001	22/09/2006	21/12/2006	2
2	Angola	n/a	23/10/2006 (a)	21/01/2007	n/a
3	Benin	23/05/2001	05/01/2004	17/05/2004	n/a
4	Botswana	n/a	28/10/2002 (a)	17/05/2004	n/a
5	Burkina Faso	23/05/2001	31/12/2004	31/03/2005	n/a
6	Burundi	02/04/2002	02/08/2005	31/10/2005	5
7	Cabo Verde	n/a	01/03/2006 (a)	30/05/2006	n/a
8	Cameroon	05/10/2001	19/05/2009	17/08/2009	5
9	Central African Republic	09/05/2002	12/02/2008	12/05/2008	3
10	Chad	16/05/2002	10/03/2004	08/06/2004	n/a
11	Comoros	23/05/2001	23/02/2007	24/05/2007	n/a
12	Republic of Congo	04/12/2001	12/02/2007	13/05/2007	n/a
13	Côte d'Ivoire	23/05/2001	20/01/2004	17/05/2004	5
14	Democratic Republic of the Congo	n/a	23/03/2005 (a)	21/06/2005	4
15	Djibouti	15/11/2001	11/03/2004	09/06/2004	n/a
16	Egypt	17/05/2002	02/05/2003	17/05/2004	5
17	Equatorial Guinea	n/a	24/12/2019 (a)	23/03/2020	n/a
18	Eritrea	n/a	10/03/2005 (a)	08/06/2005	3
19	Eswatini	n/a	13/01/2006 (a)	13/04/2006	n/a
20	Ethiopia	17/05/2002	09/01/2003	17/05/2004	2
21	Gabon	21/05/2002	07/05/2007	05/08/2007	2
22	Gambia	23/05/2001	28/04/2006	27/07/2006	1
23	Ghana	23/05/2001	30/05/2003	17/05/2004	5
24	Guinea	23/05/2001	11/12/2007	10/03/2008	5
25	Guinea-Bissau	24/04/2002	06/08/2008	04/11/2008	n/a

26	Kenya	23/05/2001	24/09/2004	23/12/2004	5
27	Lesotho	23/01/2002	23/01/2002	17/05/2004	n/a
28	Liberia	n/a	23/05/2002 (a)	17/05/2004	n/a
29	Libya	n/a	14/06/2005 (a)	12/09/2005	n/a
30	Madagascar	24/09/2001	18/11/2005	16/02/2006	5
31	Malawi	22/05/2002	27/02/2009	28/05/2009	4
32	Mali	23/05/2001	05/09/2003	17/05/2004	3
33	Mauritania	08/08/2001	22/07/2005	20/10/2005	2
34	Mauritius	23/05/2001	13/07/2004	11/10/2004	5
35	Morocco	23/05/2001	15/06/2004	13/09/2004	4
36	Mozambique	23/05/2001	31/10/2005	29/01/2006	2
37	Namibia	n/a	24/06/2005 (a)	22/09/2005	n/a
38	Niger	12/10/2001	12/04/2006	11/07/2006	n/a
39	Nigeria	23/05/2001	24/05/2004	22/08/2004	5
40	Rwanda	n/a	05/06/2002 (a)	17/05/2004	4
41	Sao Tome and Principe	03/04/2002	12/04/2006	11/07/2006	4
42	Senegal	23/05/2001	08/10/2003	17/05/2004	2
43	Seychelles	25/03/2002	03/06/2008	01/09/2008	5
44	Sierra Leone	n/a	26/09/2003 (a)	17/05/2004	n/a
45	Somalia	n/a	26/07/2010 (a)	24/10/2010	n/a
46	South Africa	23/05/2001	04/09/2002	17/05/2004	5
47	South Sudan	n/a	n/a	n/a	n/a
48	Sudan	23/05/2001	29/08/2006	27/11/2006	3
49	Togo	23/05/2001	22/07/2004	20/10/2004	2
50	Tunisia	23/05/2001	17/06/2004	15/09/2004	3
51	Uganda	n/a	20/07/2004 (a)	18/10/2004	4
52	United Republic of Tanzania	23/05/2001	30/04/2004	29/07/2004	2
53	Zambia	23/05/2001	07/07/2006	05/10/2006	2
54	Zimbabwe	23/05/2001	01/03/2012	30/05/2012	4

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47 n/a – not available

48 **Table S4** Properties of persistent organic pollutants⁷

POP properties	Evidence of POP properties
Persistence	<p>(i) Evidence that the half-life of the chemical in water is greater than two months, or that its half-life in soil is greater than six months, or that its half-life in sediment is greater than six months; or</p> <p>(ii) Evidence that the chemical is otherwise sufficiently persistent to justify its consideration within the scope of this Convention;</p>
Bio-accumulation	<p>(i) Evidence that the bio-concentration factor or bio-accumulation factor in aquatic species for the chemical is greater than 5,000 or, in the absence of such data, that the log Kow is greater than 5;</p> <p>(ii) Evidence that a chemical presents other reasons for concern, such as high bio-accumulation in other species, high toxicity or ecotoxicity; or</p> <p>(iii) Monitoring data in biota indicating that the bio-accumulation potential of the chemical is sufficient to justify its consideration within the scope of this Convention</p>
Potential for long-range environmental transport	<p>(i) Measured levels of the chemical in locations distant from the sources of its release that are of potential concern;</p> <p>(ii) Monitoring data showing that long-range environmental transport of the chemical, with the potential for transfer to a receiving environment, may have occurred via air, water or migratory species; or</p> <p>(iii) Environmental fate properties and/or model results that demonstrate that the chemical has a potential for long-range environmental transport through air, water or migratory species, with the potential for transfer to a receiving environment in locations distant from the sources of its release. For a chemical that migrates significantly through the air, its half-life in air should be greater than two days;</p>
Adverse effects	<p>(i) Evidence of adverse effects to human health or to the environment that justifies consideration of the chemical within the scope of this Convention; or</p> <p>(ii) Toxicity or ecotoxicity data that indicate the potential for damage to human health or to the environment.</p>

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55 **Table S5:** Laboratories listed in Africa for POPs analysing databank⁸

S/N	Laboratories	Countries
1	Laboratory of Ecotoxicology ERGS, Kinshasa	Democratic Republic of Congo
2	Central Laboratory of Residue Analysis of Pesticides and Heavy Metals in Food	Egypt
3	Cairo Central Center Laboratory for Environmental Monitoring in EEAA (Egyptian Environmental Affairs Agency)	
4	Environmental Chemistry Laboratory, CSIR Water Research Institute	
5	Pesticide Residue Laboratory, Ghana Standards Board	Ghana
6	Food and Drugs Board Laboratory Services Department	
7	Department of Chemistry, Ghana Atomic Energy Commission	
8	Department of Chemistry, University of Nairobi	Kenya
9	Government Chemist Department	
10	Analytical Chemistry Laboratory (ACL) – Kenya Plant Health Inspectorate Service	
11	Environmental Toxicology and Quality Control Laboratory of Central Veterinary Laboratory	Mali
12	Agricultural Chemistry Division	
13	Department of Chemistry	
14	Government Analyst Division, HQL	Mauritius
15	Mauritius Sugar Industry Research Institute	
16	National Environmental Laboratory	
17	Forensic Science Laboratory	Morocco
18	National Laboratory for Studies and Monitoring of the Pollution	
19	LANSPEX	
20	Analytical and Environmental Laboratory	Nigeria
21	Multidisciplinary Central Research Laboratory/Basel Convention Regional Coordinating Centre for Africa	
22	University of Nigeria, Nsukka, Research Laboratory	
23	Environmental Chemistry Laboratory of CERES-LOCUSTOX Foundation	Senegal
24	Persistent Organic Pollutant and Toxicant Programme (POPT), School for Environmental Sciences	South Africa
25	Pesticide Metabolism and Residue Laboratory	Sudan
26	National Chemical Laboratories	

27	Dedicated Pesticide Residue Analysis Lab. - Chemistry Department Laboratory	
28	Government Chemist Laboratory Agency	United Republic of Tanzania
29	TBS - Tanzania Bureau of Standards Food and Chemical Laboratory	
30	CEP - LAB (Chemical and Process Engineering Lab.)	
31	Laboratoire de l'Institut Togolais de Recherche Agronomique / Direction des Laboratoires	Togo
32	CAMU - Laboratoire de Toxicologie	
33	Laboratoire de Controles et d'Analyses des Pesticides, Ministère de l'Agriculture et des Ressources Hydrauliques	
34	Laboratoire du Milieu Marin (Unite Organique)	
35	INRAP - Institut National de Recherche et d'Analyse Physico-Chimique	Tunisia
36	INRST - Laboratoire de Géochimie et Physico Chimie des Eaux, Centre National des Sciences et Technologies des Eaux	
37	Laboratoire de Biophysique Appliquée à la Nutrition, Institut National de Nutrition et de Technologie Alimentaire	
38	CITET - Centre International des Technologies de l'Environnement de Tunis	
39	LCAE - Laboratoire Central d'Analyses et d'Essais	
40	GCLA - Government Chemist and Analytical Laboratory	Uganda
41	Chemiphar (U) Ltd	
42	Zambia Bureau of Standards	
43	UNZA - Department of Chemistry, University of Zambia	Zambia
44	Food and Drugs Control	

57 *44 laboratories in 16 African countries are listed among 256 laboratories.

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59 **Table S6** Regulatory guidelines on POPs by the European Union^{a9, b10}

POPs	Concentrations – market products or wastes (mg/kg); water (µg/L); Biota (µg/kg)							
	Market (UTC) ^a	Market ^a	Wastes ^a	Water AA-EQS (Inland surface waters) ^b	Water AA-EQS (Other surface waters) ^b	Water MAC-EQS (Inland surface waters) ^b	Water MAC-EQS (Other surface waters) ^b	Biota (EQS) ^b
Tetra-BDE / penta-BDE / hexa-BDE / hepta-BDE / deca-BDE	10 (0.001 % by weight)	-	-	-	-	-	-	-
∑tetra-, penta-, hexa-, hepta- and decaBDE (∑BDEs-28, 47, 99, 100, 153 and 154)	500	-	1,000	-	-	(0.14)	(0.014)	(0.0085)
PFOS	0.001 % (by weight) (*0.1%)	-	50	6.5×10^{-4}	1.3×10^{-4}	36	7.2	9.1
HBCDD	0.01	-	1,000	0.0016	0.0008	0.5	0.05	167
SCCPs	-	Substances or mixture – (1 % by weight)	10,000	-	-	-	-	-
		Articles - 0.15 % (by						

			weight)					
Endosulfan	-	-	50	0.005	0.0005	0.01	0.004	-
Hexachlorobutadiene	-	-	100	-	-	0.6	0.6	55
Polychlorinated naphthalenes	-	-	10					
PCDD/PCDF	-	-	0.015					
DDT	-	-	50	0.025	0.025	na	na	na
Hexachlorobenzene	-	-	50	-	-	0.05	0.05	10
hexachlorocyclohexanes (including lindane)	-	-	50	0.02	0.002	0.04	0.02	-
Heptachlor (+heptachlor epoxide)	-	-	50	(2×10^{-7})	(1×10^{-8})	(3×10^{-4})	(3×10^{-5})	(6.7×10^{-3})
chlordan / chlordecone / pentachlorobenzene / Mirex / toxaphene / hexabromobiphenyl	-	-	50	-	-	-	-	-
Aldrin (Σ (aldrin, dieldrin, endrin, isodrin))	-	-	50	(0.01)	(0.005)	na	na	na
Dieldrin	-	-	50	-	-	na	na	na
Endrin	-	-	50	-	-	na	na	na
Polychlorinated Biphenyls (PCB)	-	-	50	-	-	-	-	
Σ PCDD, PCDF, PCB-DL	-	-	-	-	-	-	-	0.0065 μ g/ kg TEQ

Pentachlorobenzene (PeCB)	-	-	-	0.007	0.0007	na	na	-
PCP	-	-	-	0.4	0.4	1	1	-

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61 *PFOS in semi-finished products or articles, or parts thereof calculated with reference to the mass of structurally or micro-structurally distinct
62 parts that contain PFOS or, for textiles or other coated materials, if the amount of PFOS is lower than 1 µg/m² of the coated material.

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64 UTC - unintentional trace contaminant AA – Annual average MCQ – Maximum allowable concentration

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66 EQS – Environmental quality standard na – not applicable

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Table S7 Available regulatory guidelines for PCBs¹¹

Agency	Focus	Level	Comments
OSHA	Air: workplace	1.0 mg/m ³ for PCBs with 42% Cl 0.5 mg/m ³ for PCBs with 54% Cl	Enforceable; TWA*, PEL ^a Both standards encompass all physical forms of aerosols, vapor, mist, sprays, and PCB-laden dust particles.
NIOSH	Air: workplace	1.0 µg/m ³	Advisory; TWA (10-hour)
EPA	Drinking water: environment	0.0005 ppm	Enforceable MCL ^b
FDA	Food: environment	0.2-3.0 ppm (all foods) 2.0 ppm (fish) 10 ppm (paper food- packaging materials)	Enforceable; Tolerance level
WHO FAO	Food: environment	6.0 µg/kg per day	Allowable daily intake

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*TWA (time-weighted average): TWA concentration for a normal workday and a 40-hour work week to which nearly all workers may be repeatedly exposed

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^a PEL (permissible exposure limit): the highest level of PCBs in the air to which a worker may be exposed, averaged over an 8-hour workday

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^b MCL (maximum contaminant level): enforceable level for drinking water

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91 **Table S8** USEPA regional screening level (RSL) for POPs¹²
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POP	Soil (mg/kg)		Air ($\mu\text{g}/\text{m}^3$)		Tap water ($\mu\text{g}/\text{L}$)	Protection groundwater SSLs (mg/kg)	
	Residential	Industrial	Residential	Industrial		Risk-based SSL	MCL-based SSL
Dieldrin	3.4×10^{-2}	1.4×10^{-1}	6.1×10^{-4}	6.1×10^{-4}	1.8×10^{-3}	7.1×10^{-5}	-
Aldrin	3.9×10^{-2}	1.8×10^{-1}	5.7×10^{-4}	2.5×10^{-3}	9.2×10^{-4}	1.5×10^{-4}	-
Chlordane (Technical mixture)	1.7	7.7	2.8×10^{-2}	1.2×10^{-1}	2.0×10^{-2}	2.7×10^{-3}	2.7×10^{-1}
Chlordecone	5.4×10^{-2}	2.3×10^{-1}	6.1×10^{-4}	2.7×10^{-3}	3.5×10^{-3}	1.2×10^{-4}	-
Dicofol	-	-	-	-	-	-	-
Endrin	1.9×10^1	2.5×10^2	-	-	2.3×10^0	9.2×10^{-2}	8.1×10^{-2}
Heptachlor	1.3×10^{-1}	6.3×10^{-1}	2.2×10^{-3}	9.4×10^{-3}	1.4×10^{-3}	1.2×10^{-4}	3.3×10^{-2}
(Heptachlor Epoxide)	(7.0×10^{-2})	(3.3×10^{-1})	(1.1×10^{-3})	4.7×10^{-3}	1.4×10^{-3}	2.8×10^{-5}	4.1×10^{-3}
α -HCH	8.6×10^{-2}	3.6×10^{-1}	1.6×10^{-3}	6.8×10^{-3}	7.2×10^{-3}	4.2×10^{-5}	-
β -HCH	3.0×10^{-1}	1.3	5.3×10^{-3}	2.3×10^{-2}	2.5×10^{-2}	1.5×10^{-4}	-
γ -HCH (Lindane)	5.7×10^{-1}	2.5	9.1×10^{-3}	4.0×10^{-2}	4.2×10^{-2}	2.4×10^{-4}	1.2×10^{-3}
Endosulfan	4.7×10^2	7.0×10^3	-	-	1.0×10^{-2}	1.4×10^0	
(Endosulfan Sulfate)	3.8×10^2	4.9×10^3	-	-	1.1×10^{-2}	2.1×10^0	
Toxaphene	4.9×10^{-1}	2.1	8.8×10^{-3}	3.8×10^{-2}	7.1×10^{-2}	1.1×10^{-2}	4.6×10^{-1}

Mirex	$3.6E \times 10^2$	1.7×10^{-1}	5.5×10^{-4}	2.4×10^{-3}	8.8×10^{-4}	6.3×10^{-4}	-
PCP	1.0	4.0	5.5×10^{-1}	2.4	4.1×10^{-2}	5.7×10^{-5}	1.4×10^{-3}
HBB	-	-	-	-	-	-	-
HBCDD	-	-	-	-	-	-	-
Penta-BDE	1.6×10^2	2.3×10^3	-	-	4.0×10^1	1.7×10^0	-
octa-BDE	1.9×10^2	2.5×10^3	-	-	6.0×10^1	1.2×10^1	-
deca-BDE	4.4×10^2	3.3×10^3	-	-	1.1×10^2	6.2×10^1	-
HCB	2.1×10^{-1}	9.6×10^{-1}	6.1×10^{-3}	2.7×10^{-2}	9.8×10^{-3}	1.2×10^{-4}	1.3×10^{-2}
HCBD	1.2	5.3	1.3×10^{-1}	5.6×10^{-1}	1.4×10^{-1}	2.7×10^{-4}	-
PeCB	6.3×10^1	9.3×10^2	-	-	3.2×10^0	2.4×10^{-2}	-
PCB - high risk (low risk)	2.3×10^{-1}	9.4×10^{-1}	4.9×10^{-3} (2.8×10^{-2})	2.1×10^{-2} (1.2×10^{-1})	(4.4×10^{-2})	(6.8×10^{-3})	(7.8×10^{-2})
PFHxS	1.3	1.6×10^1	-	-	3.9×10^{-1}	1.7×10^{-4}	-
PFOA	1.9×10^{-1}	2.5	-	-	6.0×10^{-2}	9.1×10^{-4}	-
DDD	2.3	9.6	4.1×10^{-2}	1.8×10^{-1}	3.2×10^{-2}	7.5×10^{-3}	-
DDE	2.0	9.3	2.9×10^{-2}	1.3×10^{-1}	4.6×10^{-2}	1.1×10^{-2}	-
DDT	1.9	8.5	2.9×10^{-2}	1.3×10^{-1}	2.3×10^{-1}	7.7×10^{-2}	-
PFOS	1.3×10^{-1}	1.6	-	-	4.0×10^{-2}	3.1×10^{-4}	-

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