POPs Data Collection – General Information

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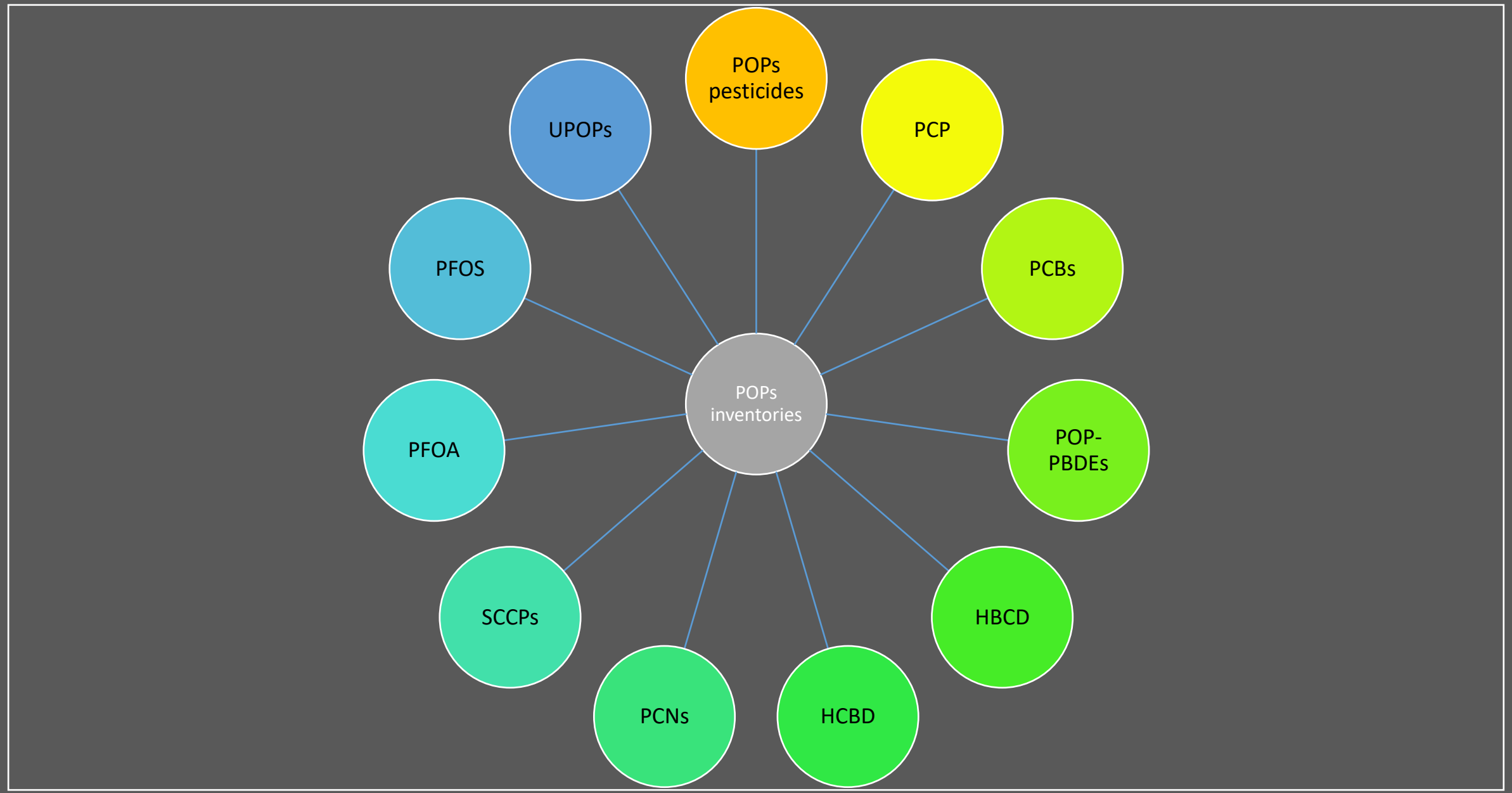
General remarks

- Information to be introduced would support:
  - Conducting the POPs data collection exercise to take place within the SSFA implementation
  - Current/Future NIP update processes
- In conducting the POPs data collection exercise, due to limited resources, focus could be made on selected POPs groups
- Information introduced represents a selection of relevant aspects detailed by POPs inventories guidance documents, therefore every time is needed these documents should be reffered to
- Additional information compilation of:
  - POPs specific exemptions
  - POPs HS codes
  - Basel Convention classification of wastes or waste categories that contain or have the potential to contain or be contaminated with POPs
  - Correspondence of source categories and activity rates for uPOPs, Hg, GHG releases estimation

is available


POPs pesticides
UPOPs
PCP
PFOS
PCBs
POPs inventories
PFOA
POP-PBDEs
SCCPs
HBCD
PCNs
HCBD

***These STEPS apply to each inventory!!!**

Define the scope of the inventory

Establish and/or lead a multi-stakeholder national inventory team

1. Planning the inventory

Develop a work plan for the inventory

Identify relevant key stakeholders

Apply tiered approach for POPs data collection

Tier I provides with a general idea of where the problems may lie and, more importantly, which sectors require further investigation

2. Selecting data collection methodology

Tier III (in-depth inventory) uses analytical measurement methods to obtain more precise data on sectors

Tier II (preliminary inventory) focuses on specific sectors considered relevant and would provide information for deciding on management measures

Data collection approaches vary from country to country based on the data gathered in steps 1 and 2; they may be by estimations, using statistical data or possibly measurements

Desk study of existing information

(customs service, national bureau of statistics, and national central bank; published literature in scientific journals, technical reports or notes, commissioned research reports, development assistance study reports and Internet searches)

3. Collecting and compiling data from key sectors

Questionnaire surveys; Site inspection, sampling and analysis

National sensitization workshop on Stockholm Convention and new POPs

4. Managing and evaluating the data

The management of collected data should be done as consistently and as transparently as possible

During the data processing, all the assumptions and conversion coefficients adopted as a result of expert judgement, where needed, should be noted/recorded and mentioned when the results are presented

Estimations are a valuable tool for providing the data needed when resources are limited

Gaps and limitations, and the measures needed to make the inventory more complete need to be identified

All the data formats including questionnaire survey formats should be determined to anchor the consistency of the data collection

5. Preparing the inventory report

Proposed Outline* of the Inventory Report

I. Summary of the inventory findings (2-4 pages) which contain key information
II. Objectives and scope
III. Data methodology used and how data were gathered
IV. Final results of the inventory in each sector considered a priority for the country
V. Results of the gap-analysis and limitations identified for completion of the inventory
VI. Further actions to be taken to complete the inventory (e.g. stakeholder involvement, data collection strategies) and recommendations
VII. Other information (e.g. stakeholder list)

***This OUTLINE applyes to each inventory report !!!**

POPs and other chemicals in different applications to address in an integrative manner during data collection

Application	POPs and other chemicals
Cables	SCCPs, PCNs, PCBs, PBDEs, HBCD
Rubber	SCCPs, PCNs, PCBs, PBDEs, HBCD
Paints/coating	SCCPs, PCNs, PCBs, PBDEs, HBCD, PFOS
Paints for buildings, bridges, towers and other metal construction and waterproof paints related removal	SCCPs, PCBs, PCNs, lead, cadmium
Paints for ships	SCCPs, PCBs, PCNs, DDT, Sn-organics, lead
Adhesives/sealants	SCCPs, PCNs, PCBs, PFOS
Paper	SCCPs, PCNs, PCBs, PFOS
Textiles (textiles for furniture upholstery, seating upholstery in transport applications, and interior textiles such as blinds and curtains as well as industrial protective clothing)	SCCPs, PCNs, PCBs, PBDEs, HBCD
Textiles with water repellent properties	SCCPs, PFOS, PFOA
Lacquers	SCCPs, PCP, endosulfan, lindane, mirex and PCBs/PCNs
Fire-retardant paints	SCCPs, PCP, endosulfan, lindane, mirex and PCBs/PCNs
PVC	SCCPs, PCNs, PCBs, lead, cadmium, DEHP (Diethylhexyl phthalate). BBP (Benzyl butyl phthalate), DBP (Dibutyl phthalate), DIDP (diisodecyl phthalate), DINP (diisononyl phthalate), or DNOP (di-n-octyl phthalate)
Lubricants	SCCPs, PCNs, PCBs
Leather	SCCPs, PCBs, PCP, PFOS
Metal working fluids	SCCPs, PCNs, PCBs
Intumescent paint	SCCPs, PCP; PCNs, PCBs, endosulfan; HCH, DDT, mirex
Transformers and capacitors	PCBs, PCNs, HCBD
Heat exchagers and hydraulic oils	PCBs, PCNs
Smoke grenades using hexachloroethane smoke	HCBD, HCB, PCNs
WEEE plastic	PBDEs, HBCD
Furniture	PBDEs, HBCD, PFOS
Insulation materials (in cosntruction)	PBDEs, HBCD
Food paper packaging	HBCD, PFOS

POPs Pesticides Data Collection

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POPs Pesticides (separate table to check on specific exemptions/acceptable purposes)

Aldrin	Annex A	No specific exemption/acceptable purpose
Chlordane	Annex A	No specific exemption/acceptable purpose
Chlordecone	Annex A	No specific exemption/acceptable purpose
Dicofol	Annex A	No specific exemption/acceptable purpose
Dieldrin	Annex A	No specific exemption/acceptable purpose
Endrin	Annex A	No specific exemption/acceptable purpose
Heptachlor	Annex A	No specific exemption/acceptable purpose
Hexachlorobenzene	Annex A	No specific exemption/acceptable purpose
Alpha hexachlorocyclohexane	Annex A	No specific exemption/acceptable purpose
Beta hexachlorocyclohexane	Annex A	No specific exemption/acceptable purpose
Lindane	Annex A	Specific exemption
Mirex	Annex A	No specific exemption/acceptable purpose
Pentachlorobenzene	Annex A	No specific exemption/acceptable purpose
Pentachlorophenol and its salts and esters	Annex A	Specific exemption
Technical endosulfan and its related isomers	Annex A	Specific exemption
Toxaphene	Annex A	No specific exemption/acceptable purpose
DDT	Annex B	Acceptable purpose
Perfluorooctane sulfonic acid, its salts and perfluorooctane sulfonyl fluoride	Annex B	Acceptable purpose

Objectives of the inventory

- Review and summarize the production, use, import and export, disposal of the pesticides listed in Annexes A and B of the Convention
- Gather information on stockpiles and wastes containing, or thought to contain, POPs pesticides
- Assess the legal and institutional framework for control of the production, use, import, export and environmentally sound disposal of the pesticide wastes listed in Annexes A and B of the Convention
- Identify gaps in information required to complete the assessment
- Identify suitable alternative products, methods and strategies to the POPs pesticides
- Determine need of exemptions and register for those POPs pesticides that exemptions are still allowed
- Identify whether the current situation meets the requirements of the Stockholm Convention and detail areas where it does not
- Identify the potential POPs pesticides contaminated sites

Outputs and outcomes of the inventory

- Report on historical and current production, import, export, use, stockpiles, waste disposal and potential contaminated sites for POP pesticides
- Legal, institutional, regulatory and enforcement systems for POPs pesticides
- Data gaps and deficiencies in the knowledge on POPs pesticides
- Conclusion on exemptions needed and listing of these exemptions
- Elements to develop an action plan to address POPs pesticides in the context of the NIP

Quantitative data to be generated for POPs pesticides

Life-cycle step	NIP Quantitative data to be generated	Unit measure	Remarks
Production	POPs pesticides produced	Tonnes	Data requested by Art. 15 report
Import/export	POPs pesticides imported/exported	Tonnes	Data requested by Art. 15 report
	POPs pesticides containing waste imported/exported for environmental sound disposal	Tonnes	
Use	POPs pesticides used	Tonnes	
Stockpiles	POPs pesticides stockpiles stored	Tonnes	
Waste stockpiles	POPs pesticides containing waste stockpiles	Tonnes	Data requested by Art. 15 report
Contaminated sites	Potentially contaminated/contaminated sites	Number	

Potential sources of information

- Ministry in charge of agriculture and/or related agencies
- Pesticides Registration Boards
- Pesticides producers/retailers/users
- National statistics
- Custom authorities
- FAO representative
- Farmer associations
- Ministry in charge of health (e.g. in case of DDT and Lindane)
- Waste disposal companies

Guidance documents

FAO Pesticide Stock Management System
http://psms.fao.org/psms/login.htm

FAO guidance (2009 to 2011) - http://www.fao.org/agriculture/crops/obsolete-pesticides/resources0/en/

Environmental Management Tool Kit for Obsolete Pesticides, Vol 1;

Environmental Management Tool Kit for Obsolete Pesticides, Vol. 2;

Environmental Management Tool Kit for Obsolete Pesticides, Vol 3;

Environmental Management Tool Kit for Obsolete Pesticides, Vol 4;

The Preparation of Inventories of Pesticides and Contaminated Materials.

Collection of information and data for POPs pesticides

- Information on POPs pesticides production
- Information on POPs pesticides import/export, including import/export for environmental sound disposal
- Information on POPs pesticides use
- Information on POPs pesticides stockpiles and wastes
- Information on POPs pesticides contaminated sites
- Information on alternatives

Potential POPs pesticides contaminated sites

Life cycle stage; Sector	Activities	Locations
POPs pesticides production	(Former) Production	Production site
	(Former) Destruction of production waste	Sites where production waste has been destroyed
	Disposal of waste from production	Landfills related to wastes from production
POPs pesticides use	Sites where POPs pesticides were/are used	Soil impacted from POPs pesticides
POPs pesticides stockpiles	Sites where POPs pesticides were/are stockpiled	Soil, underground water impacted from POPs pesticides
POPs pesticides wastes	Deposition of POPs pesticides waste	Landfill and surrounding
	Empty containers of POPs pesticides	Landfill and surrounding

PCBs Data Collection

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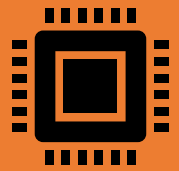
Polychlorinated Biphenyls (PCBs)

Listed under Annexes A and C

2025 – remove PCBs containing equipment from use

2028 – completely eliminate the PCBs containing wastes

Uses (former/current)



Closed applications: transformers, capacitors

Open applications: caulks, paints/plaster, anti-corrosion coatings, adhesives, small capacitors, cable sheaths, lubricating fluids, impregnating agents, flame retardants

Objectives of the inventory

- Review and summarize the use, import and export for environmental sound disposal for PCBs in closed and open applications
- Gather information on stockpiles and wastes containing, or thought to contain PCBs from closed and and open applications
- Assess the legal and institutional framework for control of the production, use, import, export and environmentally sound disposal of the PCBs in closed and open applications
- Identify gaps in information required to complete the assessment
- Identify whether the current situation meets the requirements of the Stockholm Convention and detail areas where it does not
- Identify the potential PCBs contaminated sites

Outputs and outcomes of the inventory

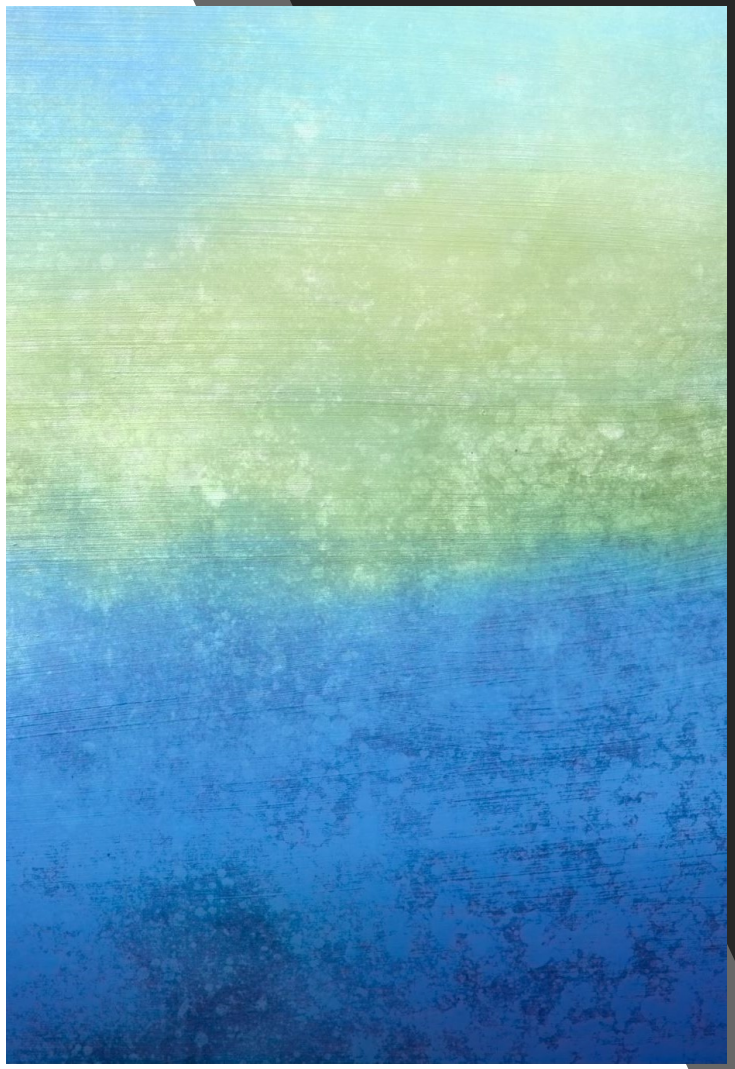
- Report on import and export for environmental sound disposal, use, stockpiles, waste disposal and potential contaminated sites for PCBs in closed and open applications
- Legal, institutional, regulatory and enforcement systems for PCBs in closed and open applications
- Data gaps and deficiencies in the knowledge on PCBs in closed and open applications
- Elements to develop an action plan to address PCBs in closed and open applications in the context of the NIP

Quantitative data to be generated for PCBs in closed applications

Life-cycle step	NIP Quantitative data to be generated	Unit measure	Remarks
Production (historical)	PCBs produced	Tonnes	Data requested by Art. 15 report
Import/export for environmentally sound disposal	PCBs imported/exported	Tonnes	Data requested by Art. 15 report
Use/ Stockpiles/ Waste stockpiles	Equipment in service/ out of service	Number	Data requested by Art. 15 report
	Mass of equipment in service/out of service	Tonnes	Data requested by Art. 15 report
	Mass of liquids (oil) of equipment in service/out of service	Tonnes	Data requested by Art. 15 report
	PCB content in oil of equipment in service/out of service	Percentage (%)	Data requested by Art. 15 report
Waste disposal	PCBs containing waste stockpiles locally destroyed	Tonnes	Data requested by Art. 15 report
	PCBs containing waste stockpiles destroyed abroad	Tonnes	Data requested by Art. 15 report
Contaminated sites	Potentially contaminated/contaminated sites	Number	

Potential sources of information for PCBs in closed applications

- Ministry of Energy
- Ministry for Mining
- Utility sector
- National statistics
- Custom authorities
- Other industries having transformers and capacitors
- GEF PCBs elimination projects

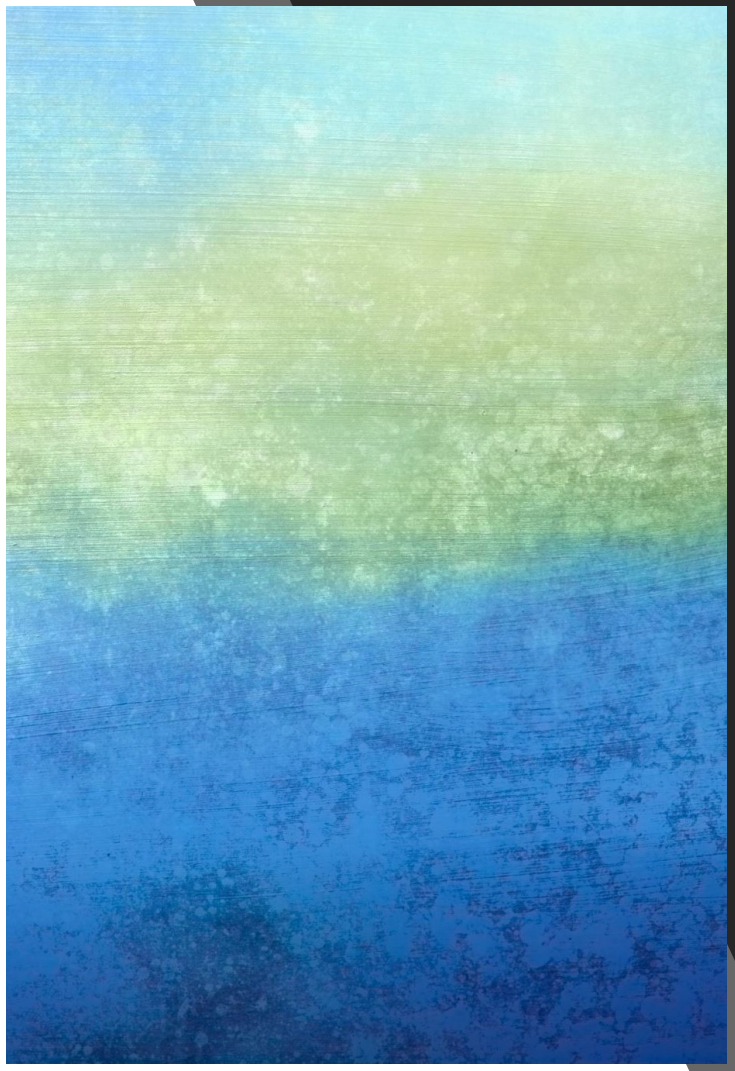


Guidance documents for closed applications

Guidelines for the Identification of PCBs and Materials Containing PCBs - http://chm.pops.int/Implementation/PCBs/Overview/tabid/273/Default.aspx

PCB Management Guidance - https://wedocs.unep.org/bitstream/handle/20.500.11822/31228/PCBMg.pdf?sequence=1

Polychlorinated Biphenyls (PCB) Inventory Guidance - https://wedocs.unep.org/bitstream/handle/20.500.11822/31250/PCBIG.pdf?sequence=1&isAllowed=y



Guidance documents for open applications

Consolidated Guidance on PCB on Open Applications

PCB-Open Applications: Identifications and Environmentally Sound Management

PCB in Open applications: Machinery and Installations

PCB in Open applications: Residential and Public Buildings

https://www.unenvironment.org/explore-topics/chemicals-waste/what-we-do/persistent-organic-pollutants/pcb-forgotten-legacy

Collection of information and data for PCBs in closed applications

Information on former PCBs production

Information on former PCBs import/export, including information on import/export of wastes for environmental sound disposal

Information on PCBs use in closed applications, including number of equipment in use/out of servce, mass of equipment in use/out of service, mass of liquids (oil) of equipment in use/out of service

Information on PCB containing wastes stockpiles locally and abroad destroyed

Information on PCB contaminated sites

Collection of information and data for PCBs in open applications

Information on former PCBs production for open applications

Information on former PCBs import/export in open applications

Information on former PCBs use in open applications: Caulks / sealants; Paints / plasters; Anti-corrosion coatings; Cable-sheaths; Cable insulation; Lubricating fluids; Adhesives; Flame retardants; Floor finish; Carbonless copy paper; Fluorescent light ballasts and small capacitors (products that may still contain PCBs)

Information on PCB from open applications in wastes

Identification of and environmentally sound management of PCB in open applications

PCB from open applications can be released into the environment by weathering and inappropriate removal of PCB containing materials

Wastes generated from PCB use in open applications are usually not defined as hazardous waste

PCB applications can be found throughout industrial facilities and other buildings, it is therefore important to also identify these applications.

Detection of PCB in open applications is only possible if the (building) material is sampled and analysed in a laboratory

The recording of data of buildings, facilities, objects and materials with PCB in open applications after their identification would minimize the risks of inexpert treatment, non-environmentally sound management and disposal and therefore minimize the impact on the environment and the human health

Many buildings worldwide, especially those constructed or renovated between the 1950s and the early 1980s, contain PCB in a wide variety of applications which emit PCB into the environment

Potential PCBs contaminated sites

Possible target industries	Common PCB-containing applications
Electric power stations and distribution stations	Transformers, Large capacitors, Small capacitors, Switches, Voltage regulators, Liquid filled electrical cables, Circuit breakers Lighting ballasts
Industrial Facilities (including mining, aluminum, copper, iron and steel, cement, chemicals, plastics, synthetics, and petroleum refining industries)	Transformers, Large capacitors, Small capacitors, Heat transfer fluids, Hydraulic fluids (equipment), Voltage regulators, Circuit breakers, Lighting ballasts, Heat transfer fluids, Vacuum pumps, Lubricating oil
Railroad systems	Transformers, Large capacitors, Voltage regulators, Circuit breakers, Vacuum pumps, Lubricating oil
Military installations	Transformers, Large capacitors, Small capacitors, Circuit breakers, Voltage regulators Hydraulic fluids (equipment)
Electronics and mechanical manufacturing and maintenance plants	Transformers, Switches, Voltage regulators Circuit breakers, Vacuum pumps, Lighting ballasts, Small capacitors
Research laboratories	Vacuum pumps, Fluorescent light ballasts, Small capacitors, Circuit breakers
Waste water discharge facilities	Vacuum pumps, Well motors
Automobile service stations	Re-used oil, Vacuum pumps
Waste recycling and recovery plants and sites	Decommissioned equipment, Small capacitors (in washing machines, hair dryers, neon tubes, dishwashers, power supply units, etc.), Circuit breakers, Lighting ballasts, Building demolition Fluff, Spills

POP-PBDEs Data Collection

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Polybrominated diphenyl ethers (c-OctaBDE and c-PentaBDE)

Listed under Annex A with specific exemptions for recycling of articles containing POP-PBDEs

c-Pentabromodiphenyl ether (Tetrabromodiphenyl ether (tetraBDE) and Pentabromodiphenyl ether (pentaBDE))

c-Octabromodiphenyl ether (Hexabromodiphenyl ether (hexaBDE) and Heptabromodiphenyl ether (heptaBDE))

Polybrominated diphenyl ethers (c-DecaBDE)

Listed under Annex A with specific exemptions for production and use:

- Parts for use in legacy vehicles
- Aircraft for which type approval has been applied for before December 2018 and has been received before December 2022 and spare parts for those aircraft
- Textile products that require anti-flammable characteristics, excluding clothing and toys
- Additives in plastic housings and parts used for heating home appliances, irons, fans, immersion heaters that contain or are in direct contact with electrical parts or are required to comply with fire retardancy standards, at concentrations lower than 10 per cent by weight of the part
- Polyurethane foam for building insulation

Decabromodiphenyl ether (commercial mixture, c-decaBDE)

Former uses c-PentaBDE

Materials/polymers/resins	Applications	Articles
Polyurethane (PUR)	Cushioning materials, packaging, padding, construction	Furniture, transportation, sound insulation, packaging, padding panels, rigid PUR foam construction
Textiles	Coatings	Back coatings and impregnation for carpets, automotive seating, furniture in homes and official buildings, aircraft, underground
Epoxy resins	Circuit boards, protective coatings	Computers, ship interiors, electronic parts
Rubber	Transportation	Conveyor belts, foamed pipes for insulation
Polyvinylchloride (PVC)	Cable sheets	Wires, cables, floor mats, industrial sheets
Unsaturated (Thermoset) polyesters (UPE)	Circuit boards, coatings	Electrical equipment, coatings for chemical processing plants mouldings, military and marine applications: construction panels
Paints/lacquers	Coatings	Marine and industry lacquers for protection of containers
Hydraulic oils	Drilling oils, hydraulic fluids	Off shore, coal mining

Source: UNEP. 2009. Guidance on feasible flame-retardant alternatives to commercial Pentabromodiphenyl ether UNEP/POPS/COP.4/INF/24.

Former uses c-OctaBDE

Polymers/materials	Application	Articles
Acrylnitrile-Butadiene-Styrene (ABS)	Polymer casings/parts in electric and electronic appliances	Computer- and TV casings (CRTs); office equipment; (other electronic equipment)
High Impact Polystyrene (HIPS)	Polymer casings/parts in electric and electronic appliances	Computer- and TV casings (CRTs); office equipment
	Cold-resistant layer	Refrigerator
Polybutylen-Terephtalate (PBT)	Polymer casings	Electronic appliances
	Transport sector	Connectors in vehicles
	Household	Iron
Polyamide-Polymers	Textiles	Furniture
	Construction	Pipes and plastic foil

Source: ESWI. 2011. Study on waste related issues of newly listed POPs and candidate POPs. Final Report 25. March 2011 (update 13. April 2011) for European Commission. No ENV.G.4/FRA/2007/0066.

Former / current uses c-DecaBDE

Sector/ industry	Applications	End use
Electric and electronics industry	Electric and electronic equipment	▪ housings and internal components of TVs ▪ mobile phones and fax machines ▪ audio and video equipment; remote controls ▪ communications cables; building cables ▪ wire and cables, e.g., heat shrinkable tubes ▪ connectors in E&E equipment ▪ circuit breakers; coils of bobbins ▪ printing and photocopy machine components - toner ▪ cartridges and connectors ▪ scanner components ▪ heating fans and hair dryers
Private and public transportation	Automotive vehicles	▪ fabric (backcoating of article) ▪ reinforced plastics ▪ under the hood or dash polymers - terminal /fuse block - higher amperage wire & cable jacketing (sparkplug wire) ▪ electric and electronic equipment
Maritime, aviation and aeronautic	Ships, boats, airplanes, space shuttles, rockets	▪ electrical wiring and cables ▪ electric and electronic equipment (as above) ▪ air ducts for ventilation systems - electrical ducts and fittings - switches and connectors ▪ adhesive tape ▪ composite materials e.g. epoxy
Textiles and furniture	Textiles and furniture	▪ automotive textiles ▪ upholstery textiles e.g. sofas, offices chairs, mattresses ▪ filters for cookers ▪ blinds, draperies, blackout curtains ▪ geotextiles, wall coverings ▪ households/furniture appliances ▪ PU flexible foam ▪ tents and tarps ▪ interliners; foam fillings ▪ carpets ▪ other
Buildings/construction		▪ Insulation (PUR and formerly XPS foams) ▪ facing laminates for insulation panel ▪ cladding panels ▪ film for use under the roof and to protect building areas ▪ cables and electrical ducts and fittings ▪ piping insulation and pipes

Source: UNEP. 2014. Supporting information related to the draft risk profile on decabromodiphenyl ether. UNEP/POPS/POPRC.10/INF/5

Objectives of the inventory

- Review and summarize the production, use, import and export for POP-PBDEs
- Gather information on stockpiles and wastes containing, or thought to contain POP-PBDEs
- Assess the legal and institutional framework for control of the production, use, import, export and environmentally sound disposal of the POP-PBDEs
- Identify gaps in information required to complete the assessment
- Determine need of exemptions and register for the exemptions still allowed
- Identify whether the current situation meets the requirements of the Stockholm Convention and detail areas where it does not
- Identify the potential POP-PBDEs contaminated sites

Outputs and outcomes of the inventory

- Report on production, import, export, use, stockpiles, waste disposal and potential contaminated sites for POP-PBDEs
- Legal, institutional, regulatory and enforcement systems for POP-PBDEs
- Data gaps and deficiencies in the knowledge on POP-PBDEs
- Elements to develop an action plan to address POP-PBDEs in the context of the NIP

Quantitative data to be generated for tetra-, penta-, hexa- and heptaBDEs

Life-cycle step	NIP Quantitative data to be generated	Unit measure	Remarks
Production (historical)	POP-PBDEs produced	Tonnes	Data requested by Art. 15 report
Import/export	POP-PBDEs imported/exported (historical)	Tonnes	Data requested by Art. 15 report
	POP-PBDEs in articles/products (EEE and vehicles) imported/exported	Tonnes	
	POP-PBDE containing waste imported/exported (WEEE and ELVs) for environmental sound disposal	Tonnes	
Use	POP-PBDEs used to manufacture article/products (EEE and vehicles) (historical)	Tonnes	
	POP-PBDEs in article/products (EEE and vehicles) in use	Tonnes	Data requested by Q III of the Reporting format for the submission of information for the evaluation and review of brominated diphenyl ethers pursuant to paragraph 2 of parts IV and V of Annex A to the Stockholm Convention
	Polymeric fraction containing POP-PBDEs (contained in EEE and vehicles)	Tonnes	Data requested by Q III of the Reporting format for the submission of information for the evaluation and review of brominated diphenyl ethers pursuant to paragraph 2 of parts IV and V of Annex A to the Stockholm Convention

Quantitative data to be generated for tetra-, penta-, hexa- and heptaBDEs

Life-cycle step	NIP Quantitative data to be generated	Unit measure	Remarks
Stockpiles	POP-PBDEs in stockpiled article/products (EEE and vehicles)	Tonnes	
	Polymeric fraction containing POP-PBDEs (contained in EEE and vehicles)	Tonnes	
Recycling	POP-PBDEs containing articles/products (EEE and vehicles) recycled	Tonnes	Data requested by Q V of the Reporting format for the submission of information for the evaluation and review of brominated diphenyl ethers pursuant to paragraph 2 of parts IV and V of Annex A to the Stockholm Convention
	Articles/products produced from recycled articles/products containing POP-PBDEs	Tonnes	
Waste stockpiles	POP-PBDEs containing wastes stockpiles (wastes of electric and elactronics equipment (WEEE) and end-of-life vehicles (ELVs))	Tonnes	Data requested by Art. 15 report
	Polymeric fraction containing POP-PBDEs, (contained in WEEE and ELVs)	Tonnes	
Contaminated sites	Potentially contaminated/contaminated sites	Number	

Quantitative data to be generated for decaBDE (commercial mixture)

Life-cycle step	NIP Quantitative data to be generated	Unit measure	Remarks
Production (historical/current)	DecaBDE produced	Tonnes	Data requested by Art. 15 report
Import/Export	DecaBDE imported/exported (historical/current)	Tonnes	Data requested by Art. 15 report
	DecBDE in articles/products (EEE, textiles, insulation foams, vehicles) imported/exported	Tonnes	
	DecaBDE containing waste imported/exported (WEEE, textiles, insulation foams and ELVs) for environmental sound disposal	Tonnes	
Use (historical/current)	DecaBDE used to manufacture article/products (EEE, textiles, insulation foams, vehicles) (historical/current)	Tonnes	
	DecaBDE in article/products (EEE, textiles, insulation foams, vehicles) in use	Tonnes	
	Polymeric fraction containing DecaBDE (contained in EEE and vehicles)	Tonnes	

Quantitative data to be generated for decaBDE (commercial mixture)

Life-cycle step	NIP Quantitative data to be generated	Unit measure	Remarks
Stockpiles	DecaBDE in stockpiled article/products (EEE, textile, insulation foam and vehicles)	Tonnes	
	Polymeric fraction containing DecaBDEs (contained in EEE and vehicles)	Tonnes	
Recycling	DecaBDE containing articles/products (EEE, textiles, insulation foam and vehicles) recycled	Tonnes	
	Articles/products produced from recycled articles/products containing DecaBDE	Tonnes	
Waste stockpiles	DecaBDE containing wastes stockpiles (WEEE, textiles, insulation foams and ELVs)	Tonnes	Data requested by Art. 15 report
	Polymeric fraction containing DecaBDE (contained in WEEE and ELVs)	Tonnes	
Contaminated sites	Potentially contaminated/contaminated sites	Number	

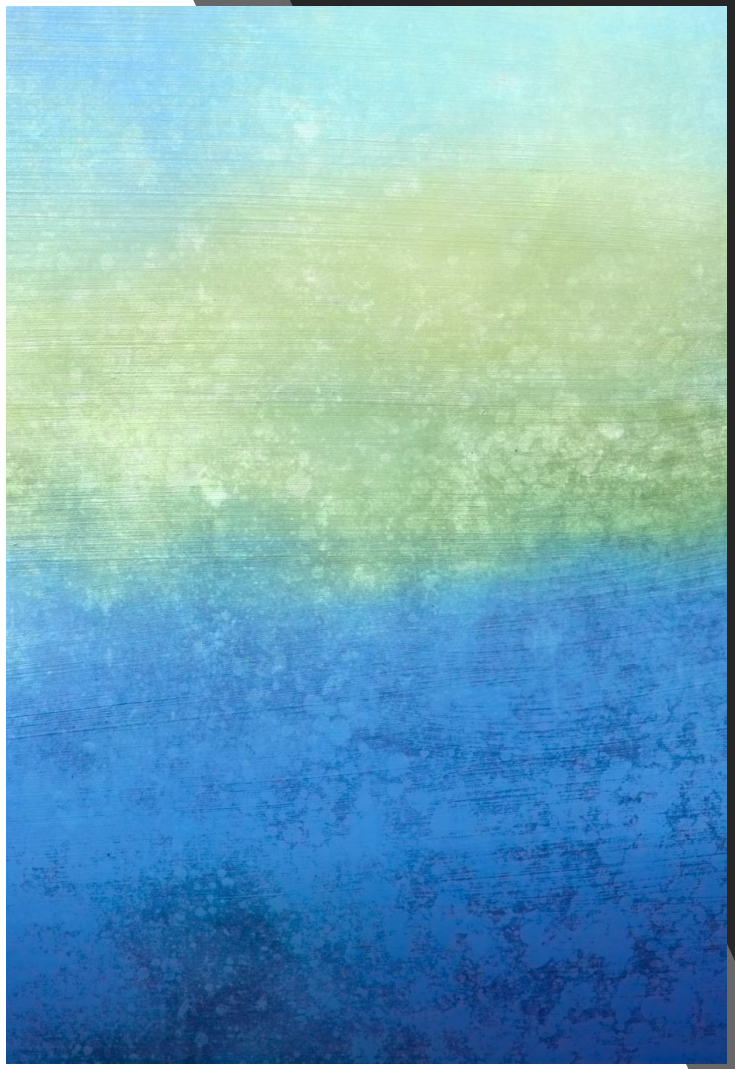
Potential sources of information

Life cycle stage	Stakeholders
For all stages	• Ministry of Environment • Ministry of Industry • Ministry responsible for waste management • Ministry of Construction • Ministry of Labour • Ministry of finance • Stockholm NIP coordinator and steering committee • Basel Convention focal point (and stakeholders) • Rotterdam Convention focal point • Customs • Office of statistics
NGOs/CSOs	• Industry associations (e.g. manufacturers of electronic and electrical equipment (EEE); plastics producers; EEE recyclers; importers and exporters of automotive vehicles; association of car manufacturers) • CSOs/NGOs working on environmental health, in particular related to POPs, and hazardous waste issues • CSOs/NGOs working on workers safety
Import and production of decaBDE	• Importers and producers of c-decaBDE and formulations containing decaBDE

Manufacturing of articles where POP-PBDEs are used or have been used	• Industries manufacturing the following:
	  ○ Electric and electronic equipment
	  ○ Automotive vehicles
	  ○ Textiles and furniture
	  ○ Insulation material
	  ○ Electric wiring and cables
	  ○ The list is not exhaustive; see chapter 3 for further details.

Articles containing c-pentaBDE, c-octaBDE, c-decaBDE	• Importers of and those who place on the market articles that may contain c-pentaBDE, c-octaBDE and decaBDE (e.g. EEE, spare parts of legacy vehicles)
End-of-life treatment	• Companies/organizations recycling electric and electronic equipment • Waste management companies • Companies operating waste incinerators and landfills

Source: UNEP.2019. Preliminary draft guidance on preparing inventories of decabromodiphenyl ether (decaBDE). UNEP/POPS/COP.9/INF/18



Guidance documents

Draft general guidance on Persistent Organic Pollutants (POPs) inventory development - UNEP/POPS/COP.9/INF/19/Add.1

Full guidance for preparing inventories of polybrominated diphenyl ethers (PBDEs) listed under the Stockholm Convention (full guidance) - UNEP/POPS/COP.7/INF/27 (revised 2017)

Preliminary draft guidance on preparing inventories of decabromodiphenyl ether (decaBDE) - UNEP/POPS/COP.9/INF/18

http://chm.pops.int/Implementation/NationalImplementationPlans/Guidance/tabid/7730/Default.aspx

Collection of information and data for POP-PBDEs – Tier I EEE sector

Information on the number of CRT appliances/capita

Information on the country population for the inventory year

Total and per capita amounts of CRT (TVs and personal computer (PC) monitors) in different regions and countries

Country/Region	Total weight (10^3 t)	Total number (Mio units)	Population (million)	CRT weight/person (kg/capita)	No. of CRTs /person (units/capita)	Source
Asian average	16,226	649	3'906	4.1	0.17	Gregory, 2009
North American average	14,623	585	529	27.6	1.11	Gregory ,2009
Latin America and the Caribbean average	5,189	207	572	9.1	0.36	Gregory, 2009
Benin	17.4	0.7	8.7	2.0	0.08	Aina et al. 2011
Côte d'Ivoire	78.0	3.1	20.8	3.75	0.15	Messou et al., 2011
Ghana, 2010	112	4.48	24.2	4.6	0.19	Green Advocacy & Empa, 2011
Nigeria, 2010	670	26.8	154.7	4.33	0.17	BCCC-Nigeria et al., 2011
Colombia, 2008/9	343	13.7	46	7.46	0.3	León, 2010
Switzerland, 2008	54	2.2	7.7	7.05	0.28	BfS, 2011

*The average weight of a CRT device used in this table is 25 kg

POP-PBDEs estimation in EEE sector - Tier I calculation equation

Once the CRT **per capita data** have been estimated, the POP-PBDEs content in CRT casings (TVs and computer monitors), flat screens can be calculated taking into consideration the following additional data:

Population of the respective country

Weight of the CRTs: **25 kg per device** (estimated average weight of a CRT monitor, either TV or PC monitor)

Polymer content of CRT casings: **30% of the CRT weight** (estimated average)

A range of hexa/hepaBDE **0.47-1.37 kg/tonne, and 3.2 to 4.4 kg/tonne for decaBDE** for plastic used in CRT casings (estimated average)

A range of hexa/hepaBDE and decaBDE in CRT devices can be calculated as follows:

$$\mathbf{M_{hexa/heptaBDE\ (i)}\ (CRTs) = [Number\ of\ CRTs/capita_{Region}]\ x\ population\ x\ 25\ kg\ x\ 0.3\ x\ [0.00047\ to\ 0.00137]}$$

$$\mathbf{M_{decaBDE(i)}\ (CRTs) = [Number\ of\ CRTs/capita_{Region}]\ x\ population\ x\ 25\ kg\ x\ 0.3\ x\ [0.0032\ to\ 0.0044]}$$

Collection of information and data for POP-PBDEs – Tier II EEE sector

Information on the number of CRT units (TVs and computer monitors) imported, in use/stockpiled at consumer level (Private consumers (households); Institutional consumers (public institutions, government, parastatals, health and educational sector); Corporate consumers (hotels, large businesses (industries), small business enterprises)), and entering the end of life (WEEE)

Information on the number of flat screen TVs (including inch size) imported, in use/stockpiled at consumer level and, entering the end of life (WEEE)

POP-PBDEs estimation in EEE sector – Tier II calculation equation

$$M_{PBDE(i)} = M_{EEE(j)} \times f_{Polymer(k)} \times C_{PBDE(i);Polymer(k)}$$

Where:

- $M_{PBDE(i)}$ is the amount of POP-PBDEs (*i*) in [kg] in import/stockpiled/entering the waste stream (in Polymer (*k*) of electrical and electronic equipment (EEE) (*j*))
- $M_{EEE(j)}$ is the amount of EEE (*j*) in [in tonnes] (imported, stockpiled or entering the waste stream) – collected via EEE inventory, importers, retailers, waste managers
- $f_{Polymer}$ is the total polymer fraction in [weight-%]
- $C_{PBDE(i);Polymer}$ is the content of the POP-PBDEs (decaBDE and hepta/hexaBDE) (*i*) in the total polymer fraction in [kg/tonne]

$M_{hexa/heptaBDE\ (i)}$ (CRTs) = Number of CRT units (TVs and monitors) x 25 kg (average weight) x 30% (polymeric fraction) x [0.00047 to 0.00137 – POP-PBDEs content]

$M_{decaBDE(i)}$ (CRTs) = Number of CRT units (TVs and monitors) x 25 kg (average weight) x 30% (polymeric fraction) x [0.0032 to 0.0044 – POP-PBDEs content]

$M_{hexa/hepta/decaBDE(i)}$ (Flat screen TVs) = Number of Flat screen TVs x 13 kg (32 inch Flat screen TVs) or 39 kg (60 Inch Flat screen TVs) x 0.37 (polymeric fraction) x [0.000009 + 0.00275 – POP-PBDEs content]

Collection of information and data for POP-PBDEs – Tier II transport sector

1975–2004

Information on number of vehicles manufactured between 1975-2004 (when c-PentaBDE was used) – imported, in use, entering end of life

Information on number of vehicles manufactured between 2005-2017 (when c-DecaBDE was used) – imported, in use, entering end of life

2005–2017

The average polymers (plastic, foams and synthetics) in cars are approximately 15 % . Considering an average weight of a car (1.333 t) this means that approximately 200 kg are polymers Please note: The polymer content and the weight of vehicles changes over time with increasing share of polymers.

POP-PBDEs estimation in transport sector – Tier II calculation equation

- In order to calculate the amount of POP-PBDEs in vehicles, information on vehicles fabrication year (distinguishing between vehicles fabricated 1975-2004 and 2005-2017) imported, in use (registered) and entering the end of life (ELVs)
- **Based on global data from PBDEs in shredder residues and recalculated average of PBDEs content of individual cars, the POP-PBDE content is**
  - 80 g decaBDE for vehicles produced before 2005 for all regions; except for the US with high use of c-PentaBDE of 40 g decaBDE and 40 g c-PentaBDE in average car* can be assumed
  - 20 g decaBDE for vehicles produced 2005 to 2017
  - 0 g decaBDE/PBDEs for vehicles produced 2017 onwards if no exemption for decaBDE is made
- Based on this practical approach the following formula can be used to estimate the PBDE amount in vehicles:

Total PBDEs in vehicles (imported/in use/end of life) = Vehicles (1975 - 2004) x 80 g decaBDE* + Vehicles (2005- 2017) x 20 g decaBDE

*For the US it is assumed that the content is 40 g decaBDE and 40 g c-PentaBDE were included in average vehicle before 2005

Collection of information and data for POP-PBDEs – Tier III EEE and transport sector

EEE

Monitoring imported EEE in particular the exempted EEE uses (heating equipment) and electronics with recorded uses of decaBDE (LCD TVs)

Monitoring of major WEEE plastic fractions

Monitoring of bromine separation of WEEE plastic for recycling

Monitoring of recycled WEEE plastic used for new products

Transport sector

Monitoring spare parts on the market

Monitoring of PBDEs in individual vehicles

Monitoring of plastic and other polymers and textile covers from trains, aeroplanes and ships

Monitoring of ASR fractions and of bromine separation of WEEE plastic for recycling

Monitoring of plastic fraction produced from recycled plastic from ASR or other plastic from transport (train, aeroplane, ship) for the use in new products

Collection of information and data for production, import and export of DecaBDEs – Tier I

Industrial associations, authorities, and national registers

- Information on (potential) manufacturers in the country
- Data on production volumes of PBDEs from national office/institute of statistics
- Information on export of c-decaBDE/PBDEs as substance
- Information on import quantities of decaBDE and companies importing and finally receiving the decaBDE

Statistics

- Production volume of c-decaBDE (including CAS number) and decaBDE content
- Import quantity of c-decaBDE (including CAS number; HS codes used)
- Export quantity of c-decaBDE (including CAS number; HS codes used)
- Information from Prior Informed Consent (PIC) procedure

Collection of information and data for production, import and export of DecaBDEs – Tier II

Producers of c-decaBDE and related industrial association

- Total yearly production of c-decaBDE
- Detailed information on use of decaBDE in manufacturing
- Information on end-of-life management of wastes from decaBDE in production and fate

Importers and exporters of c-decaBDE

- Import quantity of c-decaBDE
- Export quantity of decaBDE (including related countries and HS codes and PIC procedure)
- Detailed information on decaBDE imported/exported

Collection of information and data for production, import and export of DecaBDEs – Tier III

Monitoring the c-decaBDE product for PBDE composition to determine the content of decaBDE and lower brominated PBDEs

Monitoring of unintentional Polybrominated dibenzofurans (PBDFs) in c-decaBDE to clarify their relevance in the product and possibly give an indication on the need to modify and optimize production conditions

Collection of information and data for DecaBDE use in manufacturing of products – Tier I

Industrial associations, authorities, and national registers

- Information on potential manufacturers in the country
- Knowledge on the former and current use of c-decaBDE in industrial sectors
- Data on production volumes of industrial sectors potentially using decaBDE in production from national office, institute of statistics or associations

National manufacturers

- Information on productions of plastic housings and parts used for heating home appliances (exempted use) and other electronics (non-exempted use)
- Information on productions of exempted parts for the use in vehicles and other parts in vehicles which requiring anti-flammable characteristics and possibly use decaBDE
- Information on DecaBDE used in the productions of textiles requiring anti-flammable characteristics
- Information on DecaBDE used in the production of polyurethane foam for insulation (exempted use) and other polyurethane foams requiring anti-flammable characteristics (not exempted)
- Information on recycling potentially decaBDE (and other POP-PBDE) containing materials (e.g. e-waste plastic, PUR foam and other polymers from construction; polymers from vehicles,)

Statistics

- Import of c-decaBDE or sourcing in the country by the individual production sectors
- Quantity of plastic housings and parts used for heating home appliances (exempted use) and other plastic from electronics requiring (non-exempted use)
- Quantity of exempted parts for the use in vehicles and other parts in vehicles which are flame retarded and might use decaBDE (not exempted);
- Quantity of polyurethane foam used in insulation (exempted use) and other polyurethane foams requiring anti-flammable characteristics (not exempted)
- Quantity of textiles requiring anti-flammable characteristics, including clothing and toys requiring anti-flammable characteristics (not exempted)

Collection of information and data for DecaBDE use in manufacturing of products – Tier II

Industrial associations and user/companies

- Information on total yearly consumption of c-decaBDE in the individual industrial processes
- Information on total quantity of products manufactured containing decaBDE
- Detailed information on c-decaBDE used (decaBDE content, other PBDEs; other impurities)
- Information on final decaBDE content in the products in the individual use sectors
- Information on quantity of products produced from recycled plastics or PUR foam containing decaBDE (not exempted) or other POPs-PBDEs (exempted) and decaBDE content in the recycled material and in the products
- End-of-life management and fate of decaBDE in the individual use sectors
- Alternatives to decaBDE used in the manufacturing of the different products

Collection of information and data for DecaBDE use in manufacturing of products – Tier III

Monitoring of products containing decaBDE in the manufacturing sectors

Pre-screening of bromine in the products (see the guidance on screening of POPs in products; Secretariat of the Stockholm Convention 2017).

Monitoring of DecaBDE content in recycled plastic and other recycled materials used in the manufacturing of products

Monitoring of c-decaBDE mixtures used in production for PBDEs composition and for decaBDE content

Detailed assessment of alternatives to c-decaBDE including an assessment or ranking of the alternatives in respect to POPs criteria

Collection of information and data for DecaBDE use in textiles – Tier I

Industrial associations and user/companies

- Information on past and current use of textiles with anti-flammable characteristics and products containing these textiles

National statistics (e.g. national bureau of statistics, central bank)

- Information on the individual textile products potentially containing decaBDE
- Information on importers, retailers trading and selling these products
- Information on manufacturing of textiles products

Use of decaBDE treated textiles in major areas and uses (RPA 2010)

Areas of use	**Specific applications of textiles**
Transport	• Passenger cars; busses; • Trains; Airplanes; Ships
Public occupancy spaces	• Curtains and other draperies of theatres, hotels, conference rooms, student dormitories • Mattress ticking in hotels
High risk occupancy spaces	• Furniture and mattresses of nursing homes, hospitals, prisons
Military	• Tarps; tents • Protective clothing

Collection of information and data for DecaBDE use in textiles – Tier II

Customs statistics

- Import of textiles requiring anti-flammable characteristics
- Import of products containing flame retarded textiles
- Import of second hand textiles for reuse and recycling

Retailers and industry and associations

- Information on past and current sales and use of textiles containing decaBDE or other POPs (HBCD, SCCPs)
- Information on use/sale of flame retarded textiles in productions (furniture, transport; mattresses)
- Information on use/sale of flame retarded textiles and mattresses in public spaces (hospitals, prisons, hotels; fire fighters) and military (tents, tarps, protective clothing)
- Information on recycling of textiles and management of flame retarded textiles part

Textile sector

- Information on insulation materials used and related flame retardant standards and flame retardants used
- Information on recycling of textiles and management of flame retarded textiles

Waste and recycling sector

- Information on amount of textile waste
- Information on management of flame retarded textiles
- Data on PBDEs, HBCD, and SCCPs in textile recycling
- Information on techniques on removal of decaBDE/HBCD and other POPs containing textiles in recycling

DecaBDE in textiles in use/stock – Tier II calculation equation

If the product volume of c-decaBDE containing textiles could be compiled or can be estimated, then the following equation can be used to estimate the total quantity of decaBDE present in products and stocks:

TdecaBDE = PQtot x CdecaBDE

PQtot= Total quantity of textiles containing decaBDE (individually calculated for import, sold or in use/stock)

TdecaBDE= Total quantity of decaBDE in polymers

CdecaBDE= % of decaBDE in the product

DecaBDE concentration in some treated textile applications

c-DecaBDE application in Textiles	DecaBDE content	References
Various textiles	1.55-6.42 %	Earls (2007)
Treated tent textiles	3.8 %	Keller et al. 2014
Velour pile fabrics: 70 – 80 g/m2	21 – 32 g/m2	ECB (2002)
Cotton: 30 – 40 g/m2	9 – 16 g/m2	ECB (2002)
Flat wovens (other types): 30 – 80 g/m2 (40 – 50 g/m2)	9 – 32 g/m2	ECB (2002)
Camping tent	2 g/tent	RPA 2014

Collection of information and data for DecaBDE use in textiles – Tier III

Monitoring of current products on the market and products in use and in end-of-life

Monitoring recycling of textiles and the products produced from recycled textiles

Monitoring of containing PBDEs or HBCD including screening and analysis of textiles (if textile samples are taken from products like cars or trains or airplanes then the information on the type of vehicle and year of production should be noted to finally get an overview on the use of decaBDE in textiles in these sectors)

Collection of information and data for DecaBDE use in construction – Tier I

Information and data about existing past and current use of PUR foam insulation and other polymers in construction

Information on the individual products potentially containing decaBDE

PUR foam on the market

Other polymers used in construction

Information on importers, retailers trading and selling these products

Information on major construction companies which might use insulation foams and other polymers in construction possibly containing decaBDE

Collection of information and data for DecaBDE use in construction – Tier II

Customs statistics

- Import of PUR foam used for construction purposes
- Import of waste PUR foam for recycling
- Import of other polymers used in construction

Retailers and industry and retailers

- Information on sales of PUR foam and other polymers for construction containing decaBDE or other POPs (HBCD, SCCPs)
- Information on presence of decaBDE in the past in PUR foam and XPS foam and other polymers used in construction
- Information on current and former sales of fire-retardant paints containing decaBDE (or SCCP)
- Information on sales of fire-retardant paints containing decaBDE (or SCCP)

Construction sector

- Information on insulation materials used and related flame retardant standards and flame retardants used

Construction and demolition waste sector

- Information on amount of PUR foam and other foams in C&D waste
- Data on PBDEs, HBCD, PCBs and SCCPs in C&D waste fractions
- Information on management of PUR foam, XPS and other foams in C&D waste
- Information on management of other polymers

DecaBDE in PUR foam or other polymers in construction – Tier II calculation equation

If the total product volume of c-decaBDE containing PUR foam or other polymers in construction are known, then the following equation can be used to estimate the total quantity of decaBDE present in these products and stocks:

TdecaBDE = PQtot x CdecaBDE

PQtot= Total quantity of PUR foam or other polymers containing decaBDE (individually calculated for import, sold or in use/stock)

TdecBDE= Total quantity of decaBDE in polymers

CdecaBDE= % of decaBDE in the product

DecaBDE concentration in polymers/plastic in construction

Uses	Content (% wt)	References
PUR foam in insulation*	4 – 13%	Leisewitz & Schwarz 2000
PUR foam fillers*	22%	Leisewitz & Schwarz 2000
Extruded polystyrene (XPS)	2%	Morf et al. 2003
PE insulating foam	20%	Morf et al. 2003
PE plastic sheeting PP plastic sheeting	10%	Morf et al. 2003
PVC plastic sheeting	5%	Morf et al. 2003
Roller blind and curtain*	4%	Kajiwara et al. 2013
Adhesive layer of reflective tapes	1 – 5%	RPA 2014
Intumescent paint*	2.5 – 10%	RPA 2010

*Also c-pentaBDE has been used in PUR foams, intumescent paint and roller blinds/curtains

Collection of information and data for DecaBDE use in construction – Tier III

Monitoring on current products on the market and products in use which can be sampled in the demolition and renovation of houses

Monitoring of foams and other polymers from construction used in recycling and the products produced from recycled materials

Monitoring of polymer products containing PBDEs or HBCD including screening and analysis (if samples are taken from renovation and from demolition then the information on the year of installation should be noted to finally get an overview until which period decaBDE has been used e.g. in XPS and when it was substituted by HBCD and alternatives to HBCD)

Potential POP-PBDEs contaminated sites

Sector	Activities	Facility locations
POP-PBDEs production	Production	Organobromine industry
	Destruction of production waste	Sites where production waste has been destroyed
	Deposition of production wastes	Landfills related to waste from production
	Former water discharge	River sediment and banks related to releases from production site
Application of POP-PBDEs	Production sites of POP-PBDE-containing polymers	Production site and deposited wastes
	Textile industry and other industries formerly using POP-PBDEs	Production site and landfill with deposited wastes, river sediment and banks related to releases
	Oil drilling	Contaminated soil and groundwater, off-shore contamination
End-of-life treatment	Recycling area of EEE	Recycling areas and landfills with deposited wastes and ashes
	Metal industries treating POP-PBDE- containing materials	Production site and deposited wastes/ashes
	Deposition of POP-PBDE-containing waste	Landfill and surrounding from leachate from POP-PBDE- containing wastes
	Incineration of waste	Deposits of ash from incineration
	Discharge of POP-PBDEs via wastewater	Sewage sludge
	Application sites of sewage sludge containing POP-PBDEs	Agriculture land

HBCD Data Collection

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Hexabromocyclododecane (HBCD)

- Listed under Annex A with specific exemption for production and use in expanded polystyrene and extruded polystyrene in buildings

Uses (former/current)

Major HBCD use:

- **expanded and extruded polystyrene (EPS/XPS) polymers** where the largest amount were/are used in construction **(>90% of total HBCD)**

Minor HBCD use:

- EPS packaging
- specific textile coating applications such as performance textiles (e.g. upholstery transport/furniture, curtains)
- specific clothing (e.g. fire fighters; military; children sleepwear)
- polymers in electronics (in particular in High Impact Polystyrene (HIPS))

Objectives of the inventory

- Review and summarize the production, use, import and export for HBCD
- Gather information on stockpiles and wastes containing, or thought to contain HBCD
- Assess the legal and institutional framework for control of the production, use, import, export and environmentally sound disposal of the HBCD
- Identify gaps in information required to complete the assessment
- Determine need of exemptions and register for the exemptions still allowed
- Identify whether the current situation meets the requirements of the Stockholm Convention and detail areas where it does not
- Identify the potential HBCD contaminated sites

Outputs and outcomes of the inventory

- Report on production, import, export, use, stockpiles, waste disposal and potential contaminated sites for HBCD
- Legal, institutional, regulatory and enforcement systems for HBCD
- Data gaps and deficiencies in the knowledge on HBCD
- Elements to develop an action plan to address HBCD in the context of the NIP

Quantitative data to be generated for HBCD

Life-cycle step	NIP Quantitative data to be generated	Unit measure	Remarks
Production (historical/current)	HBCD produced	Tonnes	Data requested by Art. 15 report
Import/export	HBCD imported/exported (as powder or pellets, as masterbatches, as HBCD containing EPS beads and high impact polystyrene (HIPS) pellets)	Tonnes	Data requested by Art. 15 report
	HBCD in articles/products imported/exported (especially EPS and XPS in construction sector and flame retarded textile applications)	Tonnes	
	HBCD containing waste imported/exported for environmental sound disposal	Tonnes	
Use	HBCD used to manufacture article/products (historical/current, especially EPS and XPS in construction sector and flame retarded textile applications)	Tonnes	
	HBCD in article/products in use (especially EPS and XPS in construction sector and flame retarded textile applications)	Tonnes	

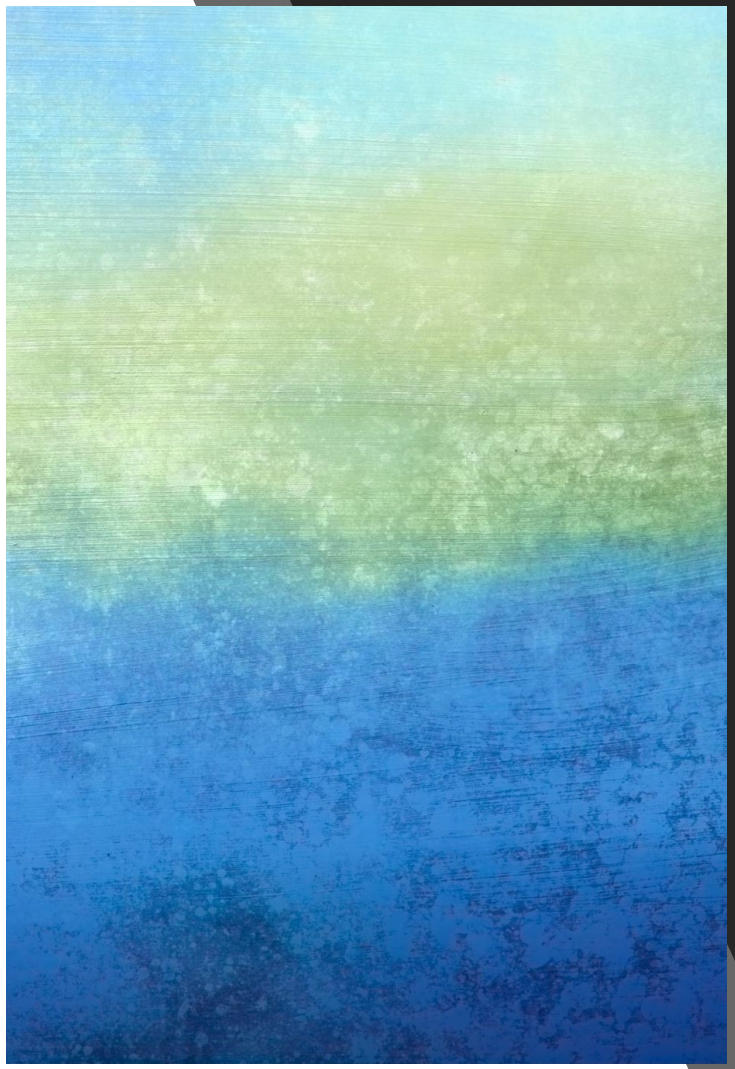
Quantitative data to be generated for HBCD

Life-cycle step	NIP Quantitative data to be generated	Unit measure	Remarks
Recycling	EPS/XPS materials containing HBCD recycled	Tonnes	
	Articles/products made from recycled HBCD containing materials	Tonnes	
	Content of HBCD in articles/products made from recycled materials	Mg/Kg	
Waste stockpiles ((a) HBCD as chemical; (b) HBCD containing mixtures and articles; (c) HBCD-containing waste from demolition; d) HBCD-containing other wastes; (e) waste generated during recycling	HBCD containing waste stockpiles	Tonnes	Data requested by Art. 15 report
	Related HBCD content	Percentage (%)	
Contaminated sites	Potentially contaminated/contaminated sites	Number	

Potential sources of information

Sectors	Stakeholders
For all uses	• Ministry of Environment, and/or Ministry responsible for waste management • Ministry of Industry, Ministry of Labour • NIP coordinator and steering committee • Basel Convention focal point (and stakeholders in Basel) • Customs authorities • Authorities in charge with fire safety requirements of e.g. buildings, vehicles, and textiles • Industry producing HBCD or importing/exporting HBCD • NGOs working on POPs
Production of HBCD	• Chemicals industry (in the few countries where HBCD production takes place)
Expanded Polystyrene (EPS) **Extruded Polystyrene (XPS) in construction and buildings and in packaging**	• Authorities in charge of construction requirements, such as building code, as well as packaging requirements (e.g. food packaging) • Industry producing EPS raw material (downstream users of HBCD) • Industry manufacturing flame retardant EPS and XPS articles (e.g. EPS and XPS insulation, ornaments, logos, packaging materials) • Construction industry (in particular related to use of insulation) • Packaging industry • Importers and exporters of EPS and XPS articles (including insulation, packaging materials) • Retailers of insulation boards and other construction materials made of EPS/XPS (ornaments etc.) • Importers and exporters of HBCD waste • Potential recyclers of HBCD containing articles/products • Other relevant stakeholders in the country (e.g. institutes educating construction professionals)
Polymer dispersion for textiles in treated applications	• Importers and exporters of flame-retardant textiles/associations • Retailers of flame-retardant textiles • Users of flame-retardant textiles: Construction industry (in particular related to upholstery), transportation industry • Other relevant stakeholders in the country (e.g. research groups working on textile material flows)
Other uses (HIPS, latex binders, adhesives and paints)	• Importers and exporters of electric and electronic appliances, adhesives and paints • Manufacturers of electric and electronic appliances, adhesives and paints • Retailers of electric and electronic appliances, adhesives and paints • Other relevant stakeholder in the country
Companies recycling HBCD containing materials	• Recyclers of construction materials and furniture • Recyclers of packaging EPS and XPS • Recyclers of WEEE
End-of-life treatment	• Waste management companies • Companies operating waste incinerators or co-processing waste for energy production • Landfill operators

Source: UNEP. 2019. Guidance on preparing inventories of hexabromobyclododecane (HBCD). UNEP/POPS/COP.7/16/HBCD (revised 2019)



Guidance documents

Guidance on preparing inventories of hexabromobyclododecane (HBCD). UNEP/POPS/COP.7/16/HBCD (revised 2019)

http://chm.pops.int/Implementation/NationalImplementationPlans/Guidance/tabid/7730/Default.aspx

Collection of information and data for HBCD - Tier I

- A list of authorities relevant to the production, import, and use of HBCD
- Past and present fire regulations related to buildings, insulation materials, and textiles
- A list of producers, exporters, and importers of HBCD
- Initial information on production and import of HBCD in the country
- A list of potential users of HBCD
- Initial information on the uses of HBCD in the country. Production volumes, import and trade of HBCD including products and articles containing HBCD
- List of products/articles on the consumer market that may contain HBCD
- Estimates of service life of the products/articles containing HBCD
- Initial information on waste management of articles that may contain HBCD
- Compilation of information as basis for Tier II assessment and initial feedback from stakeholders

Collection of information and data for HBCD Tier II

- Quantity of HBCD produced and used in the past
- Quantity of HBCD produced and used currently in manufactured products and articles, including production of EPS and XPS for use in buildings (exempted use) and possibly in other uses (e.g. packaging, textile, HIPS for electronics)
- Quantities of HBCD present in articles and products such as in EPS and XPS in use in building and construction sector and possibly in packaging and other uses (e.g. furniture, ornaments, logos)
- Quantities of HBCD in use in flame-retardant textiles (e.g. upholstery in buildings and vehicles)
- Quantities of HBCD in use in other applications (minor uses such as HIPS and adhesives), where relevant
- Quantities of HBCD in stockpiles and wastes
- Current and former production sites of HBCD
- Manufacturing sites of HBCD containing products and articles
- Waste collection centres and recyclers
- Waste management facilities
- End-of-life vehicles treatment facilities

Collection of information and data for HBCD - Tier III

- Monitoring materials containing HBCD
- Monitoring of HBCD in EPS and XPS
- Monitoring of HBCD in EPS and XPS waste
- Monitoring of HBCD in materials resulted from recycling

Typical concentrations of HBCD in different materials

Flame-retardant materials	**HBCD content (in mg/kg)**
Expanded polystyrene (EPS)	5,000-10,000 [1]
Extruded polystyrene (XPS)	8,000-25,000 [2]
Textile back-coatings Textiles	60,000-150,000 [9] 22,000-43,000 [10]
High-impact polystyrene (HIPS)	10,000-70,000 [11]

[1] Submissions by Canada and PlasticsEurope/Exiba to the Stockholm Convention, 2011 (UNEP/POPS/POPRC.7/19/Add.1) (UNEP, 2011).
[2] BFRIP 2005, XPSA and CPIA, PlasticsEurope/Exiba submissions to the Stockholm Convention, 2011 (UNEP/POPS/POPRC.7/19/Add.1) (UNEP, 2011).
[3] European Commission, 2008; Environment Canada and Health Canada, 2011 (UNEP/POPS/POPRC.7/19/Add.1) (UNEP, 2011)
[4] Kajiwara et al., 2009.
[5] ECHA, 2009 (UNEP/POPS/POPRC.7/19/Add.1) (UNEP, 2011).

Potential HBCD contaminated sites

Life cycle stage; Sector	Activities	Locations
HBCD production	(Former) Production	Production site
	(Former) Destruction of production waste	Sites where production waste has been destroyed
	Disposal of waste from production	Landfills related to wastes from production
	Former water discharge	River sediment and banks related to releases from production site
Sites where HBCD were used in EPS and XPS production and in textile and related industries	EPS/XPS industry currently or formerly using HBCD	Site of production Landfill site of related wastes Impacted surface waters (sediment and flood plains)
	Textile industry and other industries (formerly) using HBCD Factories micronising HBCD	Site of production; Landfill site of related wastes; Impacted surface waters (sediment and flood plains)
Use of articles and products containing HBCD	Sites where textiles containing HBCD is used	Soil impacted from buildings/city [1]
	Accidental fire in building	Soil/environment around fire accidents with HBCD XPS/EPS
End-of-life treatment	Recycling area of HBCD containing materials	Recycling areas and landfills with deposited wastes
	Deposition of HBCD-containing waste	Landfill and surrounding from leachate from HBCD- wastes
	Open burning or non-BAT incineration of HBCD-containing waste [20]	Related sites and sites were residues/ashes are disposed
	Application sites of HBCD impacted sludge	Agriculture land

[1] The comparison of HBCD in soils in UK cities compared to rural environment revealed higher levels in cities with elevated concentration in some city soils (Harrad et al. 2010a). For one house a transec study found decreasing HBCD levels in soils with increasing distance from the house which were below 1 mg/kg (0.29 mg/kg at 3 m; 0.12 mg/kg at 5 m, 0.035 mg/kg at 7 m and 0.015 mg/kg at 12 m distance, Desborough 2011).

[2] The combustion of HBCD-containing waste in state of art incinerators does not lead to relevant releases of HBCD or PBDD/F (Mark et al. 2015; Weber et al. 2003).

PFOS and related compounds Data Collection

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Perfluorooctane sulfonic acid (PFOS) and related compounds

Listed in Annex B with:

Specific exemptions for production and use in:

Metal plating (hard-metal plating) only in closed-loop systems

Fire-fighting foam for liquid fuel vapour suppression and liquid fuel fires (Class B fires) in installed systems, including both mobile and fixed systems

Acceptable purposes for production and use against:

Insect baits with sulfluramid (CAS No. 4151-50-2) as an active ingredient for control of leaf-cutting ants from Atta spp. and Acromyrmex spp. for agricultural use only

Use of PFOS and its related substances

Main category	Setting	Applications
Surface treatments	Industrial General public or professional applicators aftermarket treatment	Textile mills, leather tanneries, finishers, fibre producers, carpet manufacturers Apparel and leather, upholstery, carpet, automobile interiors
Paper protection	Paper mills	Food contact applications (plates, food containers, bags, and wraps), non-food contact applications (folding cartons, containers, carbonless forms, masking papers)
Performance chemicals	Industrial, commercial, and consumer applications	Fire fighting foams Mining and oil well surfactants, surfactant/wetting agent and mist suppressants for metal plating, electronic etching baths, photolithography, electronic chemicals, hydraulic fluid additives, alkaline cleaners, floor polishes, photographic film, denture cleaners, shampoos, chemical intermediates, coating additives, carpet spot cleaners, insecticide in bait stations

Objectives of the inventory

- Review and summarize the production, use, import and export for perfluorooctane sulfonic acid (PFOS) and related compounds
- Gather information on stockpiles and wastes containing, or thought to contain perfluorooctane sulfonic acid (PFOS) and related compounds
- Assess the legal and institutional framework for control of the production, use, import, export and environmentally sound disposal of the perfluorooctane sulfonic acid (PFOS) and related compounds
- Identify gaps in information required to complete the assessment
- Determine need of exemptions and register for the exemptions still allowed
- Identify whether the current situation meets the requirements of the Stockholm Convention and detail areas where it does not
- Identify the potential perfluorooctane sulfonic acid (PFOS) and related compounds contaminated sites

Outputs and outcomes of the inventory

- Report on production, import, export, use, stockpiles, waste disposal and potential contaminated sites for perfluorooctane sulfonic acid (PFOS) and related compounds
- Legal, institutional, regulatory and enforcement systems for perfluorooctane sulfonic acid (PFOS) and related compounds
- Data gaps and deficiencies in the knowledge on perfluorooctane sulfonic acid (PFOS) and related compounds
- Elements to develop an action plan to address perfluorooctane sulfonic acid (PFOS) and related compounds in the context of the NIP

Quantitative data to be generated for perfluorooctane sulfonic acid (PFOS) and related compounds

Life-cycle step	NIP Quantitative data to be generated	Unit measure	Remarks
Production (historical/current)	PFOS, its salts and PFOS-F produced as allowed by the specific exemptions/acceptable purposes	Tonnes	Data requested by Art. 15 report
Import/export (historical/current)	PFOS, its salts and PFOS-F imported/exported as allowed by the specific exemptions/acceptable purposes	Tonnes	Data requested by Art. 15 report
	PFOS, its salts and PFOS-F in articles/products imported/exported (especially firefighting foams and hydraulic fluids)	Tonnes	
	PFOS, its salts and PFOS-F containing waste imported/exported for environmental sound disposal	Tonnes	
Use (historical/current)	PFOS, its salts and PFOS-F used to manufacture article/products as allowed by the specific exemptions/acceptable purposes	Tonnes	Data requested by Art. 15 report
	PFOS, its salts and PFOS-F in article/products in use as allowed by the specific exemptions/acceptable purposes	Tonnes	
Stockpiles	PFOS, its salts and PFOS-F in article/products stockpiles (especially firefighting foams and hydraulic fluids wastes)	Tonnes	
Waste stockpiles	PFOS, its salts and PFOS-F containing wastes stockpiles (especially firefighting foams and hydraulic fluids wastes)	Tonnes	Data requested by Art. 15 report
Contaminated sites	Potentially contaminated/contaminated sites	Number	

Potential sources of information

Production and use	Stakeholders
Production of PFOS and its related substances	Manufacturers of PFOS-related substances, who use PFOSF or its secondary derivatives as the intermediates to produce PFOS-related substances and those who have the feedstock supply relationship with the known manufacturers of PFOS Associations in chemical and polymers industries, especially associations of organic fluorine compound industries if they are exist in a country Ministries responsible for chemicals management or chemical industry, who normally operate a database or inventory of existing chemicals manufactured, imported and distributed in a country Manufacturers and suppliers of specific chemical formulations containing PFOS-related substances, such products may cover major PFOS uses including surfactant, surface treatments (for textile, paper, leather et.), fire fighting foam, mist suppressant in metal plating, aviation hydraulic fluids, insecticides, photographic industry, electrical and electronic parts manufacture etc. Research and development (R&D) institutions, including R&D institutes on specialized industrial technologies, academies and universities, who conducting scientific research and technical development on organic chemistry, chemical industry or chemical processes.
Fire fighting foams	Manufacturers of fire-fighting foams and their associations Local and regional suppliers of fire-fighting foams Professional users: • off shore industry • offshore installations • oil refineries • on shore gas terminals • onshore oil and gas manufacturers and their installations • Petrochemical, chemical plants and other relevant industry • airports • Local armed forces • shipping companies and ferry companies • fire and rescue brigades • fire fighting training sites • car parks, underground parking facilities and tunnels • tank farms and fuel storage facilities

Source: UNEP. 2017. Full guidance for preparing inventories of perfluorooctane sulfonic acid (PFOS) and related chemicals listed under the Stockholm Convention. UNEP/POPS/COP.7/INF/26 (revised draft 2017)

Potential sources of information

Aviation hydraulic fluids	Manufacturers of aviation hydraulic fluids and their associations Recyclers of aviation hydraulic fluids and their associations Local and regional suppliers of fire fighting foams Professional users: a. Airports b. Armed forces
Medical devices	Larger manufacturers of medical devices Larger retailers of medical devices
Electric and electronic parts in colour printers and colour copy machines	Larger manufacturers of Electric and electronic parts in colour printers and colour copy machines Larger retailers of Electric and electronic parts in colour printers and colour copy machines
Textiles and upholstery	Larger manufacturers and suppliers of textile formulas and their associations Larger manufacturers in the textile impregnation industry and their associations Larger manufacturers of textiles, apparels, home furnishing and upholstery, and their associations Larger retailers of textiles, apparels, home furnishing and upholstery

Source: UNEP. 2017. Full guidance for preparing inventories of perfluorooctane sulfonic acid (PFOS) and related chemicals listed under the Stockholm Convention. UNEP/POPS/COP.7/INF/26 (revised draft 2017)

Potential sources of information

Synthetic carpets	Larger manufacturers and suppliers of chemical formulas for carpet impregnation and their associations Larger manufacturers of synthetic carpets and their associations Larger retailers of synthetic carpets
Paper and packaging	Larger manufacturers of chemical formulas used in paper impregnation and their associations Larger manufacturers for manufacturers of paper, paperboards and packaging and their associations Larger manufacturers of food and their associations Larger fast food chains
Insecticide: Insect bait for leaf-cutting ants Insecticide for fire ants and termites	Producers, chambers, importers, associations Suppliers of insecticides and their associations: 1. Agrochemicals importers 2. Dealers, wholesalers and Retailers Professional users: - Farmers and their associations - Larger plantations
Leather and apparel	Larger manufacturers and suppliers of leather formulas and their associations Larger manufacturers in the leather impregnation industry and their associations Larger manufacturers of leather articles and apparel, home furnishing and upholstery and their associations Larger retailers of leather articles, apparel, home furnishing and upholstery

Source: UNEP. 2017. Full guidance for preparing inventories of perfluorooctane sulfonic acid (PFOS) and related chemicals listed under the Stockholm Convention. UNEP/POPS/COP.7/INF/26 (revised draft 2017)

Potential sources of information

Coatings and coating additives - wax and polishes - Paint	Manufacturers and suppliers of chemical formulas, and their associations
Industrial and household treatment products - Water proof spray - Denture cleanser - Shampoos - Cleaning agents, - Cosmetics and hand cream - Toner and printing ink - Sealants and adhesive products	Manufacturers and suppliers of chemical formulas, and their associations Larger manufacturers and suppliers of cleaning products, surface treatments, paint, printing ink, adhesives and sealants, and their associations Larger retailers of cleaning products, surface treatments, paint, printing ink, adhesives and sealants.
Rubber and plastic i. Release agent in the manufacturing process	Manufacturers, associations and professionals on fluorocarbon surfactants and plastic products manufacture Manufacturers of PFOS-related substances and those who have the feedstock supply relationship with the known manufacturers of PFOS Associations in chemical and polymers industries, especially associations of organic fluorine compound industries if they exist in the country Manufacturers and suppliers of specific chemical formulations containing PFOS-related substances, such products may cover major PFOS uses in the manufacture of plastic products Ministries of chemicals management or chemical industry, who in some countries are operating a database or inventory of existing chemicals manufactured, imported and distributed,

Source: UNEP. 2017. Full guidance for preparing inventories of perfluorooctane sulfonic acid (PFOS) and related chemicals listed under the Stockholm Convention. UNEP/POPS/COP.7/INF/26 (revised draft 2017)

Potential sources of information

Recycling of synthetic carpets	Manufacturers of synthetic carpets Distributors of synthetic carpets Retailers of carpets Construction and demolition companies Waste transfer stations Recyclers
Photographic industry • Photoimaging	The photographic industry and their associations Manufacturers of PFOS-related substances and those who have the feedstock supply relationship with the known manufacturers of PFOS Associations in chemical and polymers industries, especially associations of organic fluorine compound industries if they exist in the country, Manufacturers and suppliers of specific chemical formulations containing PFOS-related substances, such products may cover major PFOS uses in the photographic industry Ministries of chemicals management or chemical industry, who in some countries are operating a database or inventory of existing chemicals manufactured, imported and distributed,

Source: UNEP. 2017. Full guidance for preparing inventories of perfluorooctane sulfonic acid (PFOS) and related chemicals listed under the Stockholm Convention. UNEP/POPS/COP.7/INF/26 (revised draft 2017)

Potential sources of information

Semi-conductor industry • Photoresist and anti-reflective coating • Etching agent for compound semi-conductors and ceramic filters • Photomask • Edge bead removers • De-gluing agents • Developing agent	The semiconductor industry and their associations Manufacturers of PFOS-related substances and those who have the feedstock supply relationship with the known manufacturers of PFOS Associations in chemical and polymers industries, especially associations of organic fluorine compound industries if they exist in the country Manufacturers and suppliers of specific chemical formulations containing PFOS-related substances, such products may cover major PFOS uses in the semi-conductor industry. Ministries of chemicals management or chemical industry, who in some countries are operating a database or inventory of existing chemicals manufactured, imported and distributed
Electronic industry • Photoresist and anti-reflective coating • Etching agent for compound semi-conductors and ceramic filters • Metal plating in closed loop-system • Photomask • Hard metal plating • Decorative metal plating • Desmear agent • Dispersion • Surface treatment • Solder • Paint • Adhesive	The electronic industry and their associations Manufacturers of PFOS-related substances and those who have the feedstock supply relationship with the known manufacturers of PFOS Associations in chemical and polymers industries, especially associations of organic fluorine compound industries if they exist in the country, Manufacturers and suppliers of specific chemical formulations containing PFOS-related substances, such products may cover major PFOS uses in the electrical and electronic parts manufacture Ministries of chemicals management or chemical industry, who in some countries are operating a database or inventory of existing chemicals manufactured, imported and distributed

Source: UNEP. 2017. Full guidance for preparing inventories of perfluorooctane sulfonic acid (PFOS) and related chemicals listed under the Stockholm Convention. UNEP/POPS/COP.7/INF/26 (revised draft 2017)

Potential sources of information

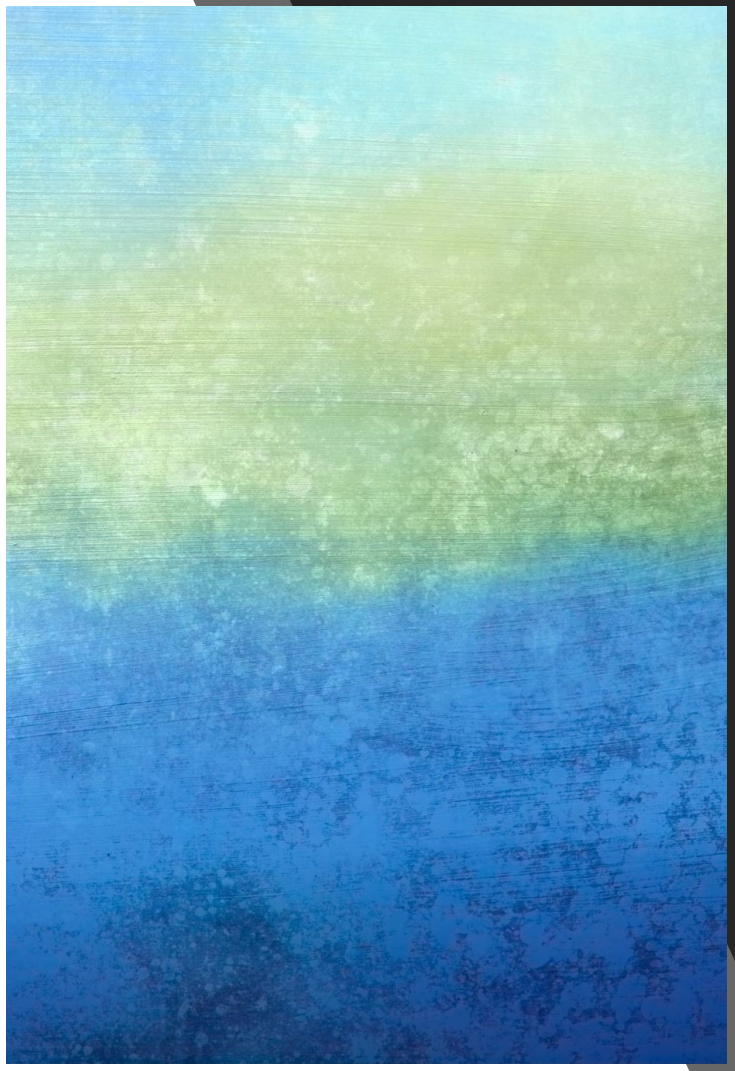
Source: UNEP. 2017. Full guidance for preparing inventories of perfluorooctane sulfonic acid (PFOS) and related chemicals listed under the Stockholm Convention. UNEP/POPS/COP.7/INF/26 (revised draft 2017)

Metal plating industry • Metal plating in closed loop-system • Hard chromium plating • Decorative chromium plating	Metal plating companies and industry associations Manufacturers and suppliers of chemistry for plating applications which contain PFOS-related substances Research and Development (R&D) institutions, including specialized R&D institutes, academies and universities conducting scientific research and technical development on organic chemistry, chemical industry or specific chemical processes. Departments of occupational health and environmental protection (especially at local level), who can act as partners in the information collection of chromium plating plants Customs services Ministry of commerce and industry Consumer protection council
Chemically driven oil and gas production	National associations for the petroleum industry Oil and gas companies (Shell, Chevron, Mobil, NAOC, Addaz, Oando etc) Oil and gas service companies (Schlumberger, Baker Hughes etc.) Customs services Consumer protection councils Ministry of petroleum resources Ministries of Environment Department of Petroleum Resources National Environmental Standards and Regulations Enforcement Agency (NESREA) State Environmental Protection Agencies (SEPAs) Manufacturers Association Small and Medium Enterprises Development Agencies Petroleum Exchange Institute of Public Analysts Importers and suppliers of chemicals and reagents

Potential sources of information

Mining industry	Customs Services Mining and Blasting Industries Geological and Mining Society Ministries of Environment Ministries of Commerce and Industries Ministries of Mines and Steel Development Ministries of Science and Technology Research Institutes Raw Materials Research and Development Commissions Manufacturers Association Mining Institute Association of Miners Small and Medium Enterprises Development Agencies National Environmental Standards and Regulations Enforcement Agencies

Source: UNEP. 2017. Full guidance for preparing inventories of perfluorooctane sulfonic acid (PFOS) and related chemicals listed under the Stockholm Convention. UNEP/POPS/COP.7/INF/26 (revised draft 2017)



Guidance documents

Full guidance for preparing inventories of perfluorooctane sulfonic acid (PFOS) and related chemicals listed under the Stockholm Convention. UNEP/POPS/COP.7/INF/26 (revised draft 2017)

http://chm.pops.int/Implementation/NationalImplementationPlans/Guidance/tabid/7730/Default.aspx

Collection of information and data for PFOS and related compounds production and import/export (Tier I)

Customs service

- Information on import and export of PFOS or its related substances

Industrial associations, authorities, and national registers

- Information on potential manufacturers in the country
- Knowledge on the use of PFOS and its related substances in industrial sectors

National statistics

- Information on manufactured, imported and exported amounts of PFOS or its related substances in the different industrial sectors

Collection of information and data for PFOS and related compounds production and import/export (Tier II)

- Information on total yearly production of PFOS and its related substances
- Information on total yearly consumption of PFOS and its related substances in industrial processes
- Information on import/export of PFOS and its related substances

Collection of information and data for PFOS and related compounds production and import/export (Tier III)

- Monitoring of PFOS and its related substances in manufactured and imported articles and products

Collection of information and data for PFOS and related compounds in articles and products (Tier I and II)

Customs service

- Information on import and export of articles or products within the use categories of PFOS

National importers/exporters

- Information on import/export of synthetic carpets, clothes, furniture, shoes, cosmetics and household products etc.

Larger retailers and suppliers

- Information on use of perfluorinated substances in their articles or products stock-in-trade
- Information on articles or products having or providing the following properties: stain resistance, water repellence, and anti-grease

Stakeholders to be considered

- Manufacturers that use PFOSF or its secondary derivatives as the intermediates to produce PFOS or its related substances
- Chemical industries producing chemical mixtures containing PFOS and its related substances, such as aviation hydraulic fluids, insecticides, fire fighting foams, chemical formulas, impregnation formulas, textile formulas, compounders, etc.
- Metal plating industry (considered a major user)
- Impregnation and coating industry
- Manufacturers of articles containing PFOS and its related substances such as shoes, paper and carbon products, clothes, furniture, etc.
- Electronics industry
- Semiconductor industry
- Photographic industry
- Mining, gas and oil industries
- Manufacturers of plastic and rubber
- Recycling industry (synthetic carpets, aviation hydraulic fluids, paper and packaging)

Collection of information and data for PFOS and related compounds in articles and products (Tier III)

- Monitoring of PFOS and its related substances in used articles and products

Estimation of PFOS and related compounds quantity in articles and products on the national market

$$Ts = A \cdot W \cdot S$$

- **Ts= Total quantity of PFOS in articles or products sold on the market per year**
- **A= PFOS amount applied by weight of material, by fibre weight, or % PFOS in the material, or product**
- **W= Weight of material in one article, or the fibre weight, or weight of product**
- **S= Average number of articles or product sold on the market per year**

Estimation of PFOS and related compounds quantity in fire-fighting foams

$$T = L \cdot X$$

- T= Total quantity of PFOS in fire fighting foam consumed yearly
- L= Percentage of PFOS in the grade of fire fighting foam
- X= National consumption of fire fighting foam or in stockpile in tons per year

Concentrations of PFOS or related compounds applied to different consumer articles and products (1)

Category of article or preparation	Process *Steps, if applicable*	**Approx. PFOS content* (mg PFOS/kg** article or preparation)**
Photographic sector	• Surfactant; Electrostatic charge control agent; Friction control agent; Dirt repellent agent; Adhesion control agent	100
Semiconductor sector	• Etching agent; Photoresist substance; Photo-acid generator; Surfactant; Anti-reflective coating agent	200 - 1000
Electronics sector	• Etching agent; Surface treatment agent; Photoresist substance; Photo-acid generator; Surfactant; Anti-reflective coating agent	200 - 1000
Aviation hydraulic fluids		500-1000
Fire fighting foams		5000-60 000
Metal plating Decorative plating of metal, rubber and plastics		50 000 – 500 000
Certain medical devices		150 ng/CCD filter
Insecticides		100-1000
Coating and impregnation of paper and packaging, synthetic carpets, leather and apparel, textiles and upholstery		500-5000
Coating and coating additives		1000-10 000
Toner and printing inks		100

* *PFOS BAT/BEP Guidelines* (Secretariat of the Stockholm Convention, 2015)
**1mg/kg=1ppm=0,0001%

Concentrations of PFOS or related compounds applied to different consumer articles and products (2)

Consumer article	**Concentrations of PFOS in material***	**Sources**	**Guidance values in wt %**
Textiles and upholstery	2-3% of the fibre weight	RIKZ, 2002	3 %
Synthetic carpets	0.03% of the fibre weight	European Commission, 2011	0,03%
Leather	0.025-0.05% by weight of material	RIKZ, 2002; European Commission, 2011	0.05 %
Paper and paperboard	1%	Kara et al., 2010	1 %
Industrial and household cleaning products	0.005%-0.1% by weight of material	UNEP, 2010b	0.1 %
Surface coating, paint and varnishes	0.01% by weight of material	UNEP, 2010b	0.01 %
Medical devices	150 ng in one CCD-colour filter	UNEP, 2010b	150 ng in one CCD-colour filter
Toner and printing inks	0.01% by weight of material	UNEP, 2010b	0.01 %
Cleaning agents, waxes and polishes for cars and floors	0.005-0.01% by weight of material	UNEP, 2010b	0.01 %

Collection of information and data for PFOS and related compounds in wastes (Tier I and II)

Relevant stakeholders

- Information on existing waste fractions containing PFOS and its related substances, waste quantities and treatment
- Information on larger quantities of waste fractions containing PFOS and its related substances generated or traded inside the country

Custom

- Information on imports or exports of larger quantities of waste fractions possibly containing PFOS and its related substances

Stakeholders to be considered

- Incineration plants (operated by local authorities or private owners)
- Operators of landfills (local authorities, industry, private operators)
- Shredder plants (for cars etc.)
- Recyclers/Downcyclers of aviation hydraulic fluids, carpets, paper and packaging
- Waste importers and waste traders

Collection of information and data for PFOS and related compounds in wastes (Tier III)

- Monitoring of larger waste fractions within the use categories for PFOS and its related compounds

Potential PFOS and related compounds contaminated sites

Life cycle stages	Location/activity	Facility
PFOS production	Chemicals industry	Production site
		Sites where production waste has been destroyed
		Landfills related to the production
		River sediment and banks related to releases from the production site
Use in production of PFOS- containing articles and preparations	Chromium plating	Production site and deposited wastes
	Coated paper, textile, leather and carpet industry	Production site and deposited wastes
	Semiconductor industry	Production site and deposited wastes
	Electronics industry	Production site and deposited wastes
	Photo imaging industry	Production site and deposited wastes
PFOS preparations in operation	Oil, mining and gas industry	Contaminated soil and groundwater
	Insecticides	Contaminated soil and groundwater
		Areas of accidental leakage or spill from stockpiles
	Fire fighting foam	Fire drill areas
		Areas of accidental leakage or spill from stockpiles *
	Aviation hydraulic fluids	Areas of accidental leakage or spill from stockpiles
Waste management of PFOS-containing articles and preparations	Waste	Landfills and dump sites
	Waste	Incineration
	Waste	Municipal waste water treatment plants
	Waste	Dump sites

PCP, its salts and esters Data Collection

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Pentachlorophenol, its salts and esters

Listed in Annex A with specific exemption for production and use in utility poles and cross-arms

Pentachlorophenol, its salts and esters listed under Stockholm Convention

	CAS No:
Pentachlorophenol	87-86-5
Sodium pentachlorophenate	131-52-2
As monohydrate	27735-64-4
Pentachlorophenyl laurate	3772-94-9
Pentachloroanisole	1825-21-4

Uses and applications

Uses

- Herbicide
- Insecticide
- Fungicide
- Algaecide
- Disinfectant and as an ingredient in antifouling paint

Applications

- Agricultural seeds
- Leather
- Wood preservation
- Cooling tower water
- Rope and paper mill system

Objectives of the inventory

- Review and summarize the use, import and export for environmental sound disposal for PCP, its salts and esters
- Gather information on stockpiles and wastes containing, or thought to contain PCP, its salts and esters
- Assess the legal and institutional framework for control of the production, use, import, export and environmentally sound disposal of the PCP, its salts and esters
- Determine need of exemptions and register for the exemptions still allowed
- Identify gaps in information required to complete the assessment
- Identify whether the current situation meets the requirements of the Stockholm Convention and detail areas where it does not
- Identify the potential PCP, its salts and esters contaminated sites

Outputs and outcomes of the inventory

- Report on historical and current production, import, export, use, stockpiles, waste disposal and potential contaminated sites for PCP, its salts and esters
- Legal, institutional, regulatory and enforcement systems for PCP, its salts and esters
- Data gaps and deficiencies in the knowledge on PCP, its salts and esters
- Conclusion on exemptions needed and listing of these exemptions
- Elements to develop an action plan to address PCP, its salts and esters in the context of the NIP

Quantitative data to be generated for PCP, its salts and esters

Life-cycle step	NIP Quantitative data to be generated	Unit measure	Remarks
Production (historical/current)	PCP, its salts and esters produced	Tonnes	Data requested by Art. 15 report
Import/export (historical/current)	PCP, its salts and esters imported/exported	Tonnes	Data requested by Art. 15 report
	PCP, its salts and esters treated timber imported/exported (for utility poles and cross-arms)	Tonnes	
	PCP, its salts and esters containing waste imported/exported for environmental sound disposal	Tonnes	
Use (historical/current)	PCP, its salts and esters used, especially for timber treatment (for utility poles and cross-arms)	Tonnes	
	PCP, its salts and esters treated timber in use (for utility poles and cross-arms)	Tonnes	
Stockpiles	PCP, its salts and esters stockpiles stored	Tonnes	
Waste stockpiles	PCP containing waste stockpiles (especially from timber treatment (for utility poles and cross-arms))	Tonnes	Data requested by Art. 15 report
Contaminated sites	Potentially contaminated/contaminated sites	Number	

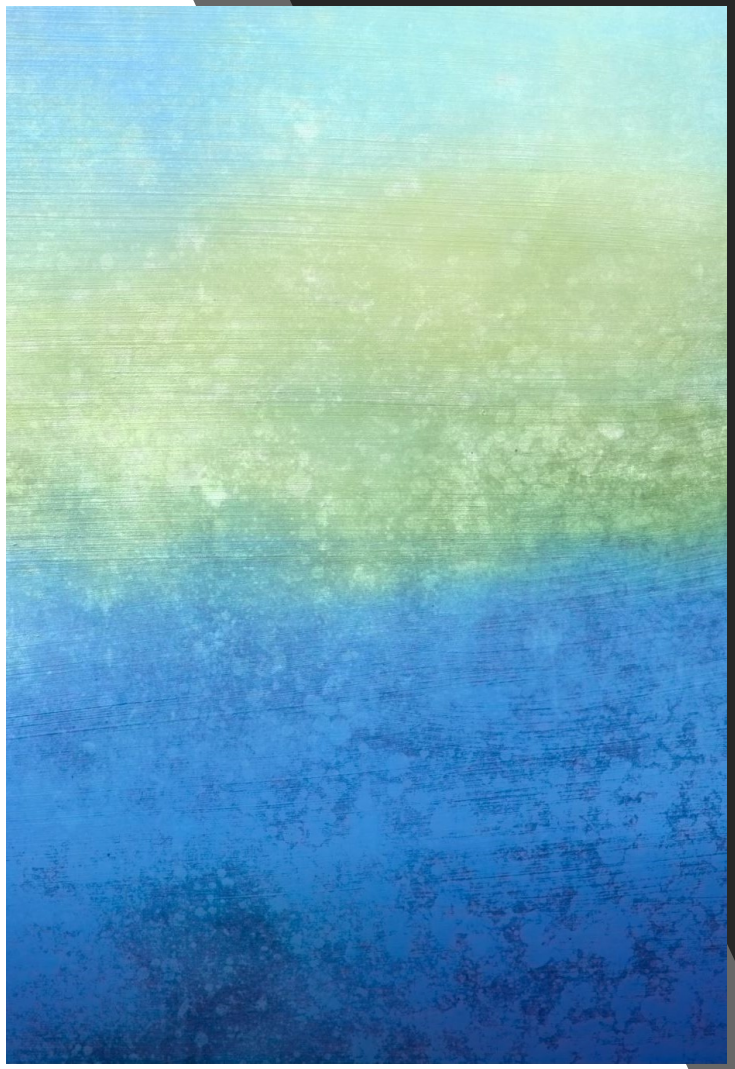
Potential sources of information

Production	Stakeholders
General stakeholders	Ministry of environment and ministry of industry; Ministry responsible for waste management; NIP coordinator and steering committee; Basel Convention focal point (and stakeholders in Basel); Rotterdam Convention focal point (and stakeholders in Rotterdam); Custom authorities; NGOs.
PCP production	Authorities granting production permits; Industry producing PCP; Waste management facility owners; Custom authorities.
Treatment of timber and non-timber products with PCP	Timber industry Authorities granting treatment permits; National infrastructure organizations such as utility companies; Waste management facility owners; Custom authorities.
Manufacturing of products/articles where PCP has been used	Textile industry; Laurate production industry; Na-PCP industry; Domestic property industry; Authorities granting treatment permits; Waste management facility owners; Custom authorities.
Use of PCP containing materials	Users/owners of treated timber or other products; Users of textiles contain laurate; Domestic users of Na-PCP; Ministry of Agriculture or Forestry and institutes and industries working with wood and treatment of wood; Ministry of defence; Ministry of business.
End-of-life treatment	Recycling companies (for textiles and treated wood waste); Housing demolition companies; Landfill owners.

Source: UNEP.2019. Guidance on preparing inventories of pentachlorophenol and its salts and ester. UNEP/POPS/COP.8/INF/20 (revised 2019)

[1] The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, hereby referred to as "The Basel Convention", is an international treaty signed in 1998 that was designed to reduce the movements of hazardous waste between nations, and specifically to prevent transfer of hazardous waste from developed to less developed countries. As part of the wider work on 'POPs', the Basel, Rotterdam and Stockholm Convention share the same executive body.

[2] The Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, hereby referred to as 'The Rotterdam Convention', is an international treaty signed in 1998 that was designed to promote shared responsibility and cooperative efforts among Parties in the international trade of certain hazardous chemicals in order to protect human health and the environment from potential harm and to contribute to their environmentally sound use, by facilitating information exchange about their characteristics, by providing for a national decision-making process on their import and export and by disseminating these decisions to Parties.



Guidance documents

UNEP.2019. Guidance on preparing inventories of pentachlorophenol and its salts and ester. UNEP/POPS/COP.8/INF/20 (revised 2019)

http://chm.pops.int/Implementation/NationalImplementationPlans/Guidance/tabid/7730/Default.aspx

Collection of information on the PCP production and uses

Individual operators

- Information on annual volume of manufacture or import of PCP
- Information on annual volumed PCP used for timber treatment activities
- Information on the working concentration of PCP in the timber produced (mg/ft^2)
- Information on PCP contaminated waste produced per annum and how the waste is managed
- Information on the use other pesticides for timber treatment as well as PCP
- Information on the use of PCP for other applications than timber treatment

Trade associations / regulators

- Data on annual production rates for timber treated with PCP (tonnes of timber)
- Data on annual quantities of imported timber treated with PCP (tonnes of timber)
- Data on the replacement rates for timber used in infrastructure networks
- Average life of utility poles / cross-arms within the infrastructure network

Collection of information on the wastes liable to contain PCP

Waste facility operators

- Information on nature of facility processing the waste (recycling, incinerator, landfill, waste handling, other)
- Information on type of waste accepted known to be contaminated by PCP (either production wastes or treated end of life timber) and how is treated
- Information on quantity of waste managed

Regulators

- Details of sites / facilities known to be managing PCP waste
- Details on enforcement actions brought for environmental release – either at sites of use, or from waste handling locations

Collection of information on the on potential contaminated sites

Trade associations / regulating agencies

- Details on former sites of manufacture for PCP
- Details on former sites conducting timber treatment that may have used PCP in the past
- Details surrounding the use of PCP for treatment in leather, textiles, paper and pulp or agriculture
- Details of locations for facilities / former facilities that were known to be using PCP
- Information of stockpiles of leather, suede or textile goods contaminated with PCP been identified within your nation
- Data available on quantities and mechanism for final disposal

Non-timber treatment uses of PCP

Leather treatment - used as a preservative in leather from the 1970s to protect leather goods from fungal damage during the wet processing of these materials

Textile treatment - PCP, Na-PCP and PCP-L have been used to treat textiles which are subject to attack by fungi and bacteria during storage and use

Agriculture – used to prevent wood decay, as herbicide and desiccant herbicide and desiccant for forage seed crops, a herbicide for non-food vegetation control, a biocide in the post-harvest washing of fruit, and for general weed control, an insecticide for use in beehives, seed plots, and greenhouses, as a herbicide in paddy and upland rice fields

Na-PCP production - used to produce Na-PCP; Na-PCP has also been used for control of the intermediate snail hosts of schistosomiasis

Other application and uses - biocides in packaging materials and glues, preservative in oil-based paints and adhesives, intermediate product in the synthesis of pharmaceuticals as well as colouring substances, included in health-care products and disinfectants for use in the home, farms, and hospitals, included indental-care products, bactericidal soaps, laundry products, and medical products for the skin

Products treated with PCP

- Most utility poles, during the manufacturing process, are typically marked in accordance with the requirements found in ANSI O5.1 or CSA O15-15
- The typical information contained on the marking includes a supplier trademark or code, the year of treatment, a code for the plant location, the species of wood, the preservative type and the class and length of the pole
- Additional information may be included based on a utility's specifications
- The information is either burn-branded on the pole or embossed on a recessed metal tag affixed to the pole
- The tag is normally located at 10 feet from the butt on poles shorter than 55 feet, and at 14 feet from the butt on poles 55 feet and longer
- Given the typical setting depths of poles, this normally places the information in the zone from 2 to 6 feet from the ground on an installed pole

End of life products treated with PCP

- In general, wood used in a commercial/industrial setting will be treated with one of three product types: **PCP, Creosote or chromated copper arsenate (CCA)** to prevent degradation and to increase its service life
- Such wood should be appropriately labelled to allow quick identification of the treatment product. However, if not appropriately labelled the treatment product can be established through suitable sampling and analysis
- Additionally, where appropriate labelling is absent, and in absence of, or prior to undertaking sampling and analysis, the **treatment product used can sometimes be inferred through visual inspection (**noting that this is an indicative method and should not be used to replace labelling and/or sampling and analysis):
  - CCA – the surface of the wood will often appear to have a slight blue/green tint to it due to oxidation of the copper in the CCA
  - Creosote – This is a tar like substance which often gives the surface of the wood a black/dark brown tar like (often sticky) finish
  - PCP – PCP itself is not noticeable leaving the surface of the wood apparently unchanged to its natural appearance. Thus if the wood does not appear to show signs of CCA or creosote, it is likely to have been treated with PCP

Timber treated with PCP (Reference Environment Canada, 2017)

Timber treated with chromated copper arsenate (CCA) (Reference NPIC, 2015)

Timber treated with creosote (Reference Bayou Forest Products, 2017)

Potential PCP, its salts and esters contaminated sites

PCP production facilities – these are factories/facilities/chemical plants which have been used, either historically, or currently, to produce PCP. This should also include sites which have been shut down/decommissioned as contamination may still be present

PCP storage facilities – these are storage facilities/warehouses etc. which have, either historically, or currently, been used to store PCP based chemicals. This should also include sites which have been shut down/decommissioned as contamination may still be present

Industrial wood treatment facilities – these are facilities which have, either historically, or currently, been used to treat wood products. This should also include sites which have been shut down/decommissioned as contamination may still be present

Treated timber and wood product storage facilities - these are facilities which have, either historically, or currently, been used to store treated timber and wood products. This should also include sites which have been shut down/decommissioned as contamination may still be present

Leather tanning and other leather treatment

Textile industries where PCP has been formerly used

Agricultural areas where PCP has been applied in the past

PCNs Data Collection

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Polychlorinated naphthalenes (PCNs)

- Listed under Annex A and C with specific exemptions for use in the production of polyfluorinated naphthalenes, including octafluoronaphthalene

PCNs listed in Stockholm Convention

PCNs name	CAS number	Molecular formula
Dichloronaphthalene	28699-88-9	$C_{10}H_6Cl_2$
Trichloronaphthalene	1321-65-9	$C_{10}H_5Cl_3$
Tetrachloronaphthalene	1335-88-2	$C_{10}H_4Cl_4$
Pentachloronaphthalene	1321-64-8	$C_{10}H_3Cl_5$
Hexachloronaphthalene	1335-87-1	$C_{10}H_2Cl_6$
Heptachloronaphthalene	32241-08-0	$C_{10}HCl_7$
Octachloronaphthalene	2234-13-1	$C_{10}Cl_8$

PCNs were replaced by PCBs and PCBs were replaced by SCCPs – Regrettable substitution

Former PCN uses in closed and open applications

Sector	Application
Transformers and Capacitors	• Capacitor impregnates (JACOBSSON & ASPLUND, 2000) • Transformer and capacitor fluids (UNECE, 2007; IPCS, 2001)
Batteries	• Separator in storage batteries (Jacobsson & Asplund 2000)
Plastics and cables	• Cable covering compositions (Jacobsson & Asplund 2000) • Additive in plastic (Jakobsson & Asplund 2000) • Intermediate for polymers and as flame-retardants in plastics (Crookes and Howe 1993; Jacobsson and Asplund 2000]
Rubber	• Additive in Neoprene and possibly other chloroprene with use in printer belts (Yamashita et al. 2003; Yamamoto et al. 2016)
Sealants	• Water proof sealants (NICNAS 2002)
Paints, lacquers, dyes/dye carrying agents	• In anti-corrosion/underwater paints and lacquers (Jacobsson and Asplund 2000) • Raw material/feedstock dye carriers (IPCS 2001; UNEP 2016)
Wood preservative / fungicide	• Impregnation of wood (IPCS 2001; Jakobsson & Asplund 2000)
Textile and paper industry	• Coating/impregnation of paper and textiles for water proofing (Van de Plassche and Schwegler 2002, Jakobsson & Asplund 2000) • Binders in paper coating and impregnation (NICNAS 2002)
Oil additives and lubricants	• Additives in oils for lubrication in gear and machinery (Jakobsson & Asplund 2000; US Department of Agriculture 1954) • Oils in mining sector (Popp et al. 1997) • Cutting oils (Jakobsson and Asplund 2000) • Engine oil additive (Van de Plassche and Schwegler 2002) • Refracting index testing oils (Van de Plassche, Schwegler 2002)
Military use	• Fogg ammunition; smoke grenades (Generalstab Schweizer Armee 1945; EMPA 2006). • Inert artillery and mortar projectiles (Hewitt et al. 2011; Clausen et al. 2004; Falandysz 1998) • Paper filter for gas masks in WW1 (Howard 1998) • Paints for ships (Redfield et al. 1952) and possibly other metal surfaces of military vehicles/equipment.

Objectives of the inventory

- Review and summarize the production, use, import and export for PCNs
- Gather information on stockpiles and wastes containing, or thought to contain PCNs
- Assess the legal and institutional framework for control of the production, use, import, export and environmentally sound disposal of the PCNs
- Identify gaps in information required to complete the assessment
- Determine need of exemptions and register for the exemptions still allowed
- Identify whether the current situation meets the requirements of the Stockholm Convention and detail areas where it does not
- Identify the potential PCNs contaminated sites

Outputs and outcomes of the inventory

- Report on production, import, export, use, stockpiles, waste disposal and potential contaminated sites for PCNs
- Legal, institutional, regulatory and enforcement systems for PCNs
- Data gaps and deficiencies in the knowledge on PCNs
- Elements to develop an action plan to address PCNs in the context of the NIP

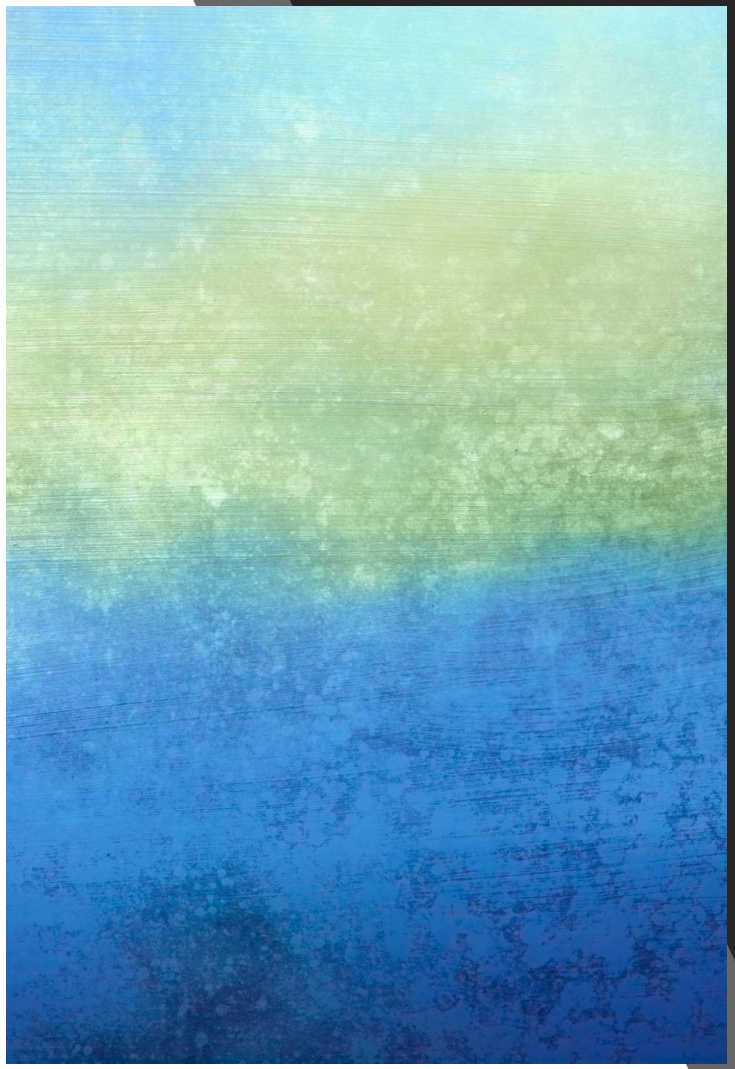
Quantitative data to be generated for PCNs

Life-cycle step	NIP Quantitative data to be generated	Unit measure	Remarks
Production (historical/current)	PCNs produced (for using as intermediate for the production of polyfluorinated naphthalenes (PFNs) or for other purposes)	Tonnes	Data requested by Art. 15 report
Import/export (historical/current)	PCNs imported/exported	Tonnes	Data requested by Art. 15 report
	PCN in articles/products imported/exported	Tonnes	
	PCN containing waste imported/exported for environmental sound disposal	Tonnes	
Use (historical/current)	PCNs used (as intermediate for the production of polyfluorinated naphthalenes (PFNs) or for other purposes like electrical cables, leather jacket, cable sheats)	Tonnes	
	PCN in articles/products in use	Tonnes	
Waste stockpiles	PCN containing waste stockpiles (especially cables containing PCNs, including POP-PBDEs and PCBs)	Tonnes	Data requested by Art. 15 report
	Related PCNs content, including POP-PBDEs and PCBs	ppm	
Contaminated sites	Potentially contaminated/contaminated sites	Number	

Potential sources of information

Sectors	Stakeholders
For all sectors	• Ministry of Environment • Ministry responsible for waste management • Ministry of Industry • Ministry of Labour • NIP coordinator and steering committee • Basel Convention focal point (and stakeholders) • CSO/NGOs
PCN production	• Industry/organochlorine association having produced or producing PCNs
Manufacturing of products/articles where PCNs have been used	• Industry (formerly) producing transformers and capacitors • Industry producing hydraulic fluids • Industry producing cables for electrical equipment and cables sheaths • Industry producing paints and other coatings (in particular chloroprene paints and lacquers and PVC copolymer paints) • Industry producing sealants/caulks and putty • Industry producing chloroprene rubber • Industry producing wood preservatives • Industries producing oils, impregnated paper, impregnated textile
Use of PCN containing materials	• Authorities in charge with construction permitting • Users/owners of transformers and capacitors (e.g. electricity supply companies etc.) • Users of hydraulic oil, especially in the mining sector • Electrical equipment companies and construction companies using electrical cables and cables sheaths • Users/industries and importers of paints (including chloroprene paints and lacquers and PVC copolymer paints and thinners) • Building and road construction companies using paints and coatings • Ship repair companies using paints and coatings • Users (e.g. prefabricated concrete building companies)/industries and importers of sealants and materials for sealants • Users/industries and importers of chloroprene rubber used especially for rubber belts, rubber belts for printers, conveyor belts and shock absorbing materials • Ministry of Agriculture or Forestry and institutes and industries working with wood and treatment of wood • Ministry of defence
Unintentional PCNs (specific productions)	• Industry producing chlorinated solvents • Industries producing chlorinated paraffins • Industry producing chlorine with chloralkali processes (in particular those having used graphite electrodes)
End-of-life treatment	• Recycling companies (for cables, chloroprene rubber and impregnated/treated wood waste) • Ship scrapping/dismantling companies • Companies treating painted scrap (e.g. electric arc furnaces) • Landfill owners

Source: UNEP. 2019. Guidance on preparing inventories of polychlorinated naphthalenes (PCNs). UNEP/POPS/COP.8/INF/19 (revised 2019)



Guidance documents

Guidance on preparing inventories of polychlorinated naphthalenes (PCNs). UNEP/POPS/COP.8/INF/19 (revised 2019)

http://chm.pops.int/Implementation/NationalImplementationPlans/Guidance/tabid/7730/Default.aspx

Collection of information and data for PCNs production

Information on PCN production

Information on PCN use as intermediate for the production of polyfluorinated naphthalenes (PFNs), in particular for octafluoronaphthalene (Octa-FN) production

Collection of information and data for PCNs import/export for exempted uses

- Information on volumes of PCNs imported/exported from industry or associations that are producing or using PCNs, and possibly from customs

**Currently PCNs do not have specific Harmonized System (HS) codes; therefore HS codes cannot be used for assessing imports of PCNs at the moment. For the PCN mixtures, CAS numbers and trade names may be used for the search at the custom level*

Collection of information and data for import and export of PCNs in products and articles

- Information on imported second hand equipment that might still contain PCNs
- Information on imported used transformers and capacitors that might still contain PCNs

Collection of information and data on PCNs use in closed applications

Information on former use volume and concentration of PCNs and PCBs in closed applications (transformers and capacitors)

Information on former use volume and concentration of PCNs and PCBs in hydraulic oils in the mining sector and other sectors

Collection of information and data on PCNs use in open applications

Information on former use volume of PCNs in open application such as cables, paints, sealants/caulks and putty, chloroprene rubber, wood preservatives, paper, textiles

Concentration of PCNs (or PCBs)* in selected application and some waste fractions

Product/sample (POPs measured)	Level of PCN or PCB content (mg/kg)	References
Neoprene rubber (PCN)	36,000 – 45,000	Yamamoto et al. 2005 Yamashita et al. 2003
Rubber coated plastic (PCN)	1000	Yamashita et al. 2003
Rubber belt for printers (PCN)	41 to 2000 (3/21)	Yamamoto et al. 2005
Rubber belt for printers (PCN)	0.001 – 0.1 (17/21)	Yamamoto et al. 2005
Aerosol adhesives (PCN)	1150 – 1200	Yamashita et al. 2003
Sealants (PCB)*	28,000 – 224,000	Kohler et al. 2003; Behnisch 1997
Paints (PCB)*	30,000 – 160,000	Zennegg et al 2014; Weber et al 2015
Cables coatings in recycling (PCB)*	10 – 325	Lehnik-Habrink et al. (2005)
Automotive shredder residue (PCN)	0.026 – 0.040	Yamamoto et al. 2005
Refused derive fuel (PCN)	0.011 – 0.086	Yamamoto et al. 2005
PCN (technical mixture)	930,000 – 1,000,000	Yamashita et al. 2003
Transformer oils (Askarel PCB)*	ca. 600,000**	Mueller 2017
Contaminated transformer oil (PCB)*	50 – 100,000	Mueller 2017
Capacitor/condensers (PCB)*	ca. 600,000**	Mueller 2017
Automotive shredder residue (PCNs)	0.026 – 0.040	Yamamoto et al. 2005
Refused derive fuel (PCNs)	0.011 – 0.086	Yamamoto et al. 2005

*For these applications only PCB data were available. Due to the use in the same application and similar chemical properties, the levels of PCB use might reflect levels if PCN was/are used.

**The PCBs can be mixed with ca. 300,000 mg/kg PCBz.

Collection of information and data for PCNs and other POPs in cables

Information on cables used in construction of houses or other long-term use (use of PCNs as flame retardants in cables and cable sheaths was a major use of PCNs)

Information on cables containing PCBs and PBDEs (PCBs and PBDEs have also been used as flame retardants in cables and cable sheaths)

Data on PCN levels in the recycled cables

Information on the management of cables and cable sheaths

Information on smouldering of cables (inventory links to the releases of unintentionally formed POPs, see UNEP Dioxins Toolkit category 2l - Thermal wire reclamation (UNEP 2013))

Collection of information and data for PCNs and PCBs in paints

Information on the former use of paints containing PCNs (and PCBs including chloroprene paints and lacquers and PVC copolymer paints and thinners) (see the questionnaire in Annex 2 of the guidance)

Information on time when PCNs and PCBs have been used in paints and coatings (as corrosion protection for metal constructions such as bridges, towers, ships, pressure pipes, water sluices, electricity poles, transformers, tanks)

Information on type of paints in which PCNs and PCBs have been used

Information on application areas of paints containing PCNs and PCBs in the country

Information on known individual constructions in which paints containing PCNs or PCBs (might) have been used

Collection of information and data for PCNs and PCBs in sealants/ caulks and putty

Information on former use and time of use of PCNs and PCBs in sealants/caulks and putty for buildings and other constructions

Information on application areas of sealants/caulks containing PCNs and PCBs in the country

Information on known individual buildings and other constructions in which sealants/caulks containing PCNs or PCBs have been used

Information on individual buildings amount of remaining sealants and volumes of PCNs and PCB

Information on buildings/constructions which are known to contain sealants with PCNs or PCBs (the history of the construction should be documented in particular whether sealants have partly been removed due to aging or there have been and PCNs/PCBs remediation activities)

Information on remediation activities for the respective buildings (the materials surrounding the sealants, e.g. concrete on both sides of the caulks or backfill insulation materials have been contaminated)

Collection of information and data for PCNs in chloroprene rubber

- Information on former use of PCNs and PCBs in chloroprene rubber for different uses
- Information on the time span when PCNs and PCBs have been used in chloroprene and other rubbers
- Information on application areas of chloroprene and other rubbers containing PCNs and PCBs in the country
- Information on the life span of the individual products
- Data on the known volumes of PCNs or PCBs in the different uses
- Data on the volume of chloroprene rubber containing PCNs and the related materials currently in use and in stock

PCNs in open applications not considered of contemporary relevance

- Oils in open applications (additives in lubrication oils in gear and machinery, cutting oils, engine oil additive and refracting index testing oils)
- Papers (to attain waterproofing and flame resistance and in binders for papers)
- Textiles (to attain waterproofing, flame resistance and protection against insects, moulds and fungi)
- Battery separators
- Specific military use (fog ammunition/smoke grenades and inert artillery and mortar projectiles)

Potential PCN-contaminated sites

Live cycle stage; Sector	Activities	Locations (potential other POPs/PBT)
PCN production	(Former) Production	Production site (other POPs produced at the site and UPOPs)
	Disposal of waste from PCNs production	Landfills related to waste from production (other POPs produced at the site and UPOPs)
	Former water discharge from production sites	River sediment and flood plains related to releases from production site (other POPs produced at the site)
Sites where PCNs have been used in production (ca. 1930s to 1990s)	Production of transformer and condenser	Site of production; Landfill site of related wastes; Impacted surface waters (sediment and flood plains) (PCBs)
	Production of chloroprene/Neoprene industry (formerly) using PCNs (used until early 2000)	Site of production; Landfill site of related wastes; Impacted surface waters (sediments and flood plains)
	Production of paints and coatings	Sites of production (PCBs; SCCP; heavy metals)
	Production of impregnated textiles and paper	Site of production; Landfill site of related wastes; (PCBs; PFOS; SCCP)
	Other uses of PCNs in production processes (cutting oils, heat exchange oils; lubricants; solvents in chemical production)	Sites where PCNs were used in these productions Landfill site of related wastes; (PCBs; SCCP)
	Wood treatment	Wood treatment sites (PCP; endosulfan; HCH; DDT; mirex)
Use of PCN-containing materials	Paints for buildings, bridges, towers and other metal construction and related removal	Sites where PCN paints have been used and have been removed. Soil impacted from buildings, bridges (PCBs, lead, Cd)
	Ship painting and paint removal	Docks where ships were painted and repainted (PCBs; DDT; Sn-organics)
	Use of PCNs in smoke grenades, fog ammunition and artillery and mortar projectiles.	Soil/environment at military sites where smoke grenades, inert artillery and mortar projectiles were used.
Unintentional PCNs (specific productions)	Chlorinated solvent production and related residues (“HCB waste” containing PCNs)	Disposal sites of residues from chlorinated solvent production and EDC production (HCB; HCBD; PCDD/F)
	(former) chloralkali production	Chloralkali sites and sites were residues where disposed (e.g. graphite electrode sludge) (PCDD/F)
End-of-life treatment	Electric Arc furnaces treating PCNs (and PCBs) painted scrap	Recycling areas and landfills with deposited wastes (PCBs)
	Ship scrapping/dismantling	Ship scrapping areas (PCBs; DDT; Sn-organics)
	Open burning or non-BAT incineration of PCNs-containing waste	Related sites and sites were residues/ashes are disposed
	Former application of PCN impacted sludge	Application/agricultural land

SCCPs Data Collection

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Short-chained chlorinated paraffins (SCCPs)

Listed under Annex A with specific exemptions for production and use in:

a) Additives in the production of transmission belts in the natural and synthetic rubber industry

b) Spare parts of rubber conveyor belts in the mining and forestry industries

c) Leather industry, in particular fatliquoring in leather

d) Lubricant additives in particular for engines of automobiles, electric generators and wind power facilities, and for drilling in oil and gas exploration, petroleum refinery to produce diesel oil

e) Tubes for outdoor decoration bulbs

f) Waterproofing and fire-retardant paints

g) Adhesives

h) Metal processing

i) Secondary plasticizers in flexible polyvinyl chloride, except in toys and children’s products

SCCPs listed in Stockholm Convention

Short-chain chlorinated paraffins (Alkanes, C10-13, chloro)$^{+}$: straight-chain chlorinated hydrocarbons with chain lengths ranging from C10 to C13 and a content of chlorine greater than 48 per cent by weight

For example, the substances with the following CAS numbers may contain short-chain chlorinated paraffins:
CAS No. 85535-84-8;
CAS No. 68920-70-7;
CAS No. 71011-12-6;
CAS No. 85536-22-7;
CAS No. 85681-73-8;
CAS No. 108171-26-2.

Note (i) of Part I of Annex A "(i) Except as otherwise specified in this Convention, quantities of a chemical occurring as unintentional trace contaminants in products and articles shall not be considered to be listed in this Annex;" does not apply to quantities of a chemical that has a plus sign ("+") following its name in the "Chemical" column in Part I of this Annex that occurs in mixtures at concentrations greater than or equal to 1 per cent by weight. In other words, if SCCPs occurs in mixtures at concentrations greater than or equal to 1 per cent by weight are considered listed under Stockholm Convention.

Use sectors, applications and concentrations of SCCPs in products

Uses and application	SCCP content (mg/kg)	Source
PVC (e.g. cables, consumer goods)	Up to 100 000	BTHA 2016 KEMI 2016
Ethylene-vinyl acetate (EVA foam) (mats; others)	Up to 70 000	BTHA 2016, Appendix 1
Rubber (e.g. Additive/FR in natural and synthetic rubbers in conveyer & transmission belt, cables, hoses, seals, uses in vehicles)	10 000-40 000, can be up to 150 000 100 000-170 000 in conveyor belts 100 000 in conveyor belts, 100 000-170 000 for other rubber products	ECB 2008 RPA 2010
Paints/coatings (Water proof paints metals, reservoirs, pools, road marking; FR coating on metals, wood, textiles; printing ink for textiles)	25 000-100 000 in intumescent coatings 50 000-200 000 in anti-corrosive and protective coatings 10 000-100 000 in road markings	RPA, 2010 ECB (2008) RPA, 2010
Leather fat liquoring (e.g. leather for furniture; clothes)	10 000 (in leather) 20 000 (mean) 200 000 in fat-liquoring mix	ECB 2000 RPA, 2010 ESWI, 2011
Adhesives/sealants	50 000-140 000 200 000-300 0000	ECB 2008 Danish EPA 2014
Textiles (flame retardant backcoating; paint)	Potential flame retardant in cellulosic textiles 40 000-150 000 in backcoating of textiles	BTHA, 2016 RPA, 2010
Metal working fluids (e.g. high pressure additives, cutting and drilling fluids)	50 000-700 000 in oil-based cutting fluids Average 500,000 <10 000 in emulsion-based cutting fluids	BUA 1992 ECB 2000, 2005 BUA 1992
Lubricants (e.g. rail, ship, automotive, industrial machinery, power generation (e.g. wind power facilities, electric generators))	10 000 – 600 000 300 000 – 700 000	MSDSs Sloan (1986)

Objectives of the inventory

- Review and summarize the production, use, import and export for SCCPs
- Gather information on stockpiles and wastes containing, or thought to contain SCCPs
- Assess the legal and institutional framework for control of the production, use, import, export and environmentally sound disposal of the SCCPs
- Identify gaps in information required to complete the assessment
- Determine need of exemptions and register for the exemptions still allowed
- Identify whether the current situation meets the requirements of the Stockholm Convention and detail areas where it does not
- Identify the potential SCCPs contaminated sites

Outputs and outcomes of the inventory

- Report on production, import, export, use, stockpiles, waste disposal and potential contaminated sites for SCCPs
- Legal, institutional, regulatory and enforcement systems for SCCPs
- Data gaps and deficiencies in the knowledge on SCCPs
- Elements to develop an action plan to address SCCPs in the context of the NIP

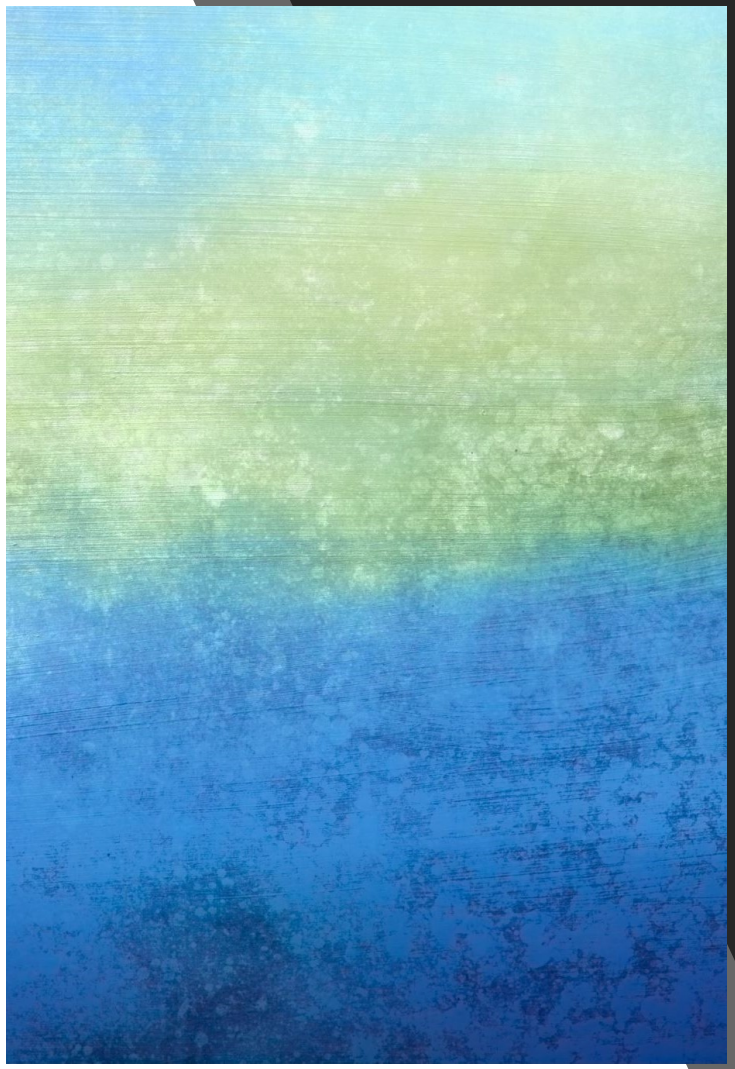
Quantitative data to be generated for SCCPs

Life-cycle step	NIP Quantitative data to be generated	Unit measure	Remarks
Production (historical/current)	SCCP produced, as allowed by the specific exemptions	Tonnes	Data requested by Art. 15 report
Import/export	SCCP imported/exported as allowed by the specific exemptions	Tonnes	Data requested by Art. 15 report
	SCCP in articles/products imported/exported	Tonnes	
	SCCP containing waste imported/exported for environmental sound disposal	Tonnes	
Use (historical/current)	SCCP used to manufacture articles/products	Tonnes	
	SCCP in articles/products in use	Tonnes	
Stockpiles	SCCP in article/products stockpiles	Tonnes	
Waste stockpiles	SCCP containing wastes stockpiles	Tonnes	Data requested by Art. 15 report
	Related SCCP content	Percentage (%)	
Contaminated sites	Potentially contaminated/contaminated sites	Number	

Potential sources of information

Sectors	Stakeholders
Ministries and authorities (For all sectors)	• Ministry of Environment; Ministry responsible for waste management • Ministry of Industry • Ministry of Construction • Ministry of Labour • Stockholm NIP coordinator and steering committee • Basel Convention focal point (and stakeholders) • Rotterdam Convention focal point • Customs; office of statistics
NGOs/CSOs	• Industry associations (plastic; rubber; paints; metal processing, chemicals/lubricants) • CSOs/NGOs working on POPs, hazardous chemicals and waste • CSOs/NGOs working on workers safety
Production of SCCPs or CPs >1%SCCPs	• Organochlorine industry • Producers of SCCPs or other CPs with SCCPs >1%
Manufacturing of products/articles where SCCPs are used or have been used	• Industries producing soft PVC and making products from (soft) PVC • Industry producing cables for electrical equipment and cable sheaths • Industry producing rubber products (conveyor belt, hoses) • Industry producing paints and other coatings (in particular intumescent paints or water proof paints such as e.g. chloroprene paints and lacquers and PVC copolymer paints) • Industry producing adhesives and/or sealants • Industries producing metal working fluids • Industries producing lubricants • Industries producing fatliquoring agents • Industries producing leather (using fatliquors) • Compounders (formulators) of textile backcoatings • Industries producing impregnated/flame retarded textiles
Industrial users of SCCP containing products	• Construction companies (users of cables, sealants, paints, flooring) • Users/industries of rubber products (conveyor belts; other rubber belts, rubber belts for printers, cables, other flame retarded rubber products) • Companies using water proof paints (road marking, swimming pools) • Producers of cables; producers of electrical/electronic equipment • Users/industries and importers of paints (including chloroprene paints and lacquers and PVC copolymer paints and thinners) • Producers of lubricants and metal working fluids • Users/consumers of metal working fluids • Consumer of lubricants including automotive (gasoline stations; car repair), agricultural machinery, rail, power generation (e.g. wind power facilities; electric generators), drilling in oil and gas exploration, petroleum refinery, military, food & beverage, earth moving equipment.
Consumer goods containing SCCPs	• Retailers of products possibly containing SCCP (soft PVC products, rubber products, lubricants, paints, adhesives/sealants) • Importers/exporters of (soft) PVC • Importer/exporter of treated rubber or synthetic rubber (e.g. conveyor belts, transmission belts; other flame retarded rubber) • Importers/exporters of water proofing and fire-retardant paints and coatings • Importers/exporters of lubricants and metal working fluids • Importers/exporters of sealants and adhesives
Companies recycling SCCP containing material	• Recyclers of cables or other PVC; Recyclers of rubber products; • Recyclers of scrap; recyclers of waste wood • Recyclers of lubricants and waste oils
End-of-life treatment	• Waste management companies • Companies operating waste incinerators or plants doing co-processing • Landfill owners

Source: UNEP. 2019. Draft full guidance for preparing inventories of short-chain chlorinated paraffins (SCCPs).



Guidance documents

Preliminary draft guidance on preparing inventories of short-chain chlorinated paraffins (SCCPs). UNEP/POPS/COP.9/INF/19

Draft full guidance for preparing inventories of short-chain chlorinated paraffins (SCCPs).

http://chm.pops.int/Implementation/NationalImplementationPlans/Guidance/tabid/7730/Default.aspx

Production and import/ export of SCCPs

Collection of information and data for SCCPs production and import/export (Tier I)

Industrial associations, authorities, and national registers

- Information on (potential) manufacturers in the country
- Data on production volumes of SCCPs from national office/institute of statistics
- Information on export of SCCPs and CPs possibly containing SCCPs
- Information on import quantities of SCCPs and other CP mixtures and companies importing and finally receiving the SCCPs and CPs possibly containing SCCPs

Information from statistics

- Production volume of SCCPs and other CP mixtures (including related CAS numbers)
- Import quantity of SCCPs and other CPs (including related CAS numbers)
- Export quantity of SCCPs and other CPs (including related CAS numbers)
- Information from Prior Informed Consent (PIC) procedure on SCCPs

Collection of information and data for SCCPs production and import/export (Tier II)

Producers of SCCPs and other CPs remixtures

- Total yearly production of SCCPs; % chlorination
- Total yearly production of other CP mixtures and SCCP content; certified analysis on the composition of CP mixtures
- Certificates on SCCP content; methods used for determining the content
- Analytical data on CP mixtures from industries (and related CAS numbers)
- Information on end of life management of wastes from SCCP/CP production and use

Major importers and exporters of SCCPs and other CP mixtures

- Import quantity of SCCPs
- Import quantity of other CPs and information on SCCP content (including CAS numbers)
- Certificates on SCCP content; methods used for determining the content
- Export quantity of SCCPs and other CPs (including related CAS numbers and countries)
- Detailed information on SCCPs and CPs imported/exported, certificates on SCCP content; % chlorination

Collection of information and data for SCCPs production and import/export (Tier III)

- Monitoring of technical CP mixtures with unknown composition produced or imported or exported (this would also include MCCPs without a certified SCCP content)

**Due to the complexity of the analysis of chlorinated paraffins such an assessment needs experienced laboratories accredited for the analysis of SCCPs or having otherwise proven to produce reliable SCCP/MCCP results*

Use of SCCPs in the manufacturing of products

Collection of information and data for SCCPs in the manufacturing of products (Tier I)

Industrial associations, authorities, and national registers

- Information on potential manufacturers in the country
- Knowledge on the use of SCCPs in industrial sectors
- Data on production volumes of industrial sectors potentially using SCCP in production from national office/institute of statistics and industrial associations

National manufacturers

- Information on production of PVC potentially using SCCP and other CP additives
- Information on production of other plastics potentially using SCCPs as additives
- Information on rubber production and type of rubber products in particular those which use flame retardants or other additives as plasticizer
- Information on production of waterproofing and fire-retardant paints potentially using SCCPs or CPs
- Information on production of fatliquoring agent and use of fatliquoring agent for leather production
- Information on production of adhesives and sealants and use of sealants and adhesives potentially containing SCCPs
- Information on recycling industries recycling potentially SCCP containing materials (e.g. PVC, rubber, lubricants and metal working fluids)

Information from statistics

- Import of SCCPs or other CPs possibly containing >1% SCCPs or sourcing in the country by the individual production sectors
- Production volumes of PVC and use of PVC requiring softeners and the respective amount and use of products
- Production of other plastics flame retarded with SCCP or CPs containing SCCPs (e.g. flame retarded Ethylene-vinyl acetate (EVA) or flame retarded polyolefins)
- Total rubber production and individual products and information on SCCP/CP use
- Quantity of waterproofing and fire-retardant paints and plasticizers and flame retardants used (also if other restricted flame retardants like DecaBDE)
- Quantity of fatliquoring of leather and use of SCCPs or other CPs
- Production of adhesives and sealants and use of SCCPs or other CPs
- Production of metal working fluids, other lubricants, and fatliquors and use of SCCPs or CP mixtures with SCCP content >1%

Collection of information and data for SCCPs in the manufacturing of products (Tier II)

Major factories and stakeholders in each industrial sector

- Information on use of SCCPs and other CP mixtures in their processes
- Information on total yearly consumption of SCCPs and CP mixtures in the industrial processes
- Information on total amount of products produced with SCCPs
- Detailed information on SCCPs and CPs used such as SCCP content, certificates on SCCP content; % chlorination
- Information on final SCCP content in the products in the individual use sectors
- Information on end of life management and fate of SCCPs/CPs in the individual use sectors
- Information on alternative to SCCPs used in the manufacturing of the different products

Equation to be used to estimate the total quantity of SCCPs used in the manufacturing of products (e.g. PVC, rubber applications, paints, adhesives):

If total quantity of SCCP use is known for a sector then the following equation can be used to estimate the total quantity of SCCP containing products manufactured (e.g. PVC, rubber applications, paints, adhesives):

$$TQproducts = TQSCCPs/CSCCPs$$

TQproducts= Total quantity of products manufactured with SCCP additive (e.g. PVC, rubber applications, paints, adhesives) per year or period

TQSCCPs= Total quantity of SCCPs used in the manufacturing of products per year or period

CSCCPs = % of SCCP in the product

If the total quantity/product volume of SCCP containing products is known then the following equation can be used to estimate the total quantity of SCCPs used in the manufacturing of products (PVC, rubber applications, paints, adhesives):

$$TQSCCPs = TQproducts \times CSCCPs$$

Collection of information and data for SCCPs in the manufacturing of products (Tier III)

- Monitoring of CPs mixtures with unknown composition used in the manufacturing of products for SCCP content

- *This would also include MCCPs without a certified SCCP content*
- *Due to the complexity of the analysis of chlorinated paraffins such an assessment needs experienced laboratories accredited for the analysis of SCCPs or having otherwise proven to produce reliable SCCP/MCCP results*

SCCPs in rubber products

Rubber application that may contain SCCPs	**Chlorinated paraffins content (% wt)**
Conveyor belting	10 – 16.8%
Rubber cable cover	3.8%
Rubber hose	6.2%
Industrial roller coverings	up to 20%
Pipe seals	4%
Fire resistant rubber products	10%
Shoe soles	6.5%
Industrial sheeting	13%

SCCPs in paints including waterproofing and fire-retardant paints

Paints and coatings that may contain SCCPs	Chlorinated paraffins content (% wt)
Organic solvent borne intumescent coating for structural steel	20-30
Plastisol screen printing inks for textiles	10-25
Organic solvent borne chlorinated rubber systems for swimming pools/fishponds	5-20
Organic solvent borne chemical and water-resistant coatings	5-20
Organic solvent borne floor and wall paints	5-10
Intumescent coating for ferrous substrates	5-10
Intumescent coating for timber-based boards	2.5-10
Organic solvent borne acrylic container coatings	2-10
Organic solvent borne road marking paints	5-8
Organic solvent borne zinc rich (epoxy) primers	2-5
Organic solvent borne chlorinated rubber primers and topcoats	1-5
Organic solvent borne vacuum metallising lacquers	1-5
Organic solvent borne flame retardant coating for wood	1-5

[1] Plastisol is a suspension of PVC or other polymer particles in a liquid plasticizer (e.g. SCCP, MCCP, other CPs)

Use of SCCPs in metal working fluids (MWFs) and lubricants

Collection of information and data for SCCPs in metal working fluids (MWFs) and lubricants (Tier I)

Major stakeholders (manufacturers/suppliers of metal working fluids; manufacturers/suppliers of lubricants; professional users of MWFs potentially using SCCPs or CP mixtures containing SCCPs; professional users of lubricants)

- Information on use of SCCPs or other CPs possibly containing SCCPs in MWFs in sectors and in lubricants in different use sectors
- Information on all chlorinated paraffins used in metal working fluids and as lubricants that might be considered SCCP containing or contaminated until companies can prove that the SCCP content is ≤1% (if providers or users of chlorinated paraffins in MWF or lubricants can proof that the SCCP content is ≤1% then the respective chlorinated paraffin mixture or product is not restricted and can be further used)
- Information on use of CP containing lubricants in sensitive uses like food & beverage and agricultural machinery

Collection of information and data for SCCPs in metal working fluids (MWFs) and lubricants (Tier II)

- Information on total production amount of MWFs containing SCCPs or contaminated with SCCPs > 1%
- Information on total amount of MWFs imported containing SCCPs or CPs contaminated with SCCPs > 1%
- Information on total amount of MWFs used in metal production containing SCCPs or CPs contaminated with SCCPs > 1%
- Information on end-of-life management and fate of MWFs in the different use sectors
- Information on alternative MWFs not containing SCCPs used in the different uses of MWFs

The following equation can be used to estimate the total quantity (TCSCCPs) of SCCPs used in metal working fluids and other lubricants per year

$$TQSCCPs = TQfluid \times CSCCPs$$

TQSCCPs = Total quantity of SCCPs used in MWFs or lubricants per year

CSCCPs = % of SCCP in the metal working fluid or lubricant

TQfluid = Yearly total consumption/quantity of metal working fluids and lubricants

Collection of information and data for SCCPs in lubricants other than MWF (Tier II)

- Information on total production volume of lubricants containing SCCPs or contaminated with SCCPs >1%
- Information on total amount of lubricants imported containing SCCPs or CPs contaminated with SCCPs >1%
- Information on total amount of lubricants in different use sectors containing SCCPs or CPs contaminated with SCCPs >1%
- Information on end of life management and fate of lubricants in the different use sectors
- Information on alternative lubricants not containing SCCPs used in the different uses

The following equation can be used to estimate the total quantity (TCSCCPs) of SCCPs used in lubricants other than MWF per year

$$TQSCCPs = TQfluid \times CSCCPs$$

TQSCCPs = Total quantity of SCCPs used in lubricants other than MWF per year

CSCCPs = % of SCCP in the lubricant other than metal working fluid

TQfluid = Yearly total consumption/quantity of lubricants other than metal working fluids

Collection of information and data for SCCPs in metal working fluids (MWFs) and lubricants (Tier III)

- Monitoring of MWFs and lubricants containing CPs with unknown composition or MCCPs without a certified SCCP content
- Monitoring of MWFs and lubricants with unknown composition which are suspected to contain SCCPs
- Screening sensitive lubricant uses in the food and beverage sector or lubricant uses in the agricultural sector (tractors and other machinery)

**Due to the complexity of the analysis of chlorinated paraffins and in particular some challenges to discern between SCCPs and MCCPs such an assessment needs experienced laboratories accredited for the analysis of SCCPs or having otherwise proven to produce reliable results*

Use of SCCPs in products, use and stocks

Collection of information and data for SCCPs in products, use and stocks (Tier I)

- Information on past and current national data on products imported, sold and in use of:
  - PVC products
  - Rubber products
  - Paints/coatings
  - Adhesives/sealants
  - Leather

Collection of information and data for SCCPs in products, use and stocks (Tier II)

Customs statistics

- Import of rubber products
- Import of PVC and PVC products
- Import of other plastics potentially containing SCCP additives (e.g. Ethylene-vinyl acetate (EVA))

Retailers, industry and customs

- Information on sales of rubber, PVC; production and individual products and information on SCCP/CP use
- Information on amount of waterproofing and fire-retardant paints and plasticizers and flame retardants used (also if other restricted flame retardants like decaBDE or HBCD are used)
- Information on amount of fatliquoring of leather and use of SCCPs or other CPs
- Information on production of adhesives and sealants and use of SCCPs or other CPs
- Production of metal working fluids and other lubricants containing SCCPs or CPs mixtures with SCCP content higher than 1%; production of fatliquors containing SCCPs

Major retailers and users in each sector

- Information on amount of products of the present product categories containing SCCPs or possibly containing SCCPs
- Information if products containing SCCPs are labelled
- Information on end of life management and fate of SCCPs/CPs in the individual use sectors

The following equation can be used to estimate the total quantity of SCCPs used in products (e.g. PVC, rubber, paint, adhesives):

$$TQ_{SCCPs} = TQ_{product} \times CS_{CCPs}$$

TQSCCPs = Total quantity of SCCPs in products per year or period

TQproduct= Total quantity of respective product containing SCCPs (e.g. PVC, rubber, paint, adhesive containing SCCPs)

CSCCPs = SCCP concentration or % of SCCP in the respective product

Collection of information and data for SCCPs in products, use and stocks (Tier III)

- Monitoring of products containing SCCPs or CPs mixtures with unknown composition for SCCP content

**Due to the complexity of the analysis of chlorinated paraffins such an assessment needs experienced laboratories accredited for the analysis of SCCPs or having otherwise proven to produce reliable SCCP/MCCP results*

SCCPs in wastes

Collection of information and data for SCCPs in wastes (Tier I)

- Information on major waste types of articles or products on the consumer market and products used in industries that possibly contain SCCPs

Relevant stakeholders:

- National and local waste management authorities
- Recyclers of PVC, rubber, conveyor belts, leather, lubricants and metal working fluids
- Waste importers and waste traders
- Waste incinerators and cement kilns
- Operators of landfills (local authorities, industry, private operators)
- Sewage plants

Waste consisting of, containing or contaminated with SCCPs

Waste source	Type of waste
a) SCCPs as substance (in particular after restriction of the use of SCCPs)	(i) Pure SCCPs (ii) Technical CPs mixtures containing more than 1% SCCPs (iii) Obsolete SCCPs/CPs which can no longer be used (iv) Packaging materials of SCCP formulations
b) Waste generated at manufacturing sites using SCCPs in (Chapter 5)	(i) Waste from production of PVC (ii) Waste from production of rubber (iii) Wastes from production of paints (iv) Waste from production of sealants/adhesives (v) Wastes from production of leather (vi) Wastes from production of lubricants/MWF
c) Waste from the use of lubricants and metal working fluids (Chapter 6)	(i) Metal working fluids, swarf from metal cutting operations (ii) Lubricants, in particular from automobile engines, electric generators, wind power facilities (iii) Lubricants in oil production and refining: oil drilling and gas exploration, petroleum refining to produce diesel oil (iv) Water based mixtures and emulsions
d) Consumer products and products from industrial use containing SCCPs (Chapter 7)	(i) Flexible PVC and ethylene-vinyl acetate (EVA) (ii) Fire-retardant rubber, (e.g. transmission and conveyor belts) (iii) Rubber, sealants, polymers in vehicles (iv) Other articles made of rubber or soft plastics, i.a. toys, sports accessories and kitchen equipment (v) Paints, adhesives, floorings and coatings (vi) Sealants, such as fire retardant dam sealants, building sealants, window sealants (vii) Fire-retardant back-coated textiles, such as upholstery, tents (viii) Leather that has been fat-liquored with SCCPs
e) Contaminated sludge or soils	(i) Contaminated soils from spillage or landfills (ii) Contaminated sludge

Collection of information and data for SCCPs in wastes (Tier II)

- Quantity of SCCP containing wastes generated in the production of SCCPs and other CPs (within the assessment of inventory of production of SCCP
- Quantity of wastes generated in the manufacturing of products with SCCPs
- Quantity of wastes from the use of metal working fluids and other lubricants
- Wastes from consumer products and products used by professional users
  - Quantity of PVC and Ethylene-vinyl acetate (EVA) waste fractions and SCCP contents
  - Quantity of rubber waste fractions and SCCP content
  - Quantity of waste paints
  - Leather wastes containing SCCPs or other POPs (e.g. PCP, PFOS)
- Information on wastes from removal of waterproofing and fire-retardant paints, sealants and adhesives in renovation or demolition of buildings and structures containing SCCPs and other POPs (PCBs, PCNs, PBDEs and HBCD)
- Information on certain treated/flame retarded wood wastes containing SCCP or other POPs (e.g. PCP, PCBs, PCNs, DDT, endrin, dieldrin, HCH, and endosulfan)
- Information/documentation on current end of life management and fate of SCCPs containing products

Collection of information and data for SCCPs in wastes (Tier III)

- Monitoring of major/selected waste fractions with high risk of SCCP contamination such as certain fractions of PVC, rubber, waste oils and waste lubricants should be assessed
- Monitoring of waste fraction such as construction & demolition waste possibly containing SCCPs, PCBs, and PCNs in sealants paints and adhesives
- Evaluation on existence of methods to separate SCCP treated products from the bulk materials to facilitate recycling of the respective waste fraction
- Assessment of releases from landfills and dumpsites (leachates; air releases) with priority of landfills from producers and users of SCCPs

Potential SCCP-contaminated sites along the life cycle of SCCPs

Live cycle stage; Sector	Activities	Locations (potential other POPs/PBTs (persistent, bioaccumulative and toxic substances))
SCCP production	Current and former production sites	Production site (other POPs produced at the site and UPOPs)
	Disposal of waste from SCCP production	Landifls related to waste from production (other POPs produced at the site; UPOPs)
	Former water discharge from production sites	River sediment and flood plains related to releases from production site (other POPs (formerly) produced at the site; UPOPs)
Sites where SCCP have been used in manufacturing of products and mixtures	Production sites of soft PVC	Site of production Landfill site of related wastes Impacted surface waters (sediment and flood plains) (PCBs)
	Production sites of rubber (using additives)	Site of production of rubber products; Landfill site of related wastes; Impacted surface waters (sediment and flood plains) (PCBs; PCNs)
	Production of paints and coatings	Sites of production (PCBs; PCNs, heavy metals)
	Production of impregnated textiles and leather	Textiles and leather production sites Landfill site of related wastes (PCBs; PCP; PFOS)
	Production of lubricants and metal working fluids (cutting oils, heat exchange oils; lubricants; solvents in chemical production)	Sites where SCCPs were used in lubricants and MWF productions Landfill site of related wastes; (PCBs; PCNs)
	Wood treatment (intumescent paint)	Wood treatment sites (PCP; PCNs, PCBs, endosulfan; HCH; DDT; mirex)
Use of SCCPs	Use of SCCPs containing metal working fluids	Factories were metals are pressed, stamped, drilled, cut or otherwise treated where cutting oil was/is used (for factories operating before 1975 also PCNs or PCBs)
	Use of SCCPs containing lubricants	engines of automobiles, electric generators and wind power facilities, and for drilling in oil and gas exploration, petroleum refinery to produce diesel oil; food & beverage
	Application of SCCP containing paints for buildings, bridges, towers and other metal construction and waterproof paints related removal	Sites where SCCP paints have been used and have been removed. Soil impacted from removal from buildings, bridges etc. (PCBs, PCNs, lead, cadmium)
	Ship painting and paint removal	Docks where ships were painted and repainted (PCBs; PCNs, DDT; Sn-organics, lead)
End-of-life treatment	Recycling and disposal of lubricants, MWFs and other SCCP liquids	Waste oil refineries; waste oil collection (PCBs)
	Recycling of (soft) PVC, certain rubber belts/products,	Recycling areas and landfills with disposed wastes
	Cable smouldering for copper and e-waste recycling (smelters; open burning)	Recycling areas and landfills with disposed wastes (UPOPs; PCDD/Fs, PCBs, PCNs)
	Scrapping/breaking of ships	Ship breaking/scrapping areas (PCBs; PCNs; DDT; Sn-organics)
	Open burning of SCCP containing products	Related sites and sites were residues/ashes are disposed
	(Former) application of SCCP impacted sludge	Application/agricultural land

HCBD Data Collection

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Hexachlorobutadiene (HCBD)

Listed under Annex A without specific exemptions/acceptable purposes and Annex C

Intentional uses (ESWI 2011 with modifications)

Sector	Application
Agriculture (open applications)	• Pesticide/phytosanitary purposes in the past: o to combat soil pests including use as fumigant o as seed dressing, as fungicide o as pesticide o as biocide and algicide o as fumigant against of phylloxera at vineyards with the consumption rate of 100–350 kg / ha
Industrial manufacture (open and semi-closed applications)	• Chemical and intermediate in several industrial manufacturing processes: o synthesis of rubber compounds o production of lubricants o manufacture of chlorofluorocarbons o manufacture of aluminum and graphite rods o as solvent for rubber, other polymers and elastomeric plastics
Purification of gas streams (Semi-closed applications)	• as purification agent for recovery of “snift”, a chlorine containing gas in chlorine plants • as washing liquor for purifying gas streams by removing hydrocarbons • as adsorption agent for gaseous contaminants • as well as solvent in chlorine gas production
Electrical and other technical equipment (closed/semi-closed application)	• as heat-transfer liquid particularly in transformers • as hydraulic fluid and liquid in gyroscops

Unintentional generation of HCBD

During the production of:

- Tetrachloroethylene
- Trichloroethylene
- Tetrachloromethane /carbon tetrachloride
- Chlorine production

Objectives of the inventory

- Review and summarize the production, use, import and export for HCBD
- Gather information on stockpiles and wastes containing, or thought to contain HCBD
- Assess the legal and institutional framework for control of the production, use, import, export and environmentally sound disposal of the HCBD
- Identify gaps in information required to complete the assessment
- Identify whether the current situation meets the requirements of the Stockholm Convention and detail areas where it does not
- Identify the potential HCBD contaminated sites

Outputs and outcomes of the inventory

- Report on production, import, export, use, stockpiles, waste disposal and potential contaminated sites for HCBD
- Legal, institutional, regulatory and enforcement systems for HCBD
- Data gaps and deficiencies in the knowledge on HCBD
- Elements to develop an action plan to address HCBD in the context of the NIP

Quantitative data to be generated for HCBD

Life-cycle step	NIP Quantitative data to be generated	Unit measure	Remarks
Production as by-product from chlorinated hydrocarbons production (historical/current)	HCBD produced (historical)	Tonnes	Data requested by Art. 15 report
	HCBD by-product	Tonnes	
	Related HCBD content	Percentage (%)	
Import/export (historical/current)	HCBD imported/exported as by-product (especially for use in agricultural sector, industrial manufacture, purification of gas streams and electrical equipment)	Tonnes	Data requested by Art. 15 report
	HCBD containing products and articles imported/exported	Tonnes	
	HCBD containing waste imported/exported for environmental sound disposal	Tonnes	

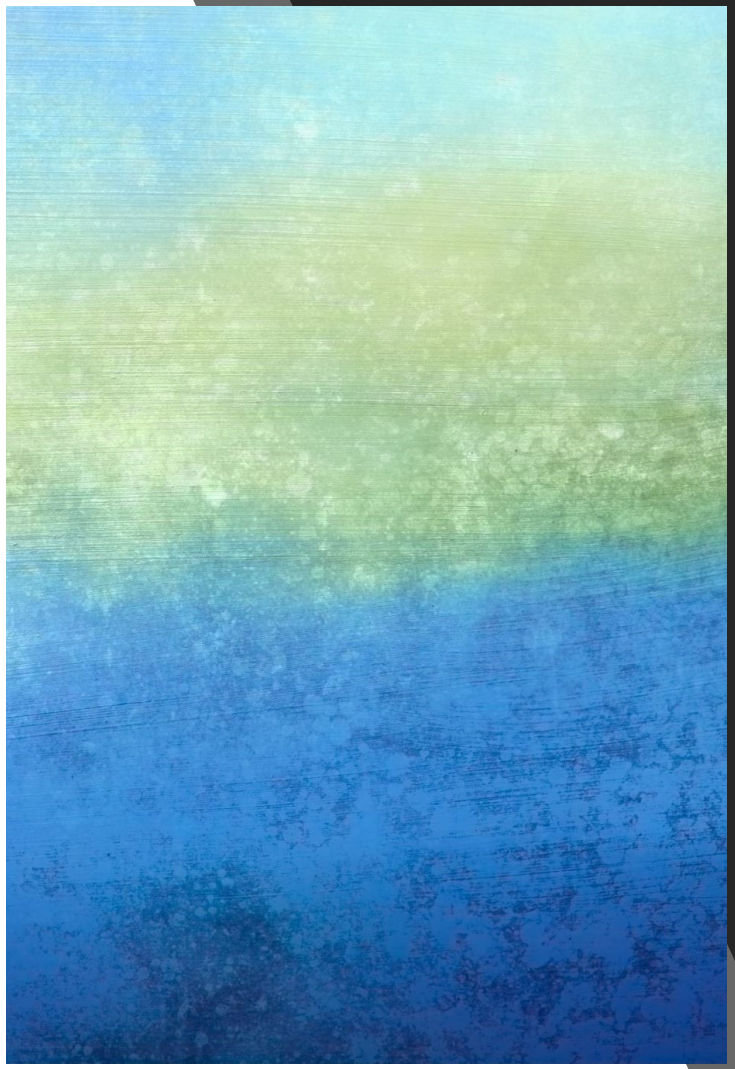
Quantitative data to be generated for HCBD

Life-cycle step	NIP Quantitative data to be generated	Unit measure	Remarks
Use (historical/current)	HCBD used as by-product (especially for use in agricultural sector, industrial manufacture, purification of gas streams, electrical equipment and re-distillation and reutilization in the production process (only in case of closed applications))	Tonnes	
	HCBD used to manufacture article/products (especially transformers, heat exchange and hydraulic fluids)	Tonnes	
	HCBD containing products and articles in use (especially transformers, heat exchange and hydraulic fluids)	Tonnes	
Waste stockpiles	HCBD containing waste stockpiles	Tonnes	Data requested by Art. 15 report
	Related HCBD content	Percentage (%)	
Contaminated sites	Potentially contaminated/contaminated sites	Number	

Potential sources of information

Production	Stakeholders
General stakeholders	• Ministry of environment • Sector ministries: Ministry responsible for industries; • Ministry responsible for waste management; • NIP coordinator and steering committee; • Stockholm/Basel Convention focal points (and Basel stakeholders); • Custom authorities; • NGOs working on POPs/chemicals.
Production organochlorine solvent and other relevant organochlorine substances	• Authorities granting production permits; • Industry producing chlorinated solvents; • Chlorine industry; • Waste management facility owners; • Custom authorities.
(Former) uses & stockpiles • Transformers • Hydraulic/heat exchange fuel; lubricant oils • Agricultural sector	• Utility sector; other transformers owners; • Mining sector; • Industry producing and trading oils and lubricants; • Authorities granting related use/production permits; • Waste management facility owners; • Ministries responsible for agriculture and health; • Pesticide producers/importers; • Import/export of HCBD containing waste; • Custom authorities.
Thermal facilities with unintentional production	• Magnesium industry; • Aluminium industry; secondary copper industry; • Hazardous waste incinerator combusting waste with high chlorine content; • Unintentionally produced POPs (UPOPs) task team leader.
Contaminated sites	• Relevant government organizations and impacted city authority; • Producers of chlorinated solvents and other relevant organochlorines; • Manufacturers using or having used HCBD; • Engineering offices specialized in contaminated sites; • University or research institute working on contaminated sites; • Community-based organizations (CBOs) and NGOs working on contaminated sites or related issues; • Labour union.

Source: UNEP. 2019. Guidance on preparing inventories of hexachlorobutadiene (HCBD). UNEP/POPS/COP.8/INF/18 (revised 2019)

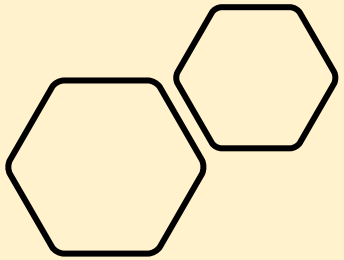


Guidance documents

Guidance on preparing inventories of hexachlorobutadiene (HCBD). UNEP/POPS/COP.8/INF/18 (revised 2019)

http://chm.pops.int/Implementation/NationalImplementationPlans/Guidance/tabid/7730/Default.aspx

Collection of information and data for HCBD production



- Information on HCBD separation from the production of organochlorine solvents or related chemicals and marketed as product

Processes with a high generation of HCBD (BUA 1991; UNEP 2013a) where HCBD recovery might take place

Process	HCBD concentration in the raw product
Conventional low-pressure chlorolysis for the manufacturing of perchloroethylene and carbon tetrachloride	5% (50,000 mg/kg)
Optimized low-pressure chlorolysis for the manufacturing of perchloroethylene and carbon tetrachloride	0.2 to 0.5% (2000 to 5000 mg/kg)
Manufacturing of tetrachloride and trichloroethylene from acetylene and chlorine and subsequent decomposition to carbon tetrachloride and trichloroethylene	0.4% (4000 mg/kg)
Manufacturing of hexachlorocyclopentadiene	0.2 to 1.11 % 2000.11,100 mg/kg)

Collection of information and data for HCBD in import and export for intentional use

Information on imports or exports for environmentally sound disposal

Information on import and export for use (this might still take place intentionally or unintentionally, and HCBD is still listed on large chemical trading platforms)

Currently HCBD is not listed in the Rotterdam Convention, so HCBD is not subject to the Prior Inform Consent (PIC) procedure and does not have a specific Harmonized System (HS) code

HCBD is traded under the HS code "Other unsaturated chlorinated derivatives of acyclic hydrocarbons" with other chemicals

The current HS code is not specific enough for assessing imports of HCBD, however, the HS code in combination with the CAS number or trade names (see Table 2 of the guidance) could be used for the search of HCBD at the custom level

Collection of information and data for HCBD in the production of trichloroethylene and hexachlorocyclopentadiene

Current and former trichloroethylene and hexachlorocyclopentadiene production volumes

Current management of HCBD containing residues (in particular it should be assessed if HCBD is separated from the waste and is commercially marketed)

Past uses of HCBD from the respective production (in case HCBD is or has been separated)

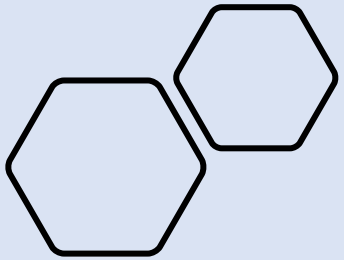
Wastes and their management and related stockpiles from current and former production and impacted landfills

*A questionnaire has been developed for gathering information from current and former producers of chlorinated solvents and other productions possibly relevant for HCBD generation (Annex 1 of the Guidance on preparing inventories of hexachlorobutadiene (HCBD).

Processes with proven or reported potential formation of HCBD where HCBD recovery is unlikely

Process	**HCBD concentration (mg/kg)**	**Reference**
Dichloroethane/Vinyl chloride monomer (EDC/VCM)	12,000 mg/kg (in the waste)*	Dow Chemicals (1990)
Tetrachlomethane (high-pressure chlorolysis or stepwise chlorination)	<1 mg/kg (raw product)	BUA 1991
Allyl chloride and epichlorohydrin	Suspected but no data	(U.S. EPA 1980; Environment Canada 2000; VROM 2002)
Chloroprene rubber	Suspected but no data	Mumma and Lawless 1975
Production of Chlorine (graphite electrodes)	<10000 mg/kg in the waste	Mumma and Lawless 1975

Collection of information and data for HCBD in transformer fluid and heat exchanger and hydraulic fluid



- Information on capacitors and transformers potentially containing HCBD
- Information on HCBD in heat-transfer liquids and hydraulic fluids (could be assessed within the assessment of PCBs and PCNs in these uses)

Collection of information and data for HCBD in obsolete pesticides

In the past, HCBD has been used for pesticidal/phytosanitary purposes, for example, to combat soil pests including use as fumigant, as seed dressing, as fungicide, as pesticide and as biocide

While no current use of HCBD as pesticide has been reported, stockpiles containing or contaminated with HCBD might still exist

HCBD should be included within the POPs pesticide stockpiles assessment

Collection of information and data for HCBD containing waste

Information on the current and former management of production residues containing HCBD

Information on incineration of waste, technology used and appropriateness and related residues and disposal

Information on disposal of production waste and residues to landfills

Potential HCBD contaminated sites

Life cycle stage; Sector	Activities	Locations (potential other POPs)
HCBD production and production of chlorinated solvents	(Former) production of HCBD	Production site (HCB)
	Disposal of waste from production	Landfills related to wastes from production (HCB)
	Former water discharge sites from production	River sediment and flood plains related to releases from production site (HCB)
Sites where HCBD has been used*	Industrial use sites	Sites of chlorine and CFC production Related landfills Related impacted surface waters (sediment and flood plains) (HCB; UPOPs)
	Production of transformers and other electrical equipment	(PCB; PCN)
	Fumigant, pesticide, biocide, fungicide, seed dressing	Site of fumigant, pesticide application (e.g. vineyards and other use area
	Other sites of production where HCBD has been used (e.g. lubricants, rubber)	Production sites and related landfills
Unintentional HCBD in thermal processes	Production of magnesium; Refining/degassing of magnesium and aluminium using hexachloroethane	Disposal sites of residues from production of magnesium and from refining of magnesium/aluminium
	Use of smoke grenades using hexachloroethane smoke	Military areas where smoke grenades were used (HCB; PCNs)
	Incineration of waste with high chlorine content	Sites where residues from these incineration processes are disposed
End-of-life treatment	Disposal of transformers and other equipment containing HCBD	Storage and treatment sites of transformers and other equipment (PCB; PCN)

UPOPs Data Collection

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Unintentional POPs

- Listed in Annex C
  - Polychlorinated dibenzo-p-dioxins (PCDD)
  - Polychlorinated dibenzofurans (PCDF)
  - Hexachlorobenzene (HCB)
  - Polychlorinated biphenyls (PCBs)
  - Pentachlorobenzene (PeCB)
  - Hexachlorobutadiene (HCBD)

UPOPs Source Groups Categories

1 - Waste Incineration

2 - Metal Production

3 - Heat and Power Generation

4 - Production of Mineral Products

5 - Transport

6 - Open Burning Processes

7 - Chemicals and Consumer Goods

8 - Miscellaneous

9 - Disposal

10 – Hot Spots

Overview of source categories included in group 1 - Waste incineration

1 - Waste incineration		Potential release route				
Source categories		Air	Water	Land	Product	Residue
a	Municipal solid waste incineration	X	(x)			X
b	Hazardous waste incineration	X	(x)			X
c	Medical waste incineration	X	(x)			X
d	Light-fraction shredder waste incineration	X				X
e	Sewage sludge incineration	X	(x)			X
f	Waste wood and waste biomass incineration	X				X
g	Destruction of animal carcasses	X				X

Overview of source categories included in group 2 Ferrous and Non-Ferrous Metal Production

2 - Ferrous and Non-Ferrous Metal Production		Potential release route				
Source categories		Air	Water	Land	Product	Residue
a	Iron ore sintering	X				x
b	Coke production	X	x	x	x	x
c	Iron and steel production and foundries	X				x
d	Copper production	X	x			x
e	Aluminum production	X				x
f	Lead production	X				x
g	Zinc production	X				x
h	Brass and bronze production	X				x
i	Magnesium production	x	x			x
j	Other non-ferrous metal production	x	x			x
k	Shredders	X				x
l	Thermal wire reclamation	X	(x)	x		x

Overview of source categories included in group 3 - Power Generation and Heating

3 - Power Generation and Heating		Potential release route				
Source categories		Air	Water	Land	Product	Residue
a	Fossil fuel power plants (coal, oil, gas, shale oil, and co-combustion of waste)	x				x
b	Biomass power plants (wood, straw, other biomass)	x				x
c	Landfill, biogas combustion	x				x
d	Household heating and cooking with biomass (wood, other biomass)	x		(x)		x
e	Household heating and cooking with fossil fuels (coal, oil, gas)	x		(x)		x

Overview of source categories included in group 4 - Mineral Products

4 - Mineral Products		Potential release route				
Source categories		Air	Water	Land	Product	Residue
a	Cement production	X				x
b	Lime production	X				x
c	Brick production	X				x
d	Glass production	X				x
e	Ceramics production	X				x
f	Asphalt mixing	X			x	x
g	Oil shale pyrolysis	X				x

Overview of source categories included in group 5 - Transport

5 - Transport		Potential release route				
Source categories		Air	Water	Land	Product	Residue
a	4-Stroke engines	X				
b	2-Stroke engines	X				
c	Diesel engines	X				(x)
d	Heavy oil fired engines	X				(x)

Overview of source categories included in Group 6 - Open Burning Processes

6 - Open Burning Processes		Potential release route				
Source categories		Air	Water	Land	Product	Residue
a	Biomass burning	X	(x)	X		(x)
b	Waste burning and accidental fires	X	(x)	X		(X)

Overview of source categories included in group 7 - Production and Use of Chemicals and Consumer Goods

7 - Production and Use of Chemicals and Consumer Goods		Potential release route				
Source categories		Air	Water	Land	Product	Residue
a	Pulp and paper production	x	x		x	
b	Chlorinated inorganic chemicals	x	X		X	X
c	Chlorinated aliphatic chemicals	x	X	(x)	X	X
d	Chlorinated aromatic chemicals	x	X	(x)	X	X
e	Other chlorinated and non-chlorinated chemicals	x	X	(x)	X	X
f	Petroleum production	x				x
g	Textile production		x		x	x
h	Leather refining		x		x	x

Overview of source categories included in group 8 - Miscellaneous

8 - Miscellaneous		Potential release route				
Source categories		Air	Water	Land	Product	Residue
a	Drying of biomass	x			x	x
b	Crematoria	x				X
c	Smoke houses	x			x	X
d	Dry cleaning residues		x		x	x
e	Tobacco smoking	x				x

Overview of source categories included in group 9 - Disposal

9 - Disposal		Potential release route				
	Source categories	**Air**	**Water**	**Land**	**Product**	**Residue**
a	Landfills, Waste Dumps and Landfill Mining		x	X		
b	Sewage / sewage treatment	(x)	x	x	x	x
c	Open water dumping		x	X*		
d	Composting			x	x	
e	Waste oil treatment (non-thermal)	x	x	x	x	x

Objective of the inventory

- Carry out initial and regularly updated evaluations of current and projected releases of the chemicals listed in Annex C of the Convention
- Assess the situation regarding BAT/BEP within industries and facilities listed in Annex C
- Detail existing laws and policies relating to the management of releases of these chemicals and to evaluate their effectiveness and deficiencies
- Link and where feasible integrate the action plan on reduction of unintentionally produced POPs with other relevant activities, such as waste/resource management and cleaner production, and to assess synergies with the reduction of mercury and greenhouse gas emissions

Outputs and Outcomes

Initial and updated inventories of releases of chemicals listed in Annex C of the Convention to all media, their presence in products and wastes, and indications of potentially contaminated sites

Report on the BAT/BEP situation within industries and facilities listed in Annex C

Initial and updated reports on the relevant laws, policies, and enforcement and control systems that control releases, on determining technology and operational restrictions applied to source categories, and on the efficacy of these measures

A plan for linking and where appropriate integrating of reduction of unintentionally POPs with other activities in the respective sectors (waste/resource management, clean production). Synergies are expected for the reduction of mercury emission and possibly with reduction of GHG emission

Guidance documents

UNEP Toolkit for Identification and Quantification of Releases of Dioxins, Furans and Other Unintentional POPs under Article 5 of the Stockholm Convention on Persistent Organic Pollutants

http://toolkit.pops.int/

Collection of information and data for UPOPs release estimates

- Information on the 10 source groups from the new/current UNEP toolkit 2013 (http://toolkit.pops.int) present in the country
- Information on individual source categories in the source groups present or possibly present in the country
- Information on activity rates and other detailed information for all source groups and related source categories present or potentially present in the country
- Selection of relevant emission factors for all source groups and related source categories present or potentially present in the country

✓ As some source categories can be similar with those for mercury, GHG emissions, the activity rates collected for compiling those inventories could be used to estimate UPOPs release estimates **(see separate Excel document)**

✓ If those inventories do not exist, the information on UPOPs activity rates collected during this inventory can be made available to those inventories (development of one database for UPOP, GHG, mercury and possibly other releases; evaluation of PRTR)

Calculation of Source Strength (Dioxin release/year)

- Gather “activity statistics” which describe quantities of a process (e.g., tonnes of wastes incinerated; tonnes steel produced per year), and use “Emission Factors” (EF) which describe release of pollutant to each medium per unit of activity (e.g., µg I-TEQ/ton)
- Multiplying EF and Activity Rate yields annual releases of a Source (Source Strength)

Annual PCDD/PCDF emission estimate:

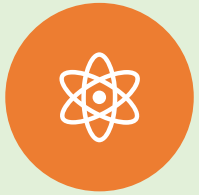
Source Strength (gram TEQ Dioxin emission per year)

= Emission Factor x Activity Rate

Total annual PCDD/PCDF release = sum of annual releases from all source groups & over all release vectors

- **To automatically estimate releases use separate Excel document**

Potential UPOPs contaminated sites



Production of chlorine (in particular chlor-alkali processes having used graphite electrodes)

Production sites of PCDD/PCDF precursors (e.g. chlorophenols, chlorinated pesticides, PCB) or HCB precursors (e.g. perchlorethene, trichloroethene, tetrachlormethane) and related waste deposits

Factories having used elemental chlorine in production processes (e.g. magnesium production, or pulp and paper production) with high PCDD/PCDF releases often in solids/sludges or to water, including related contaminated sediments

Use or application sites of organochlorine compounds known to contain PCDD/PCDF or having PCDD/PCDF precursor potential (production sites of PCB-filled equipment, PCP use in wood preservation, application areas of pesticides containing PCDD/PCDF)

End-of-life storage and disposal/dumping sites of organochlorine compounds known to contain PCDD/PCDF or having PCDD/PCDF precursor potential (obsolete pesticide storage/burial, PCB storage)

Thermal sources with high historic releases of PCDD/PCDF to air, water or wastes and related contamination

Accidents including fires with liquids and other materials polluted with PCDD/PCDF (often taking place at sources mentioned above)