Guidance on preparing inventories of short-chain chlorinated paraffins (SCCPs)

Detailed guidance

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Author: Dr. Roland Weber, POPs Environmental Consulting, 73527 Schwäbisch Gmünd, Germany

Contact information:

Secretariat of the Basel, Rotterdam and Stockholm conventions
Office address: 11-13, Chemin des Anémones - 1219 Châtelaine, Switzerland
Postal address: Avenue de la Paix 8-14, 1211 Genève 10, Switzerland
Tel.: +41 22 917 8271
Email: brs@un.org

Table of contents

List of Tables

List of Figures

Abbreviations and acronyms

BFR	Brominated flame retardant
BR	Polybutadiene rubber
CAS	Chemical Abstracts Service
CPs	Chlorinated paraffins
CR	Chloroprene rubber
CSM	Conceptual site model
CSO	Civil society organisation
DDT	Dichlorodiphenyltrichloroethane
ECHA	European Chemical Agency
ECNI	Electron capture negative ionization
EU	European Union
EVA	Ethylene-vinyl acetate
FR	Flame Retardant
GC	Gas chromatography
HBCD	Hexabromocyclododecane
HCH	Hexachlorocyclohexane
HS Code	Harmonized System Code
IARC	International Agency for Research on Cancer
ICAIA	International Chlorinated Alkanes Industry Association
IPCS	International Programme on Chemical Safety
ISO	International Organization for Standardization
LCCPs	Long-chain chlorinated paraffins
MCCPs	Medium-chain chlorinated paraffins
MS	Mass spectrometer
MWF	Metal working fluid
NBR	acrylonitrile and butadiene rubber
NGO	Non-governmental organisation
NR	Natural rubber
PBDEs	Polybrominated diphenyl ethers
PCBs	Polychlorinated biphenyls
PCDDs	Polychlorinated dibenzo-*p*-dioxins
PCDFs	Polychlorinated dibenzofurans
PCNs	Polychlorinated naphthalenes
PCP	Pentachlorophenol
POPs	Persistent Organic Pollutants
PSI	Preliminary site investigation
PVC	Polyvinylchloride
RAPEX	Rapid Alert System for Non-Food Consumer Products (EU)
SBR	Styrene and butadiene rubber
SC	Stockholm Convention
SCCPs	Short-chain chlorinated paraffins
STP	Sewage treatment plant
UNECE	United Nations Economic Commission for Europe
UNEP	United Nation Environment Program
UNIDO	United Nation Industrial Development Organisation
USEPA	United States Environmental Protection Agency

1. Introduction

1.1. Short-chain chlorinated paraffins under the Stockholm Convention

Chlorinated paraffins (CPs), or polychlorinated n-alkanes (CA), are complex mixtures of substances with the general molecular formula CxH(2x-y+2)Cly. CPs are characterised by the carbon-chain length range of their n-alkanes and by the chlorine content of the product. According to their chain length, CPs are categorized into short-chain CPs (SCCPs, C10–C13), medium-chain CPs (MCCPs, C14–C17) and long-chain CPs (LCCPs, C18–C30) (IARC, 1990, Glüge et al., 2016).

In May 2017, by decision SC-8/11, the Conference of the Parties to the Stockholm Convention (SC) on Persistent Organic Pollutants (POPs) amended Annex A to the Convention to list short-chain chlorinated paraffins (SCCPs; Alkanes, C10-13, chloro: straight-chain chlorinated hydrocarbons) with chain lengths ranging from C10 to C13 and a content of chlorine greater than 48% by weight. Additionally, a limit for the presence of SCCPs in other chlorinated paraffin (CP) mixtures was set at 1% by weight. CPs with a SCCP content >1% are therefore also considered POPs.

SCCPs were listed with specific exemptions for production and the use as detailed in Table 1-1 below.

Table 1-1: Specific exemptions for short-chain chlorinated paraffins

Chemical	**Activity**	**Specific exemption**
Short-chain chlorinated paraffins (Alkanes, C_{10-13}, chloro)$^{+}$: straight-chain chlorinated hydrocarbons with chain lengths ranging from C_{10} to C_{13} and a content of chlorine greater than 48%, 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.	Production	As allowed for the Parties listed in the Register
	Use	• Additives in the production of transmission belts in the natural and synthetic rubber industry; • Spare parts of rubber conveyor belts in the mining and forestry industries; • Leather industry, in particular fatliquoring in leather; • 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; • Tubes for outdoor decoration bulbs; • Waterproofing and fire-retardant paints; • Adhesives; • Metal processing; • Secondary plasticizers in flexible polyvinyl chloride, except in toys and children's products.

On 18 December 2017, pursuant to paragraph 4 of Article 21 of the Convention, the amendments were communicated by the depositary to all Parties. On 18 December 2018, one year after the date of communication by the depository, the amendments listing SCCPs in Annexes A to the Convention entered into force for most Parties[1]. Parties to the Convention for which the amendments enter into force have to meet the obligations under the Convention leading to the elimination of SCCPs.

[1] Amendments shall not enter into force for those Parties that have submitted a notification pursuant to the provisions of paragraph 3(b) of Article 22 of the Stockholm Convention. Also, in accordance with paragraph 4 of Article 22, the amendment will not enter into force with respect to any Party that has made a declaration regarding the amendment to the Annexes in accordance with paragraph 4 of Article 25. Such Parties shall deposit their instruments of ratification regarding the amendment, in which case the amendment shall enter into force for the Party on the ninetieth (90) day after the date of deposit with the Depositary.

Like all POPs, the listed SCCPs have toxic properties, resist degradation, and bio-accumulate in fatty tissues. They are transported through air, water and migratory species, across international boundaries and deposited far from their place of release, where they accumulate in terrestrial and aquatic ecosystems.

More information on the chemical properties, environmental fate, monitoring data, environmental and health risks of SCCPs can be found in the risk profile (UNEP/POPS/POPRC.11/10/Add.2) (UNEP 2015a) and additional information (UNEP/POPS/POPRC.11/INF/14) adopted by the POPs Review Committee of the Stockholm Convention in 2015.[2] The documents also include information on global production and use of SCCPs and alternatives to SCCPs available at the time of the adoption.

1.2. Purpose of the guidance

The purpose of this document is to provide Parties with guidance on the establishment of inventories of the SCCPs. The target audience is national focal points of the Convention and those involved in the process for NIP review and update, in particular the task teams and coordinators responsible for establishing the inventory. The document and inventory will also be of interest to other stakeholders concerned with the management and elimination of SCCPs.

In accordance with Article 7 of the Convention, following the decisions of the Conference of the Parties (COP) to list new POPs in the Convention, each Party shall review and update their national implementation plans (NIPs). The updated NIPs should be transmitted to the COP within two years of the date in which these amendments entered into force. In accordance with Article 15, Parties are required to report to the Conference of the Parties on the measures it has taken to implement the provisions of the Convention and on the effectiveness of such measures in meeting the objectives of the Convention.

To develop effective strategies for the elimination of SCCPs and the environmentally sound management of products, stockpiles, materials in recycling and wastes containing SCCPs, Parties need to acquire a sound understanding of their national situation concerning these chemicals. Such information can be obtained through an inventory of SCCPs. The establishment of inventories is thus one of the important phases in the development of NIPs (decision SC-2/7).

Article 6, paragraph 1 (a), of the Stockholm Convention requires each Party to develop appropriate strategies for the identification of products and articles in use and wastes consisting of, containing or contaminated with POPs. The identification of the current use of SCCPs and wastes containing SCCPs is the starting point for their effective environmentally sound management.

The information obtained through the establishment of the inventory of SCCPs could be compiled in the sample tables in Appendix 2 and reported pursuant to Article 15 in the respective reporting cycle.

Since the main uses of SCCPs correspond to many former open applications of polychlorinated biphenyls (PCBs) and polychlorinated naphthalenes (PCNs), the inventory of SCCPs should be linked or combined with the inventory of PCNs and PCBs in open application and the related guidance considered (Secretariat of the Stockholm Convention 2017a).

This document should be used in conjunction with documents developed under the Basel Convention which provide guidance on the development of identifications strategies and inventories in relation to POPs wastes and in particular SCCPs wastes:

- General technical guidelines on the environmentally sound management of wastes consisting of, containing or contaminated with persistent organic pollutants (UNEP 2018a);
- Draft technical guidelines on the environmentally sound management of wastes consisting of, containing or contaminated with short-chain chlorinated paraffins (UNEP 2018b);
- Methodological guide for the development of inventories of hazardous wastes and other wastes under the Basel Convention (UNEP 2015b).

1.3. Other guidance documents to be consulted

The users of this guidance should also consult *General guidance on POPs inventory development* (UNEP/POPS/COP.9/INF/19/Add.1) (UNEP, 2019) and other guidance documents to support review and updating of national implementation plans available on the website of the Stockholm Convention.[3]

[2] http://chm.pops.int/tabid/243/Default.aspx.

[3] http://chm.pops.int/tabid/7730/Default.aspx.

Furthermore, this document should be used in conjunction with documents developed under the Basel Convention which provide guidance on the development of identification strategies and inventories in relation to POPs wastes including SCCPs:

- General technical guidelines on the environmentally sound management of wastes consisting of, containing or contaminated with persistent organic pollutants (UNEP/CHW/COP.14/7/Add.1) (UNEP, 2018a);
- Draft technical guidelines on the environmentally sound management of wastes consisting of, containing or contaminated with short-chain chlorinated paraffins (UNEP/CHW/COP.14/7/Add.2) (UNEP, 2018b);
- Methodological guide for the development of inventories of hazardous wastes and other wastes under the Basel Convention (UNEP/CHW/COP.12/9/Add.1) (UNEP, 2015b);
- Draft guidance on preparing inventories of polychlorinated naphthalenes (PCNs) (UNEP/POPS/COP.8/INF/19, revised 2018) (UNEP, 2018c).

1.4. Objectives of the inventory

The main objective of developing an inventory is to acquire information for the review of the NIP and the various information requirements of the Convention (e.g. Article 15 reporting) as well as for implementation of their obligations under the Stockholm Convention.

- More specifically, the objectives are to:
- Provide the basis for identification of the national priorities in the NIP (i.e. the quantities of the POP that are produced, used, stored as stockpiles, and generated as waste in the country, identify the important economic sectors and operators and the type of actions required for those sectors, estimate the capacities needed for implementation, identify sources that should be prioritised);
- Identify dispersive uses in open applications that may pose a risk to humans and the environment for prioritisation.
- Provide a basis for the evaluation whether the current national use, production, chemical and waste management meet the requirements of the Convention and identify areas where they do not;
- Provide information on the need for specific exemptions or acceptable purposes, if available;
- Support Article 15 reporting to the Convention;
- Identify the relevant stakeholders in the government, academia, industry, waste management, commerce, NGOs, etc.;
- Identify areas where financial or technical support are needed to fill in the information gaps in the inventory/fulfil the obligations of the Convention.

The information to be obtained for the inventory may include (see also Appendix 2):

- Amounts of production, import, export of SCCPs at the national level;
- Uses of SCCPs in the country;
- Presence of products/articles consisting of, containing or contaminated with SCCPs on the market and in service;
- Imports of products/articles consisting of, containing or contaminated with SCCPs into the country;
- Waste streams of importance consisting of, containing or contaminated with SCCPs;
- Disposal practices for the POP, products/articles consisting of, containing or contaminated with SCCPs and its related substances when they become wastes;
- Stockpiles of SCCPs;
- Releases of SCCPs into the environment from point sources;
- Sites potentially contaminated with SCCPs;
- Potential harmful SCCPs exposure of humans and environment.
- Import/export of wastes containing or contaminated by SCCPs;

- Alternatives to SCCPs in exempted uses and other uses.

Information collected through inventories will provide broader understanding of the sources of SCCPs, the scope of their impacts and the risks that they pose to human health and the environment in a country. The information is important for Parties to evaluate whether they comply with obligations under the Convention regarding SCCPs and identify areas where they need to develop effective strategies and action plans for managing these POPs in order to meet the obligations. Information collected as part of the inventory will also provide a valuable basis for Parties to report to the Conference of the Parties on measures taken to implement the provisions of the Convention and the effectiveness of such measures (reporting under Article 15).

The inventory process is usually iterative. In establishing the inventory of SCCPs for the first time, Parties will also identify resources and technical capacity needed to further improve the accuracy of the inventory.

1.5. Structure of the guidance

The guidance has nine chapters and nine appendices as follows:

Chapter 1: Describes the listing, outlines the purpose of the guidance and the major objectives for undertaking an inventory;

Chapter 2: Provides necessary background information on SCCPs for undertaking the inventory;

Chapter 3: Outlines the main steps involved in conducting an inventory of SCCPs in production, use and wastes. It also provides an overview of considerations that are important for planning the inventory and defining its scope;

Chapter 4: Provides guidance on inventory of production of SCCP and import/export of SCCP;

Chapter 5: Provides guidance on developing an inventory of the use of SCCP in the manufacturing of products and articles (PVC, rubber, sealants/adhesives);

Chapter 6: Provides guidance on developing an inventory of SCCPs in lubricants and metal working fluids;

Chapter 7: Provides guidance on developing an inventory of SCCPs in products, use and stocks;

Chapter 8: Provides guidance on developing an inventory of wastes containing SCCPs;

Chapter 9: Provides guidance on developing an inventory of sites potentially contaminated by SCCPs;

Appendix 1. Consumer products containing SCCPs on the EU market

Appendix 2. Examples of tables to compile information

Appendix 3. Overview of sampling and analysis of SCCPs

Appendix 4. Questionnaire for compiling information on the production and import/export of SCCPs and other chlorinated paraffins possibly containing SCCPs

Appendix 5. Questionnaire for compiling information on the use of SCCPs in the manufacturing and import of PVC products

Appendix 6. Questionnaire for compiling information on the use of SCCPs in the manufacturing and import of SCCPs in rubber

Appendix 7. Questionnaire for compiling information on the production, import and use of SCCPs in metal working fluids

Appendix 8. Questionnaire for compiling information on the use of SCCPs in the production, import or use of SCCPs in paints and coating

Appendix 9. Questionnaire for compiling information on products containing SCCPs in import, retail or sale

The key design and content features of this guidance are:

Step by step approach: The guidance is designed to provide a step-by-step and a tiered approach that can be followed and implemented by a wide variety of users. A five-step approach is provided for the overall inventory from the planning stage to preparation of the inventory report (see Chapter 3). Furthermore, a tiered approach (Tier I Initial assessment; Tier II Basic Inventory; Tier III In-depth inventory) provides the flexibility to countries with

different capacities to develop an inventory. More detailed and specific guidance on stakeholders, data collection and other information for key sectors can be found in Chapters 3 to 9.

Questionnaires and inventory format: Questionnaire examples are provided to support the gathering of information as described above.

While tables for compilation of data are given as examples, no specific inventory format is suggested in this inventory guidance to keep it flexible considering the tiered approach.

2. Background information on SCCPs

2.1. Characteristics of SCCPs

SCCPs are complex chlorinated paraffin mixtures that are viscous, colourless or yellowish dense oils (Environment Canada 2008) with a range of synonyms (Table 2-1).

SCCPs and other CPs are produced by the chlorination of n-alkanes feedstocks (see 2.2). The feedstock used determines the carbon chain lengths in the final CP product. Using defined feedstocks of short-chain (C10-13), medium-chain (C14-17), and long-chain (C18+) n-alkanes result in the production of SCCPs, MCCPs and LCCPs.

There are a wide range of possible other CP-mixtures of different n-alkane chain length. Also in commercial products the chain length of feedstocks vary significantly, for example, an Asian country produces a CP mixture with chain lengths ranging from C10 to C20. Such a feedstock (i.e., C10 to C20) or a feedstock that contains trace amounts of short-chain lengths, may result in CP mixtures that contain SCCPs (UNEP 2010; UNEP 2018). A recent study on CP leaching from kitchen food blenders on the European market showed that still CPs with a high share of SCCPs are used in products and that all used CP mixtures were significantly above 1% SCCP content and would need to be classified as POPs-CPs (Table A-4; Yuan et al. 2017). In addition, the feedstock can contain other chemicals such as aromatic compounds and alkenes (UNEP/POPS/POPRC.6/INF/15) with detection of PCNs and PCBs as unintentional POPs sometimes above the low POPs limit (Takasuga et al. 2012, 2013).

By variation of the degree of chlorination (typically 30-70% for commercial substances with major use of 52%) different technical SCCP mixtures can be produced. The chlorine content determines the physical and chemical properties of the SCCPs. Increasing the chlorine content leads to an increase in viscosity and a decrease in volatility. Only SCCPs with a chlorine content of more than 48% by weight are POPs. Therefore, CP mixtures containing 1% of SCCPs with more than 48% chlorine determine if a CP mixture is considered a POP.

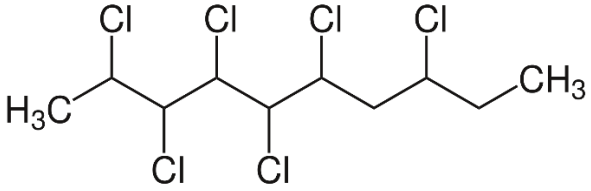
Certain Chemical Abstract Service (CAS) numbers cover specific CP mixtures like SCCPs or MCCPs or other defined chain length (Table 2-1). The CAS number of SCCPs is 85535-84-8. However around 40 CAS numbers have been used to describe the whole chlorinated paraffin family (ECHA 2008a). Some cover Alkanes, C10-13, chloro, and those that might contain SCCPs are listed in Table 2-1 below (the list is not meant to be exhaustive). Some CAS numbers for CPs do not specify chain length and might contain POP-CPs (Table 2-1). However also MCCPs might contain SCCPs levels exceeding the 1% limit set by the convention. Overall, CAS numbers often cover both POP-CPs as well as non-POP-CPs such as SCCPs with 48% and less chlorine or MCCPs (UNEP 2018). Analysis can clarify the SCCP content and chlorination degree to determine the POP-CP content and classification.

The SCCPs synonyms are also listed in Table 2-1. The synonyms are general in nature, and encompass more than the substance represented by either the CAS number given, or C10-13 chlorinated alkanes in general.

SCCPs are relatively inert substances, which are resistant to chemical degradation and are hydrolytically stable and possess good thermal stability. Therefore, they can be used for a wide range of industrial uses (see 2.3).

SCCPs are soluble in chlorinated solvents, aromatic hydrocarbons, ketones, esters, ethers, mineral oils and some cutting oils (IARC 1990, Fiedler 2010). The solubility of C10 and C13 CPs in water is estimated in the range of 6.4–2370 µg/L (BUA 1992) and landfill leachates had up to 614 µg/L (Harstad 2006).

Table 2-1: Names, synonyms and CAS numbers and selected properties of SCCPs

Common name (abbreviation)	Short-chain chlorinated paraffins (SCCPs)
IUPAC name	Alkanes, C_{10-13}, chloro;
Synonyms Several synonyms are general in nature, and may encompass much more than the substance represented by either the CAS number given or C10-13 chlorinated alkanes in general (UNEP 2018). **Molecular structure example**	Alkanes, chlorinated; alkanes (C_{10-13}), chloro-(50%-70%); alkanes (C_{10-13}), chloro-(60%); chlorinated alkanes, chlorinated paraffins; chloroalkanes; chlorocarbons; polychlorinated alkanes; paraffins chlorinated. **Figure 2-1:** Structure of a SCCP congener ($C_{10}Cl_6$) 
Molecular formula	CxH(2x-y+2)Cly, where x=10-13 and y=1-13
Chemical Abstract Service (CAS) Numbers of SCCPs and CPs which might contain SCCPs	85535-84-8[4] (Alkanes C10-C13, chloro); 71011-12-6 (Alkanes, C12-13, chloro) 85536-22-7 (Alkanes, C12-14, chloro) 85681-73-8 (Alkanes, C10-14, chloro) 108171-26-2 (Alkanes, C10-12, chloro) 68920-70-7 (Alkanes, C6-18, chloro) 84082-38-2 (Alkanes, C10-21, chloro) 97659-46-6 (Alkanes, C10-26, chloro) 84776-06-7 (Alkanes, C10-32, chloro) CAS numbers without defined chain length which might contain SCCP>1%: 61788-76-9 (Alkanes, chloro); 63449-39-8 (Paraffin waxes and hydrocarbon waxes, chloro); 97553-43-0 Paraffins, normal C>10, chloro) CAS number of MCCPs: 85535-85-9 Alkanes, C14-17, chloro (which might possibly contain >1% SCCP depending on the producer)[5].
Generic trade names of chlorinated paraffins (IARC, 1990 and update)	A 70; A 70 (wax); Adekacizer E; Arubren; Cereclor; Chlorinated paraffins (CPs); Chlorcosane; Chlorocosane Chlorez; Chlorofin; Chloroflo; Chlorparaffin; Chlorowax, Chlorowax 500AO; Chlorowax 45AO, Chlorowax 52AO; Cloparin; Cloparol; Clorafin; CP F; CP-52, CP-55, CP-60, CP-70, CW; Diablo; Derminolfett; Derminolöl; EDC-tar; Electrofine; Enpara; FL X; Hordaflam; Hordaflex; Hordalub; Hulz; KhP; Meflex; Monocizer; Paroil; Poliks; Tenekil; Toyoparax; Unichlor
Pour point (no distinct melting)	-30.5 °C (49% chlorine); 20.5 °C (70% chlorine) (ECB, 2000)
Water solubility	0.15 – 0.47 mg/L (ECB, 2000) 0.006 – 2.2 mg/L (BUA 1992)
Toxicity	SCCPs are classified in Group 2B by the IARC - possibly carcinogenic to humans based on sufficient evidence of carcinogenicity in experimental animals and mechanistic considerations (IARC, 1990).

4 This CAS number represents the commercial SCCP product that is produced by the chlorination of a single hydrocarbon fraction consisting of n-alkanes that have a carbon chain length distribution consisting of 10, 11, 12 and 13 carbon atoms; however, this CAS number does not specify the degree of chlorination of the SCCP. Please note that there are other CAS numbers which may represent or contain SCCPs. Please refer to Table 3 of UNEP/POPS/POPRC.6/INF/15 for more CAS numbers that may be relevant.

5 While MCCP can be produced with SCCP content <1% (Euro Chlor 2018), many products were found with CP mixtures with a SCCP content above 1% (e.g. Table A-4).

2.2. Production of SCCPs and other CPs

Chlorinated paraffins or chlorinated n-alkanes, including SCCPs, have been produced commercially since the 1930s with some minor production already before 1920s (Glüge et al. 2016). The mixtures are produced by reacting normal paraffin fractions obtained from petroleum distillation with gaseous chlorine exothermically at 80-120 °C in the liquid phase (Zitko & Arsenault, 1974, IARC, 1990). The degree of chlorination is indicated by the percentage number following the CP. The most used CP mixtures has a degree of chlorination of 52% (CP-52) with a market share of nearly 90% while there is a wide range of other degrees of chlorination sharing the remaining (CP-13, CP-30, CP-40, CP-42, CP-45, CP55, CP-60 and CP-70) (ICAIA 2013; UNEP 2015a).

Annual CP global production volumes between 1944 and 1977 were reported to be between 20,000 and 35,000 tonnes per year (t/year), with the United States (US) as the major producer (Hardie 1964; Howard et al. 1975). The production increased significantly after 1977, when Japan and Europe increased or started production (Zitko, 1980; IARC, 1990; Tsunemi 2010). The highest production volumes were reached, however, only after 2006, when China scaled up its CP production from 260,000 t/year in 2006 to 1,000,000 t/year in 2013 and became the major producer (Xu et al. 2014; ICAIA 2012; 2013 and 2014. China reported in 2014 that no specific SCCP production data are available since production is related to several chlorinated paraffin products that do not distinguish SCCPs from other chlorinated paraffins (UNEP 2015a). Also the CP production in India has a high share of SCCPs. Countries producing SCCPs or other CP mixtures possibly contaminated by SCCPs are listed in Table 2-2.

Due to the uncertainty of the share of CP mixtures in some countries, only limited information is available on total SCCP production (UNEP 2015a). Glüge et al. (2016) estimated in their SCCP review that currently approx. 165,000 t of SCCPs are likely produced globally.

Table 2-2: Information on countries producing SCCPs or other CPs

Status SCCP or CP production	Countries	Reference
Production of SCCPs between 1993 and 2009	USA, Brazil, Germany, France, the UK, Italy, Japan	UNECE, 2007), (ECHA, 2008) (Brazil, 2007), (German Federal Environment Agency 2007), (Iino et al. 2005)
Stopped Production of SCCPs	Brazil, EU countries, Japan, Russia, United States	ICAIA 2012, 2013, 2014
Current Production of CP's of various lengths	Australia, Brazil, China, France, India, Italy, Japan, Russia, Spain, Slovakia, South Africa, UK	Eurochlor; UNEP 2015a, ICAIA 2012, 2013, 2014
Never had SCCP production	South Africa	ICAIA 2012

That frequently mixtures of SCCPs and MCCP are produced is revealed by the presence of mixtures in products as recently demonstrated by the monitoring of chlorinated paraffins in kitchen blenders where all detected CP-mixtures contained SCCPs above 4% and up to 59% (Table A-4; Yuan et al. 2017). On the other hand industry informed that it is possible to produce MCCPs with less than 1% of SCCPs (Eurochlor 2018). This is also indicated by the study of SCCP/MCCP contamination inside backing ovens used in Germany where 48% (10 out of 21) of the ovens contained high levels of MCCPs and only 3 also SCCPs with a share of 2.8%, 5.0% and 14.4% of the CP content (Gallistl et al. 2018).

Therefore, monitoring of SCCP in CP-mixtures in use and in products is needed to determine their SCCP content to decide on their POPs categorization.

2.3. Use of SCCPs in industrial processes and products

Chlorinated paraffins are chemicals with different carbon lengths and degrees of chlorination, which give different properties. Because of their versatility, they are used for a wide range of applications. Due to the flexibility in the degrees of chlorination, SCCPs were often substituted by MCCPs or 32 LCCPs with adjusted degrees of chlorination for the respective use. MCCPs and LCCPs with <1% SCCP content are not restricted under the Stockholm Convention.

SCCPs have been used to replace polychlorinated biphenyls (PCBs) and polychlorinated naphthalenes (PCNs) in a wide range of open applications (e.g. cables, sealants, paints). However, SCCPs have been reported to not be suitable for uses requiring high heat stability (e.g., capacitors, transformers) (Howard et al. 1975).

Uses have varied between countries and over time depending on the need of products in the respective country and the regulatory frame. SCCP were used as fire-retardant, plasticizer, water-repellent and for lubrication in different uses and products. The main SCCP uses were/are in polyvinylchloride (PVC), rubber, metal-working fluids and other lubricants, paints, coatings, sealants, adhesives, textiles and leather (see Table 2-3 below) and are all exempted (Table 1-1). Details on the individual uses in manufacturing of products are compiled in Chapter 5.1 and for consumer products and products for professional use in Chapter 7.1. Details on the use in metal working fluids and lubricants are described in Chapter 6.1.

A major use of SCCPs is in **PVC as secondary plasticizers** in applications such as electrical cables (IARC 1990, ECB 2000, 2008; USEPA 2009) (see Chapter 5.1.1). Market surveys in the EU revealed that SCCPs are also used in a wide range of PVC consumer products (see Appendix 1 and Appendix 3).

Another major use of SCCPs was in **natural and synthetic rubber products** as flame retardants (FRs) (ECB 2000, 2008). Rubber containing SCCPs has been used in conveyor belts, rubber cables, sound-insulating materials in hoses as well as seals in the electrical installation and in vehicles (see Chapter 5.1.2 and Table 5-1 therein).

SCCPs is used in **waterproofing or intumescent paints and coatings** as plasticizer or flame retardant to improve resistance to water and chemicals and reduce flammability (ECB 2000; USEPA 2009, UNEP 2015a, German Federal Environment Agency 2007). The paints are used mainly in industrial/specialist applications such as marine primer paints and fire-retardant paints (ECB 2000; RPA 2010), road marking paints, anti-corrosive coatings for metal surfaces, swimming pool coatings, decorative paints for internal and external surfaces (RPA 2010).

SCCPs have been used in the **leather industry** as fat liquoring agents (ESWI, 2011). They are usually applied to the moist dressed leather and normally in the upper price segment (ECB 2000).

SCCPs are also used in **adhesives/sealants** including chlorinated rubber coatings, polysulphide, polyurethane, acrylic and butyl sealants used in building and construction and in sealants for double and triple glazed windows (IARC 1990; ECB 2008, Danish EPA 2014; German Federal Environment Agency 2007).

SCCPs have been used in **textile finishes** as flame-resistant and water repellent in military tenting, sail cloths and industrial protective clothing and tarpaulins (ECB 2000). Typical applications for back-coated textiles included furniture upholstery, seating upholstery in transport applications, and interior textiles such as blinds and curtains (Zitko & Arsenault 1974; RPA, 2010).

SCCPs have been used as **metal working fluid and other lubricants** (Chapter 6). Uses are as extreme-pressure additives in metal-machining fluids (lubricants and coolants), engineering and metal working operations such as drilling, machining/cutting, drawing and stamping e.g. in the automobile industry, precision engineering industry and in machinery construction since around 1930 (IPCS 1996, ECB 2008). In the EU, 70% of all use of SCCPs were used as metal working lubricants in 1994 (RPA 2010), until the prohibition in 2003 (ECB 2008). Similarly, nearly all use of SCCPs in Canada was related to metalworking (Environment Canada, 2008).

As SCCPs have been used in plastics, textiles, leather, rubbers, inks, paints, adhesives and surface coatings, that are used to produce apparel, footwear and accessories, they are commonly found in materials and consumer articles (German Federal Environment Agency 2007, KEMI 2016, Appendix 1, 3). The articles containing SCCPs are mainly soft plastic items made of PVC (i.a. toys, beauty cases, exercise mats (PVC/EVA), stickers for wall decoration, dress costumes, etc.) (BTHA, 2016). It has also been demonstrated that the presence of CPs in household appliances can contaminate food during preparation and is an unexpected exposure pathway and should be addressed (Yuan et al. 2017: Gallistl et al. 2018).

Only a few former applications are no longer allowed in accordance with Annex A to the Stockholm Convention including solvent in a nasal spray, component in clear lacquers for wood and hardboard, fire-proofing of wood, paper-sizing, antistatic agents on nylon, and coating for tableted calcium hypochlorite, used in the treatment of sewage and swimming pool waters.

Table 2-3: Use sectors, applications and concentrations of SCCPs in products

Uses and application	**SCCP content (mg/kg)**	**Source**
PVC (Chapters 5.1.1; 6.1.1) (e.g. cables, consumer goods)	Up to 100 000	BTHA 2016 KEMI 2016
EVA foam (Chapter 5.1.1; 6.1.1) (mats; others)	Up to 70 000	BTHA 2016, Appendix 1

Rubber (Chapters 5.1.2; 7.1.2) (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 (Chapter 5.1.3; 7.1.3) (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 (Chapter 5.1.4) (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 (Chapter 5.1.5)	50 000-140 000 200 000-300 0000	ECB 2008 Danish EPA 2014
Textiles (Chapter 5.1.6) (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 (Chapter 6) (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 (Chapter 6) (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)

SCCPs have been under scrutiny for their health and environmental impacts since the 1990s, and some countries had already put in place restrictions for use of SCCPs. Restrictions had been implemented in e.g. Albania, Canada, EU, Norway and the United States (UNEP 2016). Norway banned SCCPs in 2002. Canada stopped the production of chlorinated paraffins by 2008 (Environment Canada 2008), and the use of SCCPs was prohibited in 2013 (Government of Canada 2013). Use of SCCPs in metalworking and for fat liquoring of leather was prohibited in the EU in 2003 and the use was limited to flame-retardant in mining conveyor belts and dam sealants in 2012 and finally was restricted in 2015 (European Commission 2015; UNEP 2018). The US prohibited use of SCCPs in 2013 (van Mourik et al., 2016). Japanese industry discontinued the use in metalworking voluntarily in 2007 (UNEP 2015a).

2.4. SCCPs in wastes and recycling

2.4.1 Wastes containing SCCPs or contaminated with SCCP

Compared to most other POPs, historical production and use of SCCPs are high (Glüge et al. 2016). Therefore, also the amount of waste impacted by SCCP can be expected to be high. However, as the use started already in the 1930s and hazardous waste management capacity and practices were not developed until the 1970s, it can be assumed that a large amount of wastes containing SCCPs have already been disposed of (ESWI 2011; UNEP 2018). Wastes may contain variable concentrations of SCCPs, depending on the quantities in which they were originally present in specific products and the quantities released during product use and waste management. Waste consisting of, containing or contaminated with SCCPs (hereinafter referred to as “SCCP wastes”) may be found as presented in Chapter 8 Table 8-1 (UNEP 2018).

Many applications of SCCPs have long service-lives (for example conveyor belts, cooling oils, sealants, paints, adhesives and floorings used in construction sector). ESWI (2011) cites service-life of a conveyor belt at 2-30 years. Service life for sealants/adhesives or cables in construction might have service life of 50 years and longer (Glüge et al. 2016). Therefore, waste originating from SCCP use will be generated for decades. In such long term uses also PCBs and PCNs largely used in the 1950s to 1980s might still be present and should also be included in the inventory and assessment (Secretariat of the Stockholm Convention 2017a).

On the other hand, metal and leather processing fluids and lubricants have relatively short product life cycles. It can therefore be assumed that the used processing fluids, and lubricants will soon be disposed of after prohibition.

SCCPs have been used worldwide as a fire retardant or plasticizer in materials, such as plastics (PVC and EVA), rubbers, fabrics, inks, paints, adhesives and surface coatings and leather, that are used to produce e.g. equipment, pipes, apparel, clothing, footwear, and accessories. SCCPs have been found in construction waste and consumer articles in levels of up to 7 000 mg/kg (UNEP 2018).

2.4.2 Recycling of materials containing SCCPs

There is no SC exemption listed for the recycling of SCCP containing waste. However, materials containing SCCPs might be recycled (e.g. recycling of PVC/plastics, rubber and textiles or recycling of demolition waste containing sealants) without recyclers being aware of the POPs content. Also, SCCPs might be released during recycling and elevated SCCP concentrations have been found in biota near an e-waste recycling site in China (Luo et al., 2017, Yuan et al., 2017). Conveyor belts have been recycled by reduction to powder and subsequent manufacture of new belts, curtains, mats and building materials (ESWI, 2011).

2.5. Releases of SCCPs into the environment

Releases of SCCPs into the environment may occur during production, storage, transportation, industrial and consumer usage of SCCP-containing products, disposal and burning of waste, and landfilling of products (Tomy et al. 1998). An overview on estimated releases from the life cycle of SCCPs is compiled in Figure 2-2.

There is currently no evidence of any significant natural source of CPs (including SCCPs) (U.K. Environment Agency 2003a).

SCCPs may be released from products and articles during the service life as well as after their disposal, unless properly managed. ESWI (2011) assumes that about 8 % of the SCCPs in sealants is emitted during lifetime. Also landfill leachates and sludge from waste water treatment contain SCCPs (Danish EPA 2014; Harstad 2006; Stevens et al. 2003; Zheng et al. 2012).

2.5.1 Releases from production

Releases from formulation of metalworking fluids

Losses of CPs, including SCCPs, could occur during blending of metalworking fluids. It has been estimated that the likely loss of lubricant at a formulation site would typically be in the region of 1%, with a maximum of 2% (ECB 2000). Most of these losses would be controlled losses, such as off-specification material that could not be reused, and would be collected and sent for disposal.

Releases from production of rubber

SCCPs are used as a flame retardant, softener or process oil in rubber (UNEP 2010). SCCPs used as flame retardants are added to rubber in a proportion of 1–10%. The U.K. draft risk assessment (U.K. Environment Agency 2003a) discussed the release estimates for plastics additive substances used in the polymer industry, such as MCCPs: the release factors for flame retardants (during the polymer processing step for thermoplastics are 0.1% to air (boiling point <300°C/unknown; vapour pressure <1 Pa) and 0.05% to wastewater. For thermosetting resins, the release factor to air is 0 and the release factor to wastewater is 0.0005 (0.05%).

Releases from production of textiles and polymeric materials

In some applications (e.g., waterproofing fabrics) small amounts of CPs could be applied directly to the textile in an emulsion, which may cause releases to wastewater (ECB 2000, U.K. Environment Agency 2001). Also releases could occur from washing step of these textiles, which are generally used in furniture and other interior decorations.

Releases from production of paints and sealants

Some SCCPs are used in paints to a small extent. Losses to air and wastewater from formulation of SCCP-containing paints and coatings are estimated to be insignificant (U.K. Environment Agency 2003b). Losses to wastewater during the manufacture of sealants are reported to be low or zero. Scrap material and machine cleaning can account for up to 5% solid waste.

2.5.2 Releases from use of CP-containing products

Releases from use of metalworking fluids and lubricants

Large amounts of SCCPs are releases from the use in metal working fluids and lubricants. Experiences from industrial countries indicate that from the use of metal working fluids 18 to 31% of SCCPs are released into the environment. Losses of SCCPs due to carry-off from workpieces were estimated to be 2.5 kg/site per year for a small user (100-L capacity) and 2500 kg/site per year for a large user (95000-L capacity) based on the early 1990s (Government of Canada 1993). The estimated annual losses of CPs from cutting fluid, based on the replacement rates, are thought to be 48% for a large machine shop, 75% for a medium-sized machine shop and 100% for a small machine shop (ECB 2000).

Release from paints, sealants and varnishes

The U.K. draft risk assessment assumed a release factor for MCCPs to water for outdoor use in paints and sealants of 0.15% per year over 5–7 years and the same fractional release over the 20- to 30-year lifetime of sealants. No estimate of leaching loss from paints was available in the EU assessment of SCCPs (ECB 2000); however, it can be assumed to be similar to that for MCCPs/LCCPs or somewhat higher due to the higher volatility with the lower chain length. Coating and paints are sometimes removed from objects by abrasive blasting resulting in the environmental release of the total or a share of pollutant inventory as has been discovered with PCB paints and related environmental contamination (Jartun et al. 2009; Weber et al. 2018).

Releases from PVC and other plastic

Plasticizers can migrate within the material and leach out of it over time, ending up in the environment or result in human exposure. Recent studies on CPs from food blenders (Table A-4) and baking ovens have revealed that leaching of SCCPs and MCCPs from PVC/plastic in polymer coating, gasket or cables (Gallistl et al. 2018; Yuan et al. 2014) can result in human exposure.

Losses from volatilization — Rubber

SCCPs are reported to be used in rubber, with applications mostly in high-density conveyor belts (EC 2000). Releases from use of SCCPs in polymers such as rubber or PVC may also occur via volatilization or from loss of polymeric material as particles during wear and abrasion of the products. Volatilization of 0.05% of the MCCPs during the lifetime of the product was assumed (U.K. Environment Agency 2003a), and it is reasonable to assume that this would be the case for the slightly more volatile SCCPs as well.

Belts may also be recycled into other products at the end of their life with related releases.

Releases from leather fatliquoring

Leather fatliquoring is an open application with associated releases. SCCPs are slowly released from leather. SCCPs can be released from leather via skin contact and can result in exposure.

2.5.3 Releases during disposal

For the EU it is estimated that 67% of SCCPs were landfilled largely in products for the period 1994 to 2010 (ESWI 2011). Landfilling is a major disposal route for polymeric products in Canada. POPs are released from landfills in leachates at varying degree depending on their physico-chemical properties (Weber et al. 2011). The median concentrations of SCCPs in 19 leachates in Norway were 339 µg/l (Harstad 2007). Emissions of these products, which are effectively dissolved in polymers, could occur for centuries after disposal (IPCS 1996).

The releases and bioavailability of CPs from polymers that are landfilled or from losses of polymeric material as particles during wear and abrasion of flooring, rubber products, etc., are unknown. These releases could be sources of input of CPs to air and soils in urban and industrial areas (U.K. Environment Agency 2001, 2003a,b).

Polymer-incorporated CPs could also be released during recycling of plastics, which may involve processes such as chopping, grinding and washing. If released as dust from these operations, the CPs would be adsorbed to particles because of high sorption coefficients (UNEP 2010).

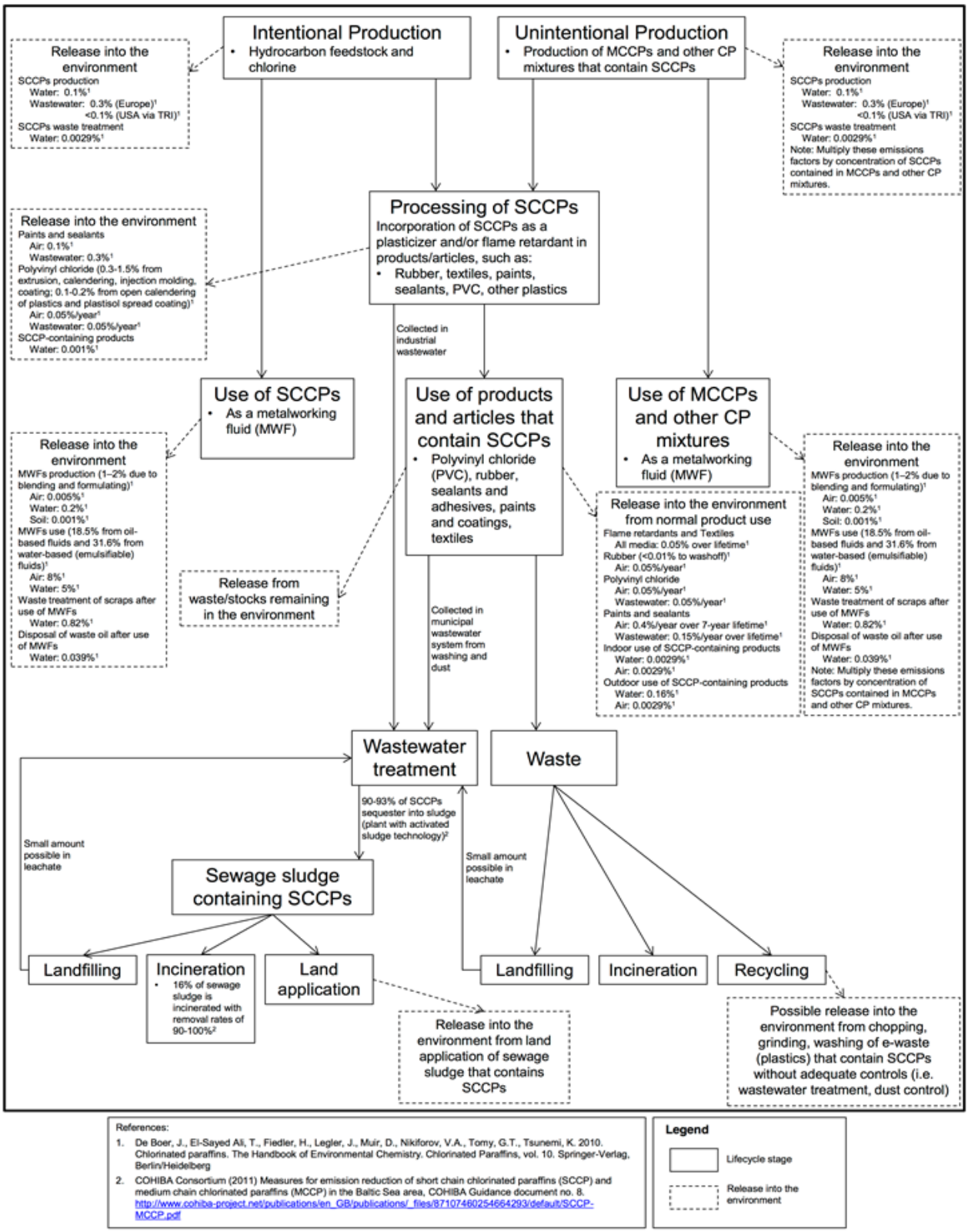


Figure 2-2: Lifecycle and estimated releases of SCCPs (De Boer et al. 2010; Cohiba Consortium 2011) Note: Emission factors apply to annual consumption/use of SCCPs and products that contain SCCPs. The factors are expressed as percentages; therefore, to estimate the amount of a release in a specific scenario the concentration of SCCPs in the product is multiplied by the emission factor.

2.6. Sites potentially contaminated by SCCPs

Sites where SCCPs have been produced or used, for any of the activities described in chapters 4 to 8, could potentially be contaminated with SCCPs depending on the use practice and waste management practice. Also, sites where recycling or recovery of SCCP-containing lubricants, metal working fluids or plastics or rubber takes place might be impacted by SCCPs.

SCCPs in soils and water at a production site and sediments downstream of sewage treatment plants (STPs) of factories using SCCPs were frequently contaminated with SCCPs or SCCPs/MCCPs in the mg/kg scale (Table 2-4).

A screening tool for water release of SCCPs (and other POPs) are "sewer films" attached to the wall of the sewer. Levels of SCCPs in sewer films in industrial areas had 65,000 µg/kg while the sewer films in domestic sewer had levels of 500 µg/kg (Rieger and Ballschmiter 1995; Table 2-4).

Users of this inventory guidance can use the approach provided in Chapter 9 for developing an inventory of sites potentially contaminated by SCCPs.

Table 2-4: SCCP levels in environmental matrices impacted and not impacted by industrial sources and activities.

Sample matrix	Sampling site	Level of SCCPs/CPs	References
Soil (dry weight)	Background Switzerland (grassland), (urban park)	3 µg/kg 35 µg/kg	Bogdal et al. 2017
	Remote area China		
	Paddy soil around e-waste areas	30.4 to 530 µg/kg	Yuan et al. 2017b
	Soil inside CP production site	28,000 - 554,000 µg/kg	Wang et al. 2018
	Soil farmland around CP production site	102 to 441 µg/kg	Wang et al. 2018
Sediment (dry weight)	Lake Thun/Switzerland 1960 and 2000	0.003 and 0.032 µg/kg	Iozza et al. 2008
	Sediment impacted from landfill	19.4 µg/kg (ww)	Borgen et al. 2003
	Lock at CP production site 2 km downstream of CP production site	53,000 – 63,000 µg/kg* 1600 µg/kg*	CEFAS 1999
	PVC production/paint manufacture; 100 m, 800 m, 2.5 km downstream STP	21,100 µg/kg*;,<200 µg/kg*; 5,300 µg/kg*	CEFAS 1999
	Producer PVC compounds; 300 m and 500 m downstream STP	25,600 µg/kg** 58,400 µg/kg**	CEFAS 1999
	PVC cable manufacturer at STP and 300 m downstream	19,000 µg/kg** 12,800 µg/kg**	CEFAS 1999
	Metal working/leather finishing 100 m downstream	2,500 µg/kg* 4,900 µg/kg*	CEFAS 1999
Sewage sludge	Sewage sludge UK	7000 – 200,000 µg/kg*	Stevens et al. 2003
	Sewage sludge China	800 – 52,700 µg/kg	Zheng et al. 2012
Sewer skin in sewer system	Domestic sewer	500 – 7000 µg/kg	Rieger and Ballschmiter 1995
	Industry impacted sewer	17,000 – 65,000 µg/kg	
Water	Lake Ontario, Canada	0.3 – 1.2 ng/L	Muir et al. 2003
	River water, Japan	7.6 – 31.1 ng/L	Iino et al. 2005
	River water, China	18 – 652 ng/L	Wang et al. 2018b
	Llobregat river, Spain	300 – 2100 ng/L	Castells et. al. 2004
	Landfill leachate, Norway	64,000 – 614,000 ng/L	Harstad 2006

*Mixture of SCCPs and MCCPs
**Mainly MCCPs

3. How to develop an SCCP inventory

3.1. Step by step approach for planning and conducting an inventory

This chapter outlines five steps for planning and carrying out a national SCCP inventory. Since PCNs and PCBs have been used in many of the open applications uses of SCCPs (Secretariat of the SC 2017) and have been substituted by SCCPs (or other CPs) in the 1970s to 1990s, these legacy POPs would also be considered in inventory activities for SCCPs where appropriate (see below).

The official contact point/national focal point of the Stockholm Convention or national project coordinator could be responsible for initiating the inventory process. The steering committee on POPs that was formed for the NIP development would be used or re-established for updating the NIP and involved in the planning of the inventory.

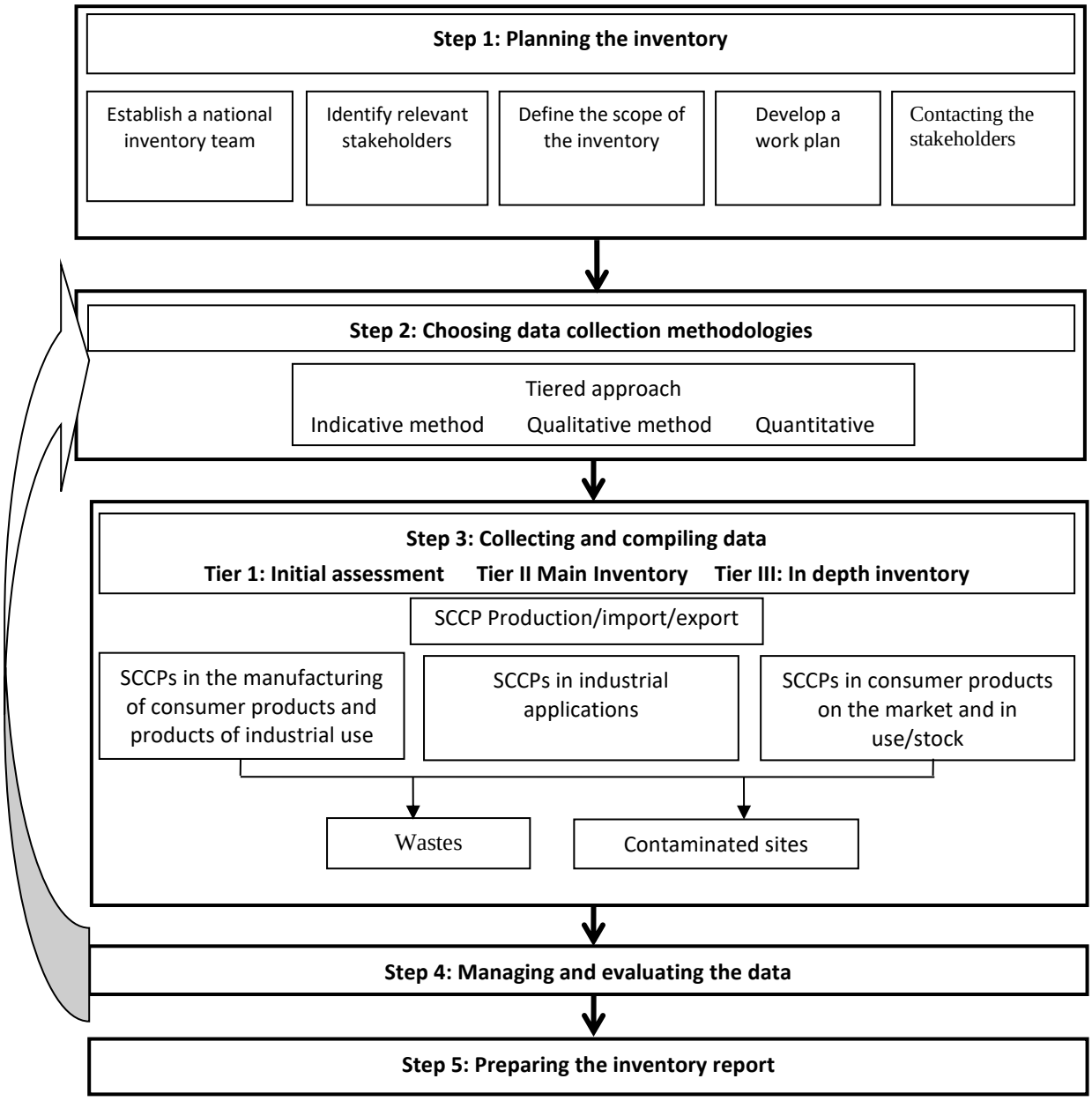


Figure 3-1 : Overview of the national SCCP inventory development process

The inventory process might not be conducted in an entirely linear fashion. The inventory team may need to repeat activities in earlier steps depending on how the inventory proceeds and which sectors are involved.

The inventory team will decide on the complexity of the methodology which is appropriate for their particular situations, taking into account their financial and technical capacities. For many countries, it could be evident at the beginning of the process that a complex monitoring (Tier III) may not be feasible (see Chapter 3.3). Others could

decide after evaluating the results of the initial inventory to undertake more in-depth data collection (move to a higher Tier) in the future, and include such activities as an activity within the action plan in their NIPs.

3.2. Integrated approach of SCCP/POPs inventory development

Other POPs in particular PCBs and PCNs have been used in several of the applications where SCCPs are used such as cables, rubber, paints, adhesives/sealants or treatment of paper or textiles (IPCS 2001; UNEP 2012; Wagner et al. 2014; PCB Elimination Network 2014). Also PBDEs and HBCD have been used in some of applications where SCCPs are used (cables, rubber, paints, textiles) (Secretariat of the Stockholm Convention 2017c; Thuresson et al. 2005).

The SCCPs inventory of stockpiles and wastes should therefore be linked or integrate the assessment of other POPs used in the same applications, in particular PCBs (open application) and PCNs (see related inventory guidance Secretariat of the Stockholm Convention 2017a). Also where other brominated POPs were used as flame retardants in the same application, their common presence should be evaluated (cables, rubber, paints, textiles).

SCCP have also been used to some extent in wood treatment (lacquers and in fire-retardant paint) where a range of other POPs such as pentachlorophenol (PCP), endosulfan, lindane, mirex and PCBs/PCNs have been used.

3.3. Planning the inventory (Step 1)

For general description of Step 1, please refer to Chapter 2.2 of General guidance on POPs inventory development (UNEP/POPS/COP.9/INF/19/Add.1) (UNEP, 2019).

The first step in developing a national inventory is to define the scope of the inventory and target the national relevant sectors for SCCPs. It is important to clearly define the responsibilities for national inventory team in developing the inventory as to streamline the work. Parties are advised to establish a multi-stakeholder national inventory team for the task. The development of a national inventory of SCCPs requires cooperation with the relevant stakeholders involved during the life-cycle of SCCP containing products and applications (see Table 3-1).

In order to act in a coordinated and integrated manner, when planning, the inventory team should correlate with other inventory teams set up nationally under the Stockholm Convention. Since the use of SCCPs are in the same major applications as PCNs and PCBs in open applications (Secretariat of the Stockholm Convention 2017), the inventory activities should be linked or integrated. Since most Parties have not developed an inventory of PCBs in open applications or of PCNs, the SCCP inventory activity might address all three POPs in a synergistic manner in the common open application uses.

Table 3-1: Sectors and stakeholders involved in the life-cycle of SCCPs

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,

Sectors	Stakeholders
	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

3.3.1. Establish a national inventory team and identify key stakeholders

The responsible national focal point for the Stockholm Convention could establish and/or lead a multi-stakeholder national inventory team to acquire the necessary competences and access to relevant inventory information. The team would comprise government ministries, industry, the national customs service, the private sector, non-governmental organizations (NGOs), and researchers from universities and research institutes (see Table 3-1).

The first meeting of the national inventory team provides the opportunity to determine the available information in various stakeholder organizations and to brainstorm how best to proceed with the inventory exercise.

Making contact:

Making contact with stakeholders at the beginning of the inventory exercise can give them a better understanding of the background, scope and objectives of the inventory and provide them with an opportunity to communicate their views and questions. This initial feedback can help make the inventory more effective by targeting the relevant areas of national use.

Consulting with relevant stakeholders:

During the inventory planning stage, it may be more efficient to contact and consult only a small number of relevant stakeholders such as large-scale manufacturers, national industrial associations and the customs service. Then to decide which other stakeholders to contact in the different stages of inventory development/tiers.

Holding stakeholder group meetings

There may be a large range of stakeholder groups involved depending on the areas of use of SCCPs for manufacturing products/articles and sectors using the products.

Such meetings should also address other POPs used in the respective applications and products in particular PCBs, PCNs and PBDEs (see Chapters 5 and 7).

3.3.2. Define the scope of the inventory

Defining the scope of the inventory involves identifying the relevant national sectors to be investigated further. This can be achieved by consulting key stakeholders (see Table 3-1) and focusing on the current and former production, use categories and life cycle stages discussed in chapters 4 to 9.

Main information includes:

- Current/past production, import and export of SCCPs at the national level (Chapter 4);
- Current and past use of SCCPs in manufacturing of products (Chapter 5);
- Current/past use of lubricants and metal working fluids containing SCCPs (Chapter 6)

- Current products on the market and in use containing SCCPs (Chapter 7);
- Alternatives to SCCPs in production;
- Recycling practices of SCCP containing products;
- Disposal practices for production residues and products and articles containing SCCPs when they become wastes (Chapter 8 and partly in Chapter 5 and 6);
- Sites potentially contaminated with SCCPs (Chapter 9).

Since PCBs and PCNs have been used in the same applications in the past (see Secretariat of the Stockholm Convention 2017b), they should be considered in the assessment of stocks, wastes and contaminated sites.

The following criteria are important in defining the scope of the inventory:

- Obligations for SCCPs under the Stockholm Convention (see Chapter 1);
- Objectives of a SCCP inventory (see Chapter 1);
- Existing resources and capacity;
- National priorities and exposure risk.

The degree and depth of the inventory can be defined by consulting the Chapters 3.3 and 3.4 the tiered approaches mentioned in chapters 4 to 9, and considering the resources needed.

3.4. Choosing data collection methodologies (Step 2)

3.4.1. Tiered approach

The tiered approach to collecting data in a SCCP inventory is illustrated in Figure 3-2. The suggested methodologies for data collection in the three tiers are described in chapter 3.5.1 and mentioned in chapters for the individual inventory sectors. This approach provides flexibility to a wide range of Parties with varying priorities and capacities. Each tier represents a level of methodological complexity. Moving from lower to higher tiers implies a Party is opting for approaches that are progressively more demanding in terms of complexity and data requirements, and therefore more resources may be needed.

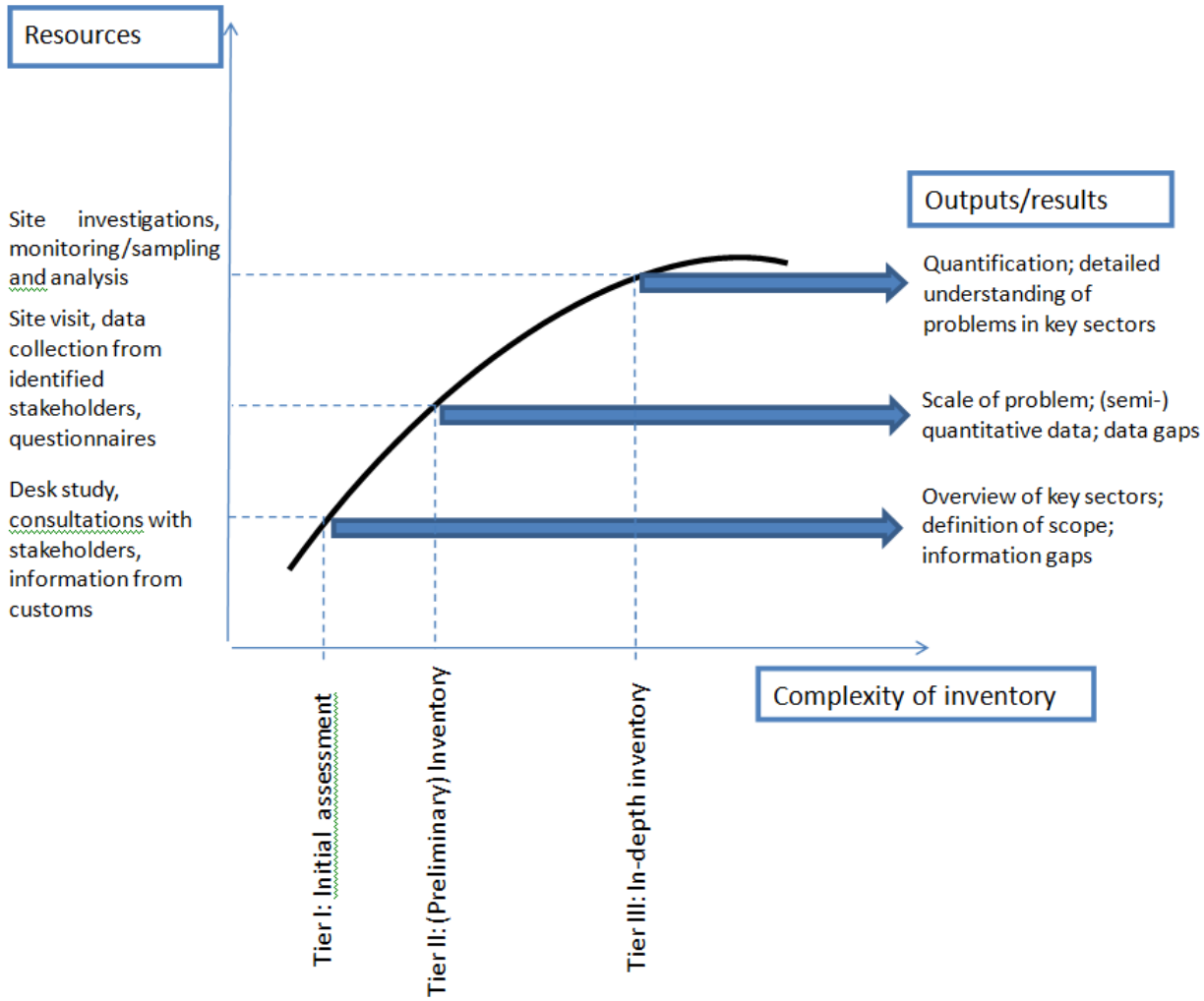


Figure 3-2: The tiered approach to the inventory of SCCPs

3.4.2. Indicative, qualitative and quantitative methodologies

There are a number of different approaches that have been used for gathering information for POPs inventories, i.e. indicative method, qualitative method and quantitative method. For more information on those methodologies, please refer to Chapter 2.3 of General guidance on POPs inventory development (UNEP/POPS/COP.9/INF/19/Add.1) (UNEP, 2019).

- **Indicative method:** provides initial information for further planning of the inventory depending on the availability of resources.
- **Qualitative method**: uses workshops, interviews and questionnaires to obtain specific data which also might include quantitative data.
- **Quantitative method**: provides accurate and specific numerical information, includes data provided from industry and possibly site inspection or studies from research institutions. The quantitative approach can also include sampling and analysis for some areas where quantitative data are needed (see Tier III sections in Chapters 4 to 9 and Appendix 3).

Four approaches that are normally used for data collection are discussed briefly below:

- Desk study of existing information. This approach is typically used in the Tier I assessment;
- National sensitizing/inventory workshop on Stockholm Convention and new listed POPs including SCCPs (and PCNs and PCBs in open application);
- Questionnaires;

- Site inspection, sampling and analysis. Some information on sampling, instrumental analysis of SCCPs including international standards are compiled in Appendix 3. Data from monitoring of SCCPs in consumer goods above EU regulatory limit are compiled in Appendix 1.

3.5. Collecting data (Step 3) and evaluating the data (Step 4)

3.5.1 Collecting data

For general description of Step 3, please also refer to Chapter 2.4 of General guidance on POPs inventory development (UNEP/POPS/COP.9/INF/19/Add.1) (UNEP, 2019).

Tier I: Initial assessment

Tier I methods usually rely on readily available information and statistics. Methods used for higher tiers involve more resource-intensive data collection activities and possibly country-specific measurements but should also yield more accurate results.

An initial assessment (Tier I) is carried out to obtain an overview of the relevant uses and stakeholders to be contacted in the key sector under investigation. Tier I methods usually rely on available literature and statistics in combination with calculations based on already existing information, such as the risk profile (UNEP/POPS/POPRC.11/10/Add.2) (UNEP 2015a) and risk management evaluation (UNEP/POPS/POPRC.12/11/Add.3) (UNEP 2016) adopted by the POPs Review Committee.

Parties should endeavour to use methods that provide a robust level of certainty. This is especially true when, for example, the preliminary inventory concludes that SCCPs could pose high human health and environmental risks in the country and that more accurate data is needed to prioritize risk reduction measures and estimate their costs.

The initial assessment (Tier I) provides the inventory team with a general idea of where the problems may lie and, more importantly, which sectors require further investigation and what are the information gaps. Tier I outputs are rather qualitative and require (subsequent) verification. Suggested Tier I activities are described in the individual chapters.

In Tier I, information may be available only as chlorinated paraffin mixtures, rather than SCCPs. This information is still valuable and should be noted. Communication with industry associations may provide an indication of the production or import of SCCPs or other chlorinated paraffins potentially containing >1% SCCPs.

Expected outputs of the initial assessment (Tier I) include:

- *A list of industry associations and authorities relevant to the production of SCCPs;*
- *A list of producers of SCCPs and other chlorinated paraffins possibly containing SCCPs;*
- *A list of users of SCCPs and other chlorinated paraffins possibly containing SCCPs in various sectors (see Table 3-1 above);*
- *A list of importer A list of stakeholders in the supply-chain;*
- *and exporter of SCCPs and other chlorinated paraffins;*
- *HS codes used, where relevant;*
- *Initial information on potential uses of SCCPs in the country;*
- *Initial information on the import and export of SCCPs in the country;*
- *Data on production volumes and trade volumes accessible by desk studies;*
- *Product categories in the same uses which may additionally contain PCBs or PCNs from former uses (rubber, cables, paints, sealants/adhesives);*
- *Priority list of products/articles on the consumer market that may contain SCCPs;*
- *Average service life of the products/articles identified as containing SCCPs;*
- *Compilation of information as basis for Tier II assessment and initial feedback from stakeholders.*

The (basic) inventory (Tier II) builds on Tier I information. Therefore the Tier I assessment should compile information and highlight the gaps as basis for Tier II.

Tier II: Main Inventory

Main inventory (Tier II) will follow to generate data on the main sectors through interviews and questionnaires to the national stakeholders, and further identify missing information. This would also include actions such as desk study on pesticides storage facility contents.

The basic inventory generally focuses on the specific sectors present in the country. It involves surveys and site visits to estimate production and use data that were identified as missing in the initial assessment/Tier I. Possible production applications and uses are described and target locations should be identified, followed by site visits including questionnaire survey.

Tier II inventories should aim for compiling estimates of quantity of SCCPs and CP mixtures possibly containing >1% SCCPs produced, imported and used in production and products.

Examples of tables that could be used in developing main inventory are available in Appendix 2 to the present guidance.

Since different CP mixtures containing SCCPs are in use and often MCCPs and LCCPs are used as alternative, the Tier II inventory should clarify to the extent possible:

- Chlorinated paraffin mixtures containing >1% SCCPs;
- Chlorinated paraffin mixtures with unknown % of SCCPs; and
- MCCPs and LCCPs mixtures certified as containing <1% SCCPs.

Details on suggested activities for Tier II inventory are described within the individual chapters.

Expected outputs of the basic inventory (Tier II) include:

- *Detailed information on the production of SCCPs and other chlorinated paraffins containing SCCPs >1%;*
- *Detailed information on the use of SCCPs and other chlorinated paraffins containing SCCPs >1% in manufacturing of products (PVC, rubber, adhesives/sealants, paints, fatliquoring leather, textiles);*
- *Detailed information on the use of SCCPs in metal working fluids and lubricants;*
- *Detailed information on the products/articles containing SCCPs (including total quantity);*
- *All major producers, users, importers and exporters approached, questionnaires filled out with the responses;*
- *Compilation of information and data provided by major stakeholders and their supply-chain stakeholders on total annual production, use, export and import of SCCPs*
- *Data on production volumes and trade volumes;*
- *Data gaps on SCCP content in chlorinated paraffin mixtures identified and the need for Tier III inventory elaborated;*
- *Overview on domestic supply-chain networks;*
- *Additional stakeholders identified and contacted;*
- *Information in relevant material safety data sheets (MSDS) assessed;*
- *The amount of SCCPs waste generated at production sites assessed and quantified;*
- *Potentially contaminated sites.*

In Tier I and Tier II, chlorinated paraffins used in the manufacture of products could be considered as potentially containing SCCPs or contaminated with SCCPs unless companies can prove that the SCCP content is ≤1% (e.g. by a certificate from the supplier or an accredited laboratory). If providers or users of chlorinated paraffins can certify that the SCCP content is ≤1%, then the respective chlorinated paraffin mixture or product can continue to be used.

It could be challenging to assess SCCPs in chlorinated paraffin mixtures where the SCCP content is unknown (see Appendix 3). The range of SCCPs content in chlorinated paraffins released from 12 kitchen food blenders reported to be between 4 and 59% (average 28%) (Yuan et al., 2017: Table A-4 in Appendix 3). The average content of SCCPs in global CP production is estimated to be at least 16.5% (Glüge et al., 2016). Those figures could be used in estimating the SCCPs content in chlorinated paraffins of unknown composition (approximately 20%).

One outcome of Tier II assessment should be a gap analysis to be addressed by a more detailed Tier III assessment or which can feed into the action plan of the NIP.

Tier III: In-depth inventory

If needed and resources are available, a more in-depth inventory (Tier III) can be initiated after evaluation of the data gathered in the main inventory.

The in-depth inventory may include sampling and analysis of SCCPs. It is not possible to identify the SCCP-containing consumer products without laboratory analysis (UNEP 2018). Also monitoring is likely needed to clarify if chlorinated paraffin mixtures contain >1% SCCPs. Furthermore, monitoring of SCCPs in products on the market might be needed in particular for high exposure risk (Appendices 1 and 3 and Table 2-3).

Standard sampling and analytical procedures should be established and agreed upon before the start of a sampling campaign. Sampling and analysis should comply with specific national legislation, where it exists, or with international regulations and standards and Good Laboratory Practice.

The samples should be analysed by a laboratory accredited for the measurement of SCCPs in the respective matrix or have otherwise proven to reliably measure SCCPs in the respective matrix and have an ISO17025 or similar accreditation.

Instrumental analysis of SCCPs is complex and requires appropriate instrumentation, quantification standards and educated staff (see Appendix 3).

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

The inventory team should investigate and collect the following data in the country:

- Current and former production of SCCPs or CPs containing SCCPs (Chapter 4);
- Import and export of SCCPs or CPs containing SCCPs (Chapter 4);
- Industries using SCCPs in manufacturing of products (Chapter 5);
- Lubricants and metal working fluids containing SCCPs (Chapter 6)
- Products and articles containing SCCPs on the market (Chapter 7)
- Products and articles containing SCCPs on the market/import and in use (Chapter 7);
- Products and materials containing SCCPs that are recycled, the possible extent of recycling, and the types of articles produced from recycling, including the likely fate of SCCPs in these processes and related releases and the exposure risk of the final product (Chapter 5; Chapter 8);
- SCCPs in waste and how such waste is managed (Chapter 8; see also the related Basel Convention draft technical guidelines, UNEP 2018b);
- Potentially SCCP contaminated sites (Chapter 8 and activities in Chapter 4-8).

3.5.2 Data management and mechanisms for evaluation of the inventory

For general description of Step 4, please refer to Chapter 2.5 of General guidance on POPs inventory development (UNEP/POPS/COP.9/INF/19/Add.1) (UNEP, 2019).

The compiled data (draft inventory) should be assessed by stakeholders and possibly by an external expert. Depending on the feedback, further information may need to be gathered.

Since Parties have different designs and levels of legal framework, political organization and economic support for environmental management, different methodologies may be applied in the data gathering process as described in Chapter 3.2. 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 should be recorded and mentioned when the results are presented.

Some challenges may still exist at the end of the inventory including a lack of monitoring data and detailed information on certain applications in particular since the content of SCCPs in many technical CP mixtures might not be known and no measurement capacity for SCCPs exists in most developing countries. Also open applications like sealants and paints are difficult to assess. An evaluation of the process, strategy used and information collected can take place along with a decision on what further actions are needed to make the inventory more complete.

The compiled inventory data should be presented to the stakeholders for feedback. Regional Stockholm Convention Centres and international experts can support evaluations.

The evaluation includes identification of the following:

- Gaps and limitations;
- Need for validation of the information compiled in the inventory;
- Further monitoring and actions needed to make the inventory more complete;
- Actions needed to meet the requirements of the Stockholm Convention.

Important elements in this evaluation step are to check all data for plausibility, identify any gaps and limitations, and the measures needed to make the inventory more complete.

Gaps, limitations and necessary actions to complete the inventory will also be important information for the NIP, especially for developing countries with a need of financial support and technical support.

It is also important to identify whether the current situation meets the requirements of the Convention, including the actions needed to fulfil the obligations of the Convention.

3.6. Preparing/finalizing the inventory report (Step 5)

The final step for the inventory team is to finalize the inventory report. This report will include the inventories of all sectors investigated by the Party (see chapters 4 to 8), as well as information on potential contaminated sites (see Chapter 9).

Although its aim is to support the development of the NIP, the report can also be used for other purposes such as feeding into Article 15 reporting, developing post-NIP projects, and developing effective strategies and action plans for managing SCCPs to meet the obligations of the Convention.

The essential elements of the report are:

- Summary (designed that it can be used with modifications for updating the NIP);
- Objectives and scope;
- Description of data methodologies used and how data were gathered, including all the assumptions and conversion coefficients adopted as a result of expert judgement;
- Final results of the inventory for each sector considered a priority for the country (using a format to be provided in this guidance, as such or adapted from that format);
- Results of the gap analysis and limitations identified for completion of the inventory;
- Further actions (e.g. stakeholder involvement, data collection strategies) to be taken to complete the inventory and recommendations;
- The inventory report can also include a preliminary list of activities for the action plan discovered during inventory development as basis for developing the action.

Other information (e.g. stakeholder list) could be included in the report depending on the national preferences.

4. Inventory of SCCP production and import/export

4.1. Production of SCCPs and other CPs containing SCCPs

Parties to the Stockholm Convention are allowed to produce SCCP, if they have notified the Secretariat of their intention to utilize the time-limited specific exemption for production and use of SCCPs for the exempted uses as provided in Annex A to the Convention. The Party registering the specific exemptions should provide to the Secretariat the information on the production and use of SCCPs.

The register of specific exemptions for SCCPs is available on the website of the Stockholm Convention (http://chm.pops.int/Implementation/Exemptions/SpecificExemptions/tabid/1133/Default.aspx).

Countries that are producing SCCPs or formerly produced SCCPs should compile data on the current and historic production of SCCPs.

MCCPs might contain SCCPs at concentrations above low POPs limit and would be considered SCCP. Also chlorinated paraffin mixtures of unknown composition might contain SCCPs and there would be included in the assessment.

Information on the amount of related current and former production of wastes and the historic management and disposal of wastes containing SCCPs should be gathered within the inventory process. The information on stocks of SCCPs from producers should be noted and included in the inventory.

A questionnaire for gathering of information from current and former producers is in Appendix 4 which can be used possibly with country specific information or translation.

Information on contamination at and around production sites and/or associated landfills and surface water should also be gathered (see Chapter 9 on contaminated sites), taking into account that SCCP contamination has been detected at and around production sites of CPs (Wang et al. 2018).

The information on current and former production of SCCPs and other CPs containing SCCPs should include data on exports.

4.2. Import and export of SCCPs

SCCPs is listed in Annex III to the Rotterdam Convention and are subject to the Prior Inform Consent (PIC) procedure.

SCCPs and CPs containing SCCPs can be imported or exported for the use in specific exemptions (see Table 1-1) by Parties that are registered for those specific exemptions (see Guidance for the control of the import and export of POPs, UNEP 2012b). Such imports and exports should be recorded in the inventory including the quantities.

This chapter only deal with the SCCP and CPs as substances/chemicals and not in products. SCCPs in products including import and export are addressed in Chapter 6.

4.2.1. Import of SCCPs

It has been experienced that the control of import of industrial chemicals is a challenge since the HS code for classification are not specific for most POPs (Korucu et al. 2015). Currently also SCCPs do not have specific Harmonized System (HS) codes. Therefore, HS codes cannot be reliably used for assessing import quantities of SCCPs at the moment. But they can give an indication (Tier I) and can be used for further assessment by Tier II and III approaches.

Experience has shown that chlorinated paraffins are imported under different HS codes. These are mainly:

- HS Code 27122010 Synthetic paraffin wax of a molecular weight of 460 or more but not exceeding 1560
- HS Code 27129090 (paraffin waxes)
- HS Code 38122090 Plasticizers, compound; for rubber or plastics
- HS Code 38249090 Chemical products and preparations of the chemical or allied industries, not elsewhere specified or included.

These codes are not specific for SCCPs and are also not specific for the class of chlorinated paraffins. However, in some countries additional information might be included in the import documents which can inform if individual imports/exports under these HS categories are chlorinated paraffins.

For SCCPs mixtures, CAS numbers and trade names (see Table 2-1) may be used in combination with above mentioned and further HS codes for the search at the custom level.

Care should be taken to avoid double counting any import and the respective use of SCCPs in manufacturing of products (see Chapter 5) when documenting the life cycle. For example, by not double counting the quantity of the imported SCCPs and further use of SCCPs in production and use and to clearly document this in the report.

The total amount of SCCP imported and produced should be compared with the inventory of total SCCP use in exempted productions and uses as a proof that the produced or imported SCCPs have only been used for these exempted purposes.

4.2.2. Export of SCCPs as chemical

Information on export of SCCPs and other CPs possibly containing SCCPs should be gathered from the chemical industry, chemical associations that are producing or trading SCCPs. All relevant information obtained and gaps, should be included in the inventory.

For SCCPs mixtures, CAS numbers and trade names (see Table 2-1) may be used in combination with HS codes (e.g. those mentioned Chapter 4.2.1) for the search at the custom level.

4.3. Step 1: Planning the inventory of production of SCCPs and import/export

This first step focuses on defining the scope of the inventory, identifying stakeholders and developing a work plan (see Chapter 3.1).

The inventory of production and export/import of SCCPs and other CPs containing SCCPs is expected to address the following:

- Production quantities of SCCPs:
- Production quantities of CP mixtures with SCCP content >1%;
- Export quantities of SCCPs and CP mixtures with SCCP content >1%
- Import quantities of SCCPs and CP mixtures with SCCP content >1%
- Status of labelling of SCCPs (in particular CP mixtures containing >1% SCCPs);
- Assessment if PIC procedure is appropriately observed;
- Management and releases of SCCPs at the production sites;
- Exposure and exposure risk of the workers and other receptors of SCCPs;
- Waste management and releases of SCCPs to the environment at production sites and risk of contaminated sites (see Chapter 9).

Appropriate members of the inventory task team need to be selected to conduct the inventory. Specific stakeholders for the inventory of SCCPs are listed in Table 3-1 and are selected according to the country situation. The NIP coordinator or task team leader can decide which stakeholders would be included in an inventory team and which stakeholders would just be contacted for an interview or with a questionnaire (Appendix 4).

4.4. Step 2 & 3: Choosing data collection methodologies and collecting data

4.3.1. Tier I: Initial assessment of the production, import and export of SCCPs

Expected outputs of the initial assessment include:

- *A list of industry associations and authorities relevant for SCCP/CP production;*
- *A list of producers of SCCPs and other CPs possibly containing SCCPs;*
- *Importer and exporter of SCCPs and other CPs;*
- *Information from Prior Informed Consent Procedure;*
- *HS codes used (see initial list above in);*
- *Supply chain stakeholders;*
- *Data on production volumes and trade volumes accessible by desk studies*

Identify industrial associations, authorities, and national registers

Identify industrial associations, authorities and national registers relevant to production and import/export of SCCPs/CPs that can be useful sources for the inventory and compile:

- 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.

Identify national manufacturers and exporter and importers

Perform a desk study identifying companies in the following industrial sectors:

- Companies producing SCCP and other CP mixtures (noting CAS numbers);
- Companies exporting SCCPs and other CPs mixtures (noting CAS numbers/HS codes);
- Companies importing SCCPs and other CPs mixtures (noting CAS numbers/HS codes).

Following information might be gathered 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.

In the Tier 1 assessment for some of the production sectors only the total production volume or formulations of CPs might be found. Also this information is valuable and should be noted. An initial communication with industry association might give an indication of the production or import of SCCPs or other CPs potentially containing >1% SCCPs.

4.3.2. Tier II: Basic inventory of the production, import and export of SCCPs

Expected outputs of the preliminary inventory include:

- *Detailed information on the production of SCCPs*
- *Information on the production of CPs mixtures containing >1% SCCPs;*
- *All producers approached and questionnaires filled out with the responses of identified companies and possibly other stakeholders (associations; exporters and importers)*
- *Compilation of information and data provided by major stakeholders and their supply chain stakeholders on total yearly production, export, and import of SCCPs*
- *Data on production volumes and trade volumes;*
- *Assessment if PIC procedure is appropriately observed;*
- *Gaps on SCCP content in CP mixtures identified and documented and need for Tier III inventory elaborated;*
- *Additional stakeholders identified and contacted;*
- *Overview on domestic supply chain networks.*

Collection of information and data

Contact the producers of SCCPs and other CPs mixtures (as identified in the initial assessment), and related industrial association by visit, telephone, or mail/letter, to:

- Inform them about the purpose of the inventory and its process (see questionnaire)

and to request information and data about:

- 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;
- MSDS of the technical CP mixtures
- Analytical data on CP mixtures from industries (and related CAS numbers);
- Detailed information on downstream use of SCCPs and other CPs (see Chapter 5);
- End of life management of wastes from SCCP/CP production and use;
- Releases of SCCPs in the individual productions (see also Chapter 9);

Contact the major importers and exporters of SCCPs and other CP mixtures and request information and data about:

- 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;
- Downstream users of imported SCCPs and other CP mixtures (see also Chapter 5)
- 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;
- Information generated from the inventory of downstream users (see Chapter 5).

Information on Material Safety Data Sheets (MSDS) of CPs produced, exported and imported and used in production (see Chapter 5) should be compiled and assessed.

The gathering of information in Tier II should have in the early phase a national sensitization and information workshops on the Stockholm Convention and SCCP production and use (and possibly use of other new listed industrial POPs). Producers, importers and exporters and companies using SCCPs and other CP mixtures in production as well as other selected stakeholders (see Table 3-1) would be invited.

Evaluate the information

The evaluation is intended to

- Identify gaps
- Identify actions for filling the gaps

Comparison of information on production and import/export of SCCPs and CPs containing SCCPs and the use of these products in manufacturing and use (Chapter 5 and 6):

- Comparison of production and import/export of SCCPs and other CPs mixtures containing SCCPs (Chapter 4) and the quantity used in productions (Chapter 5 and 6).

If more information is needed:

- Identify additional stakeholders to be contacted or other sources of use for the inventory (see Chapter 3).
- Identify the national supply chain for each industrial sector from information gathered in the previous steps.

In the Tier I and Tier II approach for a first conservative estimate, chlorinated paraffin mixtures with unknown SCCP content produced or imported can be considered as potentially containing >1% SCCPs and included in the respective category in Table 4-1.

There are different grades of MCCPs on the market. Some MCCPs have SCCP contents ≤ 1% (Euro Chlor 2018) and others have SCCP contents considerable above 1% as revealed by CP analysis in recent products (Yuan et al. 2017: Gallistl et al. 2018). If companies or importers can prove that the SCCP content is ≤1% (e.g. by a certificate from an accredited laboratory) then the respective chlorinated paraffin mixture or product can be considered not to contain

SCCPs and is not restricted from Stockholm Convention perspective.[6] If producers or importers of chlorinated paraffins cannot proof that the SCCP content is ≤1% these products could be considered potentially SCCP containing or contaminated.

One particular challenge is the assessment of SCCPs in CP mixtures where the SCCP content is unknown and concentrations can vary significantly: The percentages of SCCPs released from 12 CP containing kitchen food blenders were between 4 and 59%, with an average of 28% SCCPs and an average of 72% MCCPs (Yuan et al. 2017; Table A-4). The average percentage of SCCPs in global CP production is estimated to at least 16.5% (Glüge et al. 2016). A reasonable middle bound estimate for an average SCCP content in CP mixtures of unknown homologue composition might be a percentage of 20%, unless no other certified information is available.

For MCCPs with certified SCCP content ≤1% the upper estimate would be 1% or if a particular concentration is certified then this concentration can be chosen for an upper SCCP estimate.

The summary of inventory information should be compiled in Table 4-1 or an adjusted table. Where data are available, an inventory of production, import and export should cover a longer period. The best approach would be from the start of the individual CP production factories. Generating these data would allow a better estimate of production from countries. Large gaps exist on the global production (Glüge et al. 2016) which need to be filled for a better estimate of historic production and estimate of present stocks.

Table 4-1: Sample table -Total production and import and export of SCCPs and CPs containing SCCPs

Uses of SCCP	Total quantity of Product (t)	Concentration of SCCP in product (%)	Total quantity of SCCP (t)
Production of SCCPs		**	
Production of other CPs*			
Import of SCCPs		**	
Import of other CPs			
Export of SCCP		**	
Export of other CPs			

*Containing SCCPs; if no information and certificate on the SCCP content can be provided by producers or importers, then 20% SCCP content might be assumed.
**100% or measured concentration.

4.3.3. Tier III: In-depth inventory of the production, import and export of SCCPs

A basic uncertainty of an SCCP inventory is the SCCP content of CP mixtures with unknown composition and without a certified content of SCCP. While in the Tier II inventory some suggestions for reasonable estimates have been given, such estimates have considerable uncertainties (please see the variation of SCCP content in CPs released from kitchen blenders in Table A-4). Therefore, in a Tier III inventory, technical CP mixtures with unknown composition produced or imported or exported should be analysed 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.

The refined data from the Tier III monitoring and assessment should be included or updateTable 4-1 and included in the inventory report.

4.4. Step 4: Managing and evaluating data; Step 5 inventory report

In the data evaluation **Step 4** the data compiled in the inventories need to be assessed for completeness and plausibility, possibly including a comparison with data from other countries in the region.

Data gaps may (partly) be filled by extrapolation of available statistical data. If the quality of the data is considered unsatisfactory, additional data collection (Tier II+III) or screening (Tier III) might be undertaken.

The compiled data (draft inventory) should be assessed by stakeholders and possibly by an external expert. Depending on comments further information might need to be gathered or finalized.

[6] However, the use and management of MCCPs should also be controlled due to their persistence and bio-accumulation (Glüge et al. 2018).

As last **Step 5** the compiled information and evaluated data for production, import and export of SCCPs would be compiled in a chapter within the inventory report. This should include:

- the methodology used in compilation of the data
- the calculations made
- assumptions made in the calculations
- all country-specific adjustments and estimates would be noted and described.
- the gaps and uncertainties of the data
- possibly further inventory tasks in a next stage (in the NIP implementation)

5. Inventory of SCCPs in the manufacturing of products

In this chapter major production sectors are compiled which might use SCCPs in the manufacturing of products (e.g. PVC, rubber, adhesives/sealants, fatliquors, lubricants/MWF). The inventory team should assess the presence of these production sectors and the quantity of SCCPs used in these industries as well as the total quantity of goods produced in these productions containing SCCPs.

Please note that the inventory of SCCP in consumer products are described in Chapter 6. Care need to be taken that there is no double counting of the use of SCCPs in manufacturing of products (this chapter) and products on the consumer market (Chapter 6).

5.1. Use of SCCP in the manufacturing of products

5.1.1. Additive in PVC production and assessment

The specific exemptions for SCCPs include secondary plasticizers in flexible polyvinyl chloride (PVC), except in toys and children's products where the use is not allowed.

SCCPs or CP mixtures containing SCCPs are used mainly as secondary plasticizers. The primary plasticizers are generally phthalates or phosphate esters (Houghton 1993). Primary plasticizers in PVC are used to increase the elongation properties and softness of the polymer. Secondary plasticizers, when used in combination with primary plasticizers, cause an enhancement of the plasticizing effect, and so are also known as extenders.

Flexible PVC has many applications such as electrical cable sheathing, in plumbing, conveyor belts, imitation leather, flooring, signage, phonograph records, inflatable products or tubes for outdoor decoration bulbs. The articles containing SCCPs are mainly soft plastic items made of PVC (i.a. toys, beauty cases, exercise mats made of PVC plastic, stickers for wall decoration, dress costumes, etc.) (Table A-1 in Appendix 1; BTHA, 2016).

The industry using PVC should be approached to obtain the information on the use and quantitative data of SCCPs and other CPs containing more than 1% of SCCPs in the respective uses. To compile this information, the individual companies producing PVC and products made from PVC as well as related associations would be contacted.

For use in PVC it is possible that pellets (masterbatch) containing SCCPs could be manufactured outside the country and then imported into the country for further processing to give the final product (U.K. Environment Agency 2009).

The assessment should include the current use of SCCPs and the former use of SCCPs in PVC (see questionnaire Appendix 5) including the volumes of SCCPs used and volumes of PVC as well as the products made from these PVC materials.

The steps for inventory development and the tiered approach are described below in Chapter 5.2 to 5.4.

Other POPs used in PVC

It should be noted that also other POPs have been used as additives in PVC in the past (before the 1980s) including PCNs and PCBs (Secretariat of the Stockholm Convention 2017a). Therefore, within an inventory of SCCP use in PVC also the former use of PCNs and PCBs in these uses should be assessed.

Assessment of recycling of PVC

PVC is recycled to some extent. The PVC entering the recycling can contain SCCPs. Recycling of SCCPs is not exempted. Therefore, SCCP containing PVC should be separated in PVC recycling and managed in an environmentally sound manner.

PVC can contain other hazardous chemicals including POPs (PCBs, PCNs) or heavy metals (lead, cadmium). PVC may also contain problematic softeners such as DEHP (Diethylhexyl phthalate). BBP (Benzyl butyl phthalate), DBP (Dibutyl phthalate), DIDP (diisodecyl phthalate), DINP (diisononyl phthalate), or DNOP (di-n-octyl phthalate) which are regulated in some regions and are prohibited e.g. in the EU in toys or medical devises (EU Commission 2015).

The situation of recycling of PVC and the presence/quantity and management of SCCP and other pollutants should be assessed and documented in the inventory.

The steps for inventory development and the tiered approach are described below in Chapter 5.2 to 5.4.

5.1.2. Rubber products

The specific exemptions for SCCPs include additives in the production of transmission belts in the natural and synthetic rubber industry and also spare parts of rubber conveyor belts in the mining and forestry industries (Table 5-1). Since companies might have difficulties to distinguish exempted and not-exempted uses in the rubber industry,

an overall assessment of the use of SCCPs and other CPs containing >1% SCCPs in rubber production and for rubber products should be conducted.

SCCPs are added to rubber products as flame retardants and/or plasticizers.

There are different types of natural and synthetic rubbers and elastomers to which SCCPs may be added in production. It is reasonable to expect that elastomers that do not have good flame resistance would be the prime candidates to be protected with SCCPs (RPA 2010).

Conveyor belts are a major application. Rubbers such as natural rubber (NR), styrene and butadiene rubber (SBR), polybutadiene rubber (BR), acrylonitrile and butadiene rubber (NBR), butadiene or isoprene rubber (IR) and ethylene propylene diene monomer (EPDM) rubber have very poor flame resistance (Conveyor Belt Guide, 2018). Therefore, these rubber types require the addition of flame retardants for uses where flammability standards exist such as for conveyor belts (ISO 340:2013).

On the other hand, chlorobutadiene rubber (e.g. chloroprene, also known as neoprene or CR) and PVC have inherent flame resistance. However, it is known that SCCPs are used as additives in PVC as secondary plasticizer (see Chapter 5.1.1). Also chloroprene rubber may be used for mining conveyor belt compounding alongside chlorinated paraffins for both the cover compound and the skim compound (Dick 2001). In the cover chlorinated paraffins may be added at concentrations of 15% by weight and in a skim coat at 30% by weight (Dick 2001).

Therefore, SCCPs or other CPs containing > 1% SCCPs may be used for the production of all major types of rubbers used in rubber belts.

The use of SCCPs and other flame retardants in rubber applications depends on the individual uses and the related safety and in particular flammability standards. Applications where rubber compounds might be flame retarded with different SCCP content (Table 5-1) include e.g.:

- Rubber conveyor belts
- Rubber transmission belts
- Rubber in sealants in housing
- Rubber applications in the transport sector (cars, busses, trains, airplanes)
- Rubber cables
- Industrial rubber rollers

SCCPs have also been used in rubber hoses, industrial sheeting, and shoe soles with different SCCP content (Table 5-1) (BRMA 2001).

Table 5-1 below lists rubber applications that may contain SCCPs or chlorinated paraffins with >1% SCCPs.

Please note: For rubber tyres normally no flame retardants are added and therefore tyre production is not considered as a use of SCCPs. However, SCCPs were detected in a first assessment of tyre granulates in Netherlands at low levels <50 ppm (Brandsma et al. 2018).

Table 5-1: Rubber applications that contain CPs and may contain SCCPs (BRMA 2001)

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%

For the inventory, the producers of the different type of rubbers and rubber products and applications should be contacted to gather the information on the current and former use of SCCPs in the respective products. The detailed steps for inventory development and the tiered approach are described below in Chapter 5.2 to 5.4.

Assessment of recycling of rubber products

Rubber products might be recycled. According to European Chemical Agency (ECHA), the lifetime of rubber belts is around 10 years (ECHA 2008b) (though a belt manufacturer suggests a lifetime of 15 years) and the belts are increasingly being recycled by reduction to powder. ECHA suggests that it is possible that also articles other than conveyor belts could be made of it (for example mats, building materials, paving materials) and so this could result in an additional source of widespread use of, and hence diffuse exposure from, SCCPs (ECHA 2008b). On the other hand, European rubber producers stress that they normally do not recycle SCCP containing rubber belts or rubber belts at all (RPA 2010). However, there are specialized companies for recycling of rubber belts stating: "*Once conveyor belts can no longer be used as conveyor belts, rather than being cut or shred into raw materials, they can be reused as gym floors, cow mats, dock bumpers, etc. When the belts can no longer be used for those purposes they can be reused as gasket materials and thin rubber sheeting. And finally once the belt can no longer be used in these applications it can then be shredded and used as a rubber mulch material*." (EZA Recycling Solutions 2018).

5.1.3 Paints including waterproofing and fire-retardant paints

SCCPs, or other CPs containing SCCPs, are used as plasticizers and flame retarding agents in paints and coatings. Waterproofing and fire-retardant paints are listed in the Stockholm Convention as exemptions for SCCP use.

The main types of paints that are likely to contain chlorinated paraffins are those based on chlorinated rubber, vinyl copolymers and acrylic based coatings (ECHA 2008b). SCCPs may also be used in crosslinkable polyester systems for the production of long-term road markings (RPA 2010).

Chlorinated rubber-based paints are typically used in aggressive environments such as marine, industrial applications or liquid manure pit. Vinyl copolymer-based paints are used mainly for exterior masonry (ECHA 2008b).

Applications of SCCPs and other CPs in paint formulations include:

- road marking paints;
- anti-corrosive coatings for metal surfaces;
- swimming pool coatings, fishpond coatings and water tank coatings;
- decorative paints for internal and external surfaces;
- masonry paints;
- intumescent coatings; and
- textile printing inks.

While only waterproofing and fire-retardant paints are listed as exemptions (Table 1-1), other manufacturers of paints might not be aware of this and use SCCPs or other CPs containing >1% SCCPs. Therefore, productions of all paints and coatings potentially using these CP mixtures should be assessed for the use of SCCPs and CPs containing >1% of SCCPs.

The application rate of chlorinated paraffins in paints depends on the type of paint and application and is between 1 and 30% by weight in paints based on resins such as chlorinated rubber, vinyl copolymers and acrylics (see Table 5-2).

A particular interesting paint application are waterproof paints for coating of fishponds and swimming pools (Table 5-2) and water tanks. These applications might present direct exposure to humans via food or skin contact.

The detailed steps for inventory development and the tiered approach for the assessment of manufacturing of paints are described below in Chapter 5.2 to 5.4.

If details on the SCCPs content in these paints is unknown then 10% might be chosen as an estimate for CP content since this is considered typical for these type of paint (ECHA 2008b). With an average of approx. 20% SCCPs share of global CP production (Glüge et al. 2016) the average SCCPs contribution in these paints might be estimated to 2%. This lead to an upper estimate since only a share of these paints contain CPs.

Table 5-2: Paints and coatings that contain CPs and may contain SCCPs (Environment Agency for England and Wales 2007; von Eckhardt & Grimm 1967; RPA 2010).

Paints and coatings that may contain SCCPs	Chlorinated paraffins content (% wt)
Organic solvent borne intumescent coating for structural steel	20-30

Paints and coatings that may contain SCCPs	Chlorinated paraffins content (% wt)
Plastisol[7] 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

5.1.4 Leather production (fatliquoring)

The specific exemptions for SCCPs include leather industry, in particular fatliquoring in leather.

The fatliquoring step is the last stage of leather preparation. The amount of fatliquor used in this step is around 7–12 per cent, based on the shaved weight of the leather to be treated (i.e. around 70–120 g of fatliquor/kg of leather). Since the fatliquor typically contains around 10 % (range 5–to 20%) chlorinated paraffins, the amount of chlorinated paraffins used in this step is around 7–12 g chlorinated paraffin/kg leather (range 3.5–18 g chlorinated paraffin/kg leather) (RPA 1997; U.K. Environment Agency 2009).

When offered to the leather, between 95% and 99% of the SCCPs may be taken-up by the leather, leaving between 1% and 5% of the SCCPs in the waste 'washings' (RPA 1997). Depending on further treatment this SCCP is discharged to the drain or removed within a waste water step. The final fate of the residues should be noted or assessed. SCCP release from industries can e.g. be assessed in sewer films or sediments (Rieger and Ballschmiter 1995).

Production of fatliquoring

Within the assessment of fatliquoring of leather also the upstream producer and importers of fatliquors should be assessed and detailed information on the CPs used gathered. The formulation of leather fatliquors is by a simple mixing process using an enclosed system at ambient temperature (U.K. Environment Agency 2009). The main components of the fat liquors are water, natural fats (e.g. fish oils), surfactants and the chlorinated paraffins. The chlorinated paraffins accounts for about 10 % (range 5–15 %) by weight of the formulated fat liquor (U.K. Environment Agency 2009).

5.1.5. Adhesives and sealants

The specific exemptions for SCCPs include adhesives.

SCCPs and other CPs are used as plasticizer and flame retardant in the production of adhesives and sealants. Adhesives and sealants are often considered together because they both adhere and seal; both must be resistant to their operating environments; and their properties are highly dependent on how they are applied and processed (Petrie 2000). The difference between an adhesive and sealant can be difficult to define as some are used as adhesives and vice versa. Generally, sealants are considered to be materials that are installed into a gap or joint to prevent water, wind, dirt or other contaminants from passing through the joint or crack. Adhesives, on the other hand, are used to transfer loads and are typically designed with much higher tensile and shear strength than sealants (Palmer and Klosowski, 1997).

While for adhesives an exemption has been granted, there is no particular exemption for sealants. Since sealants might be used as adhesives, SCCPs might still be used in the production of sealants. Furthermore, companies which are not aware that SCCPs are banned under the Stockholm Convention might further use SCCPs or CP mixtures with >1% SCCPs.

In any case the use of SCCPs, and CPs containing >1% SCCPs, in the production of sealants should be assessed together with the production of adhesives.

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

CPs are used in different adhesive and sealant materials including polysulphide, polyurethane, butyl and acrylic materials. CP containing adhesives and sealants are used in building and construction, and CPs are used in sealants for double and triple glazed windows. The different productions could be approached with the methodology described below. The SCCPs/CPs are typically added at amounts of 10–15 % and up to 20% by weight of the final sealant (BUA, 1992).

Solid waste can be generated during the production process and this may be up to 5% of the amount of sealant produced as a result of machine cleaning or scrap material.

5.1.6. Production of textiles

The use of SCCPs in textiles is not exempted but textile producers might still use SCCPs in flame-retarding, water repelling and rot-preventing textile finishes.

SCCPs and other POPs flame retardants (decabromodiphenyl ether (decaBDE) and hexabromocyclododecane (HBCD)) are/were used in the backcoating in textiles for furniture upholstery, seating upholstery in transport applications, and interior textiles such as blinds and curtains as well as industrial protective clothing. SCCPs were also used for the production of tent fabrics which have been substituted with rot-flame-water proofing based on a combination of MCCPs, decaBDE and biocide in a formulation based on aqueous dispersions (RPA 2010).

In the assessment of manufacturers of such textiles, all POPs chemicals used as flame retardants should be assessed.

In the assessment of textiles with water repellent properties, the use of PFOS/PFOA and related chemicals should be assessed in addition to SCCP use.

In addition to these textile companies, also compounders (formulators) of textile backcoatings or textile water-repellents should be included in the inventory.

5.2. Step 1: Planning the inventory of SCCPs in manufacturing of products

This first step focuses on defining the scope of the inventory, identifying stakeholders and developing a work plan (see section 3.1).

All the sectors where SCCPs are possibly used in the manufacturing of products (see 5.1) should be assessed for the current and past use of SCCPs in these productions. For this assessment industries and productions possibly using SCCPs in the country should be evaluated.

Considering the information on productions above, the inventory of SCCP in the manufacturing of products is expected to assess the following:

- SCCPs or CPs mixtures with SCCP content >1%
    - used in the production of PVC and products made from PVC;
    - used in the rubber production;
    - used in waterproofing and fire-retardant paints;
    - used in fatliquoring of leather and in the production of fatliquors;
    - used in production of adhesives and sealants;
    - used in the production of metal working fluids and lubricants (Chapter 6);
- Status and the possible need of labelling of products containing SCCPs;
- Management and releases of SCCPs at the production sites;
- Exposure and exposure risk of the workers and other receptors of individual uses of SCCP;
- End of life management and fate of SCCPs and CPs containing SCCP in the different use sectors.
- Alternatives used in the different sectors

Appropriate members of the inventory task team need to be selected to conduct the inventory of the individual sectors. Specific stakeholders for the inventory of SCCPs are listed in Table 3-1 and are selected according to the country situation. The NIP coordinator or task team leader can decide which stakeholders would be included in an inventory team and which stakeholders would just be contacted for an interview or with a questionnaire (Questionnaires are in Appendices 5 to 8) The inventory task team can be extended as appropriate during the inventory process.

5.3. Step 2 and 3: Choosing data collection methodologies and collecting data

5.3.1. Tier I: Initial assessment of SCCPs use in manufacturing of products

Expected outputs of the initial assessment include:

- *A list of relevant industrial associations and authorities of the potential use sectors in the country (see Chapter 5.1);*
- *A preliminary list of identified industries, companies and supply chain stakeholders;*
- *Initial information on relevant productions using SCCPs in the country;*
- *A list of products containing SCCP that are most likely manufactured in the country*
- *A preliminary list of industries using or having potentially used SCCPs in the past and might have generated contaminated sites and landfills (compiled for the inventory in Chapter 9)*

Identify industrial associations, authorities, and national registers

Identify industrial associations, authorities and national registers relevant to the sectors listed in chapter 5.1 that can be useful sources for the inventory and compile:

- 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 (Chapter 5.1) from national office/institute of statistics and industrial associations.

Identify national manufacturers

Perform a desk study identifying companies in the following industrial sectors:

- Production of PVC potentially using SCCP and other CP additives;
- Production of other plastics potentially using SCCPs as additives (e.g. EVA)
- Rubber production and type of rubber products in particular those which use flame retardants or other additives as plasticizer;
- Production of waterproofing and fire-retardant paints potentially using SCCPs or CPs;
- Production of fatliquoring agent and use of fatliquoring agent for leather production;
- Production of adhesives and sealants and use of sealants and adhesives potentially containing SCCPs;
- Industries producing metal working fluids or other lubricants containing SCCPs or CPs mixtures with SCCP content >1% used (compiled for the inventory in Chapter 6)
- Recycling industries recycling potentially SCCP containing materials (e.g. PVC, rubber, lubricants and metal working fluids)

Following information might be gathered from statistics on production volumes of the sectors:

- Import of SCCPs or other CPs possibly containing >1% SCCPs or sourcing in the country by the individual production sectors (information from or for Chapter 4).
- 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%;

In the Tier 1 for some of the production sectors only the total production volume or formulations potentially using SCCPs might be found. However, this information is also valuable and should be noted. An initial communication with industry association of the different use sectors might give an indication of the use of SCCPs or other CPs potentially containing >1% SCCPs in the individual sectors.

5.3.2. Tier II: Basic inventory of SCCPs use in manufacturing of products

Expected outputs of the preliminary inventory include:

- *Detailed information on the individual sectors using or potentially using SCCPs or other CPs containing SCCPs >1% in the manufacturing of products (Chapter 5.1)*
- *Contact established to the respective industry associations and users/companies*
- *Major users approached and questionnaires filled out with the responses of identified companies and possibly other stakeholders (associations; related research institutes)*
- *Compilation of information and data provided by major stakeholders and their supply chain stakeholders on total yearly use, and consumption of SCCPs:*
- *Total quantity of products containing SCCPs;*
- *Gaps on SCCP content in CP mixtures identified and documented and need for Tier III inventory elaborated;*
- *Additional stakeholders identified and contacted and key industries selected as most relevant sectors in the country;*
- *Overview on domestic supply chain networks;*
- *Alternatives used in the sectors and in particular in the exempted uses.*

Collection of information and data

Contact the major factories and stakeholders in each industrial sector (as identified in the initial assessment), by telephone, mail or letter, to:

- Inform them about the purpose of the inventory and its process (see questionnaires)
- Ask them on
    - Use of SCCPs and other CP mixtures in their processes
    - Total yearly consumption of SCCPs and CP mixtures in the industrial processes
    - Total amount of products produced with SCCPs
    - Detailed information on SCCPs and CPs used such as SCCP content, certificates on SCCP content; % chlorination;
    - Final SCCP content in the products in the individual use sectors;
    - Downstream users and sales of products and upstream suppliers;
    - End of life management and fate of SCCPs/CPs in the individual use sectors;
    - Releases of SCCPs in the individual productions and related contamination (see also Chapter 9);
    - Alternative to SCCPs used in the manufacturing of the different products;
- Use information generated from other inventory on upstream suppliers (producers or importers see Chapter 4) and downstream users/sales (see Chapter 6) in the collected information.

Information on Material Safety Data Sheets (MSDS) of CP additives used in the production sector as well as the MSDS of the manufactured products should be assessed.

The gathering of information in Tier II can have in the early phase a national sensitization and information workshops on the Stockholm Convention and SCCP use (and possibly use of other new listed industrial POPs). Also details on exemptions and restrictions would be communicated and discussed.

Such workshops can have breakout groups on the individual sectors to be investigated further. Further stakeholder meetings can be included in a work plan targeting these sectors with a need for further investigation.

Evaluate the information

The evaluation is intended to

- Identify gaps;
- Identify actions for filling the gaps.

Comparison of information on manufacturing of products containing SCCPs and products on the market (Chapter 7).

The information which is generated by the inventory on manufacturing of product and the information on products on the market (see Chapter 7) and in import/export of products (see Chapter 4) should be compared. Here parallel investigations downstream and upstream in the national supply chain of the industrial sectors can be conducted and compared:

- Comparison of the amount of products manufactured in the sectors with the total product amount on the market (see Chapter 7) and the import and export quantity to understand if the quantities match. For example, compare the total amount of SCCPs in PVC or rubber production delivered to the respective manufacturers, as provided by suppliers, and the total amount used in manufacture of PVC or rubber, as provided by manufacturers. If there are gaps in the data, further investigation in cooperation with the respective industries and industry associations should be conducted;
- Comparison of production and import of SCCPs or CPs mixtures containing SCCPs (Chapter 4) and the amount used in productions.

If more information is needed:

- Identify additional stakeholders to be contacted or other sources of use for the inventory (see Chapter 3);
- Further assessment in industries where the use of SCCPs could not be clarified;
- Identify the national supply chain for each industrial sector from information gathered in the previous steps.

In a Tier I and Tier II approach for a first conservative estimate, chlorinated paraffins used in the manufacturing of products could be considered potentially SCCP containing or contaminated until companies can prove that the SCCP content is ≤1% (e.g. by a certificate from the supplier or an accredited laboratory).

If providers or users of chlorinated paraffins can proof that the SCCP content is ≤1% then the respective chlorinated paraffin mixture or product is not restricted and can be further used. However, their use and management should also be noted in the inventory, in particular since different quality of MCCPs[8] might be on the market with SCCPs content ≤ 1% (Euro Chlor 2018) and also content considerable above 1% (Table A-4; Yuan et al. 2017; Gallistl et al. 2018) and companies might switch the provider with other quality of CP mixtures.

One particular challenge is the assessment of SCCPs in CP mixtures where the SCCP content is unknown. For MCCPs with certified SCCP content ≤1% the upper estimate would be 1% or if a particular concentration is certified then this concentration would be chosen for calculation. For other MCCPs and other CP mixtures without any information on SCCP content, the concentration can vary significantly. The percentages of SCCPs released from 12 CP containing kitchen food blenders were between 4 and 59%, with an average of 28% SCCPs and an average of 72% MCCPs (Yuan et al. 2017; Table A-4). The average percentage of SCCPs in global CP production is estimated to at least 16.5% (Glüge et al. 2016). A reasonable middle bound estimate for an average SCCP content in CP mixtures of unknown homologue composition might be a percentage of 20%, unless no other certified information is available.

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

Information from manufacturing sector gathered might either contain the information on the total quantity of SCCPs (or CPs) used in the productions or the total quantity of products containing SCCPs produced. Both data are relevant and should be compiled (Table 5-3).

8 Furthermore also the use and management of MCCPs should be controlled due to their persistence and bio-accumulation (Glüge et al. 2016).

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 x CSCCPs

The summary of inventory information should be compiled in Table 5-3 or a modified table including key information. Where data are available, an inventory should cover the use of SCCPs in the production of a longer period, best for the total period of the use by the industry or at least for the product lifetime or service life of a product. Generating this data set would allow an estimate of SCCP containing products still in use if performing a dynamic substance flow analysis in Tier III assessment (here also export and import of the products need to be considered).

Table 5-3: Sample table - Total uses of SCCPs in manufacturing of products in the inventory year and/or for the period where information were available

Uses of SCCP*	Total quantity of products containing SCCPs	Concentration of SCCP in products**	Total quantity of SCCPs used in products
Production of PVC			
Production of rubber			
Fire-retardant and water- proofing paint			
Fatliquoring in leather			
Adhesives and sealants			

*For metal working fluids and lubricants see Table 6-1 and Table 6-3

** Measured concentrations; See also Table 5-1; Table 5-2; Screening in EU Table A-1

Gathering information on alternatives

In the Tier II approach also the availability and use of alternatives to SCCPs in the different manufacturing of products would be gathered and compiled (Table 5-4). This information will also be important to decide if exemptions for the use of SCCPs in any of the exempted uses are needed and the particular use would then be registered.

Table 5-4: Sample table - Information gathered on alternatives for uses of SCCPs in manufacturing of products

Uses of SCCP*	Please note alternatives used in these applications	Comments regarding performance and cost
Production of PVC		
Production of rubber		
Fire-retardant and water-proofing paint		
Fatliquoring in leather		
Adhesives and sealants		

*For alternatives for SCCPs in metal working fluids see Table 6-2

Assessment and inventory of end-of-life management at production sites using SCCPs in manufacturing of products

Within Tier II it is also expected that the amount of waste generated at production sites is assessed and quantified and data then compiled (information compiled in Chapter 8 on waste). The questionnaires in Appendices 4 to 9 contain also a section to gather information on the management of wastes.

In the end of life evaluation, information on the recycling, reuse, treatment, destruction and disposal of SCCP containing wastes would be gathered. Since recycling of SCCPs is not allowed according the Stockholm Convention listing, specific management of SCCPs might be needed that products/materials containing SCCPs do not negatively impact recycling and to avoid (cross) contamination of the recyclates (e.g. PVC, rubber). Related information should be compiled in the inventory.

5.3.3. Tier III: In-depth inventory of SCCPs use in manufacturing of products

A basic uncertainty of an SCCP inventory is the SCCP content of CP mixtures with unknown composition and without a certified content of SCCPs. While in the Tier II inventory some suggestions for reasonable estimates have been given, such estimates have considerable uncertainties (please see the variation of SCCP content in CPs released from kitchen blenders in Table A-4). Therefore, in a Tier III inventory, CPs mixtures with unknown composition used in the manufacturing of products should be analysed for SCCP content. This would also include MCCPs without a certified SCCP content. Samples should be selected in such a way that the monitoring results close major gaps from Tier II assessment.

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.

The refined data from the Tier III monitoring and assessment should be included or update the Tables 5-3 and Table 5-4 and included in the inventory report.

5.4. Step 4: Managing and evaluating data; Step 5: inventory report

In the data evaluation **Step 4** the data compiled in the inventories need to be assessed for completeness and plausibility, possibly including a comparison with data from other countries in the region.

Data gaps may (partly) be filled by extrapolation of available statistical data. If the quality of the data is considered unsatisfactory, additional data collection (Tier II+III) or screening (Tier III) might be undertaken.

The compiled data (draft inventory) should be assessed by stakeholders and possibly by an external expert. Depending on comments further information might need to be gathered or finalized.

Another useful approach to evaluate data could be the development of a material and substance flow analysis (SFA) (Eriksson et al. 2012; Bolliger and Randegger-Vollrath 2003) using free software (http://www.stan2web.net/).

As last **Step 5** the compiled information and evaluated data for SCCPs used in the manufacturing of products would be compiled in a chapter within the inventory report. This should include:

- the methodology used in compilation of the data
- the calculations made
- assumptions made in the calculations
- all country-specific adjustments and estimates would be noted and described.
- the gaps and uncertainties of the data
- possibly further inventory tasks in a next stage (in the NIP implementation)

The data in the inventory report should serve for the NIP and action plan development and for article 15 reporting. The inventory report might contain a chapter with (preliminary) suggestions on activities for the action plan.

New information on SCCP use in manufacturing of products could be reported to the secretariat for update of the inventory guidance.

6. Inventory of metal working fluids and lubricants

Some uses of SCCPs are in production processes and not in products. This includes the use of SCCPs or CPs containing SCCPs in metal working fluids and the use as lubricants in a wide range of applications. During the use in these applications a large share of SCCPs can be released into the environment (see Chapter 2.5).

6.1. Background on metal working fluids (MWFs) and lubricants

Metal working fluids (MWFs) and lubricants are often traded or produced by the same companies. MWFs have in most applications also a lubricating role.

Therefore, MWF and lubricants are addressed within one inventory activity in this chapter.

6.1.1. Use of SCCPs in metal working fluids

Metalworking fluids are liquids, which are supplied to a manufacturing process of a metal in a way that allows for increased productivity based on lubricating and cooling effects (Brinksmeier et al. 2015). In various manufacturing processes, metalworking fluids (MWFs) are applied to ensure workpiece quality, to reduce tool wear, and to improve process productivity (Brinksmeier et al. 2015). MWF play a significant role in manufacturing processes such as forming (Bay et al. 2012), cutting (Weinert et al. 2004), and grinding (Brinksmeier et al. 1999). By their lubricating and cooling properties, MWFs contribute to the avoidance of thermal damage of the workpiece material and reduce wear of the tool.

Liquids which are included in the term MWFs have been classified based on different criteria. According to DIN 51385, MWFs are classified following their composition as oil-based or water-based MWFs (DIN 2013). They can also be categorized according to the manufacturing process as cutting fluid, grinding oil or forming oil.

For oil-based fluids, the chlorinated paraffin content of the fluid ranges from about 5% wt. for light machining up to 70% wt. for heavy drawing processes (metal forming fluids) (BUA, 1992).

Chlorinated paraffins in general are used in a wide variety of cooling and lubricating fluids used during metal cutting, grinding and forming operations (Brinksmeier et al. 2015). Chlorinated paraffins are in particular used as extreme pressure additive in metal working.

Neat cutting oils find application in a variety of machining operations such as drilling, hobbing, turning, honing, and broaching as they help to enhance the surface finish along with increasing the tool life.

Metal working fluids have an impact on occupational health. According to the German ordinance on occupational diseases, 23% of patients with toxic, toxic-degenerative and allergic contact eczema frequently got in contact with MWFs (Bagschick et al. 1998; Barth 2003). Therefore, the selection of MWF with low toxicity is relevant for workers.

6.1.2. Use of SCCPs as lubricant additives

Lubricants have been listed as exemptions in the Stockholm Convention (Table 1-1). There are a wide range of lubricants uses. Lubricants are used in automotive (engine oils, transmission fluids and gear oils), industrial automotive (heavy duty vehicles; agricultural equipment, construction and other earth moving equipment; military) rail, ships, industrial machinery (e.g. machine bearings, centrifuge, rotary compressors, air compressors), power generation (e.g. wind power facilities; electric generators), drilling in oil and gas exploration, petroleum refinery, food & beverage (European Commission 2016; UNEP 2017).

Metal working fluids are also industrial lubricants for manufacturing of metal parts (e.g. cutting, grinding, forming). Due to their specific listing in the exemptions and the specific use of CPs they are specifically addressed separately in this chapter (see Chapter 6.1.1).

Many of lubricant uses are open applications with related releases (“Total Loss Lubricants”) or Partial Loss Lubricants (European Commission 2018). Furthermore, some applications have a particular risk for human exposure. This includes for example all lubrication activities for the food & beverage sector where direct impact to food can occur. E.g. high levels of SCCPs have been detected in food oils in an Asian country (Cao et al. 2015). The SCCP contamination did not stem from the seeds/environment (Cao et al. 2015) and therefore stem from the oil production or refining process. Another exposure sensitive area is agriculture. The use of PCNs lubricants on farms in the 1940s/50s resulted in the suffering and slaughtering of cattle (US Ministry of Agriculture 1954; Secretariat of the Stockholm Convention 2017). Also, the former uses of PCBs in lubricants/hydraulic oil are still considered a risk on farms at area where machinery parked or had maintenance (BMU 2013). But also the direct exposure at the workplace is relevant for workers.

Therefore, it is important to develop an inventory and understand where SCCPs are used, the exposure relevance and which uses can be substituted by less harmful alternatives.

6.2. Step 1: Planning the inventory of SCCPs in MWFs and lubricants and identifying stakeholders

This first step focuses on defining the scope of the inventory, identifying stakeholders and developing a work plan (see section 3.1).

Considering the information above, the inventory of SCCP in MWFs and in lubricants is expected to address production and import, use and type of use, releases and related contamination, end of life management and alternatives to SCCP use (see chapters 6.3.2.1 and 6.3.2.2).

Appropriate members of the inventory task team need to be selected to conduct the inventory of the metal working fluid sector and the lubricant sectors. Specific stakeholders for the inventory of SCCPs are listed in Table 3-1 and are selected according to country situation. The inventory task team can be extended as appropriate. The NIP coordinator or task team leader can decide which stakeholders would be included in an inventory team and which stakeholders would just be contacted for an interview or with a questionnaire (A sample questionnaire for metal working fluids is in Appendix 7. The questionnaire can in a slightly modified way be used as questionnaire for lubricants.

6.3. Step 2 and 3: Choosing data collection methodologies and collecting data

6.3.1. Tier I: Initial assessment of SCCPs containing MWFs and lubricants

Expected outputs of the initial assessment include:

- *A list of manufacturers/suppliers of metal working fluids*
- *A list of manufacturers/suppliers of lubricants*
- *A list of sectors and professional users of MWFs potentially using SCCPs or CP mixtures containing SCCPs.*
- *A list of sectors and professional users of lubricants*
- *A list of other stakeholders that might have valuable information for the inventory*
- *Compilation of data collected including initial feedback from stakeholders*

In the first step the inventory team can screen the available literature and information from the institution compiling national statistics, technical reports or communications from industry and industry associations, the resources provided by the Stockholm Convention; commissioned research reports, published literature in scientific journals, and internet searches. The information should be collated, evaluated and verified, and a gap analysis of the data could be undertaken to feed into a Tier II assessment.

In a second step the inventory team would contact major stakeholders to get initial information if SCCPs or other CPs possibly containing SCCPs are being used in MWFs in sectors and in lubricants in different use sectors. Also, the ministry of environment and the ministry in charge of industry could be contacted and asked for available information.

In a Tier I approach for a first conservative estimate, all chlorinated paraffins used in metal working fluids and as lubricants 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. The use and management can also be noted in the inventory in particular since different quality of MCCPs might be on the market with SCCPs content ≤ 1% (Euro Chlor 2018) and considerable above 1% (Table A-4; Yuan et al. 2017; Gallistl et al. 2018;) and companies might switch the providers over time. Although not listed as a POPs, the management of MCCPs in these open applications should be controlled due to their persistence and bio-accumulation (Glüge et al. 2016).

In an initial assessment of the use of CP containing lubricants, sensitive uses like food & beverage and agricultural machinery should be included.

6.3.2. Tier II: (Preliminary)[9] Inventory of SCCPs containing MWFs and lubricants

In the Tier II assessment detailed quantitative information on the current and overall use of SCCPs in the MWFs and in lubricant use sectors should be collected by gathering detailed information from the related industry (MWF and

[9] Depending on the quality of information and the uncertainties, the inventory developed in Tier II might contain sufficient information for developing an action plan for the NIP and further management steps in this sector

lubricant producing and using industries), from industry associations, importers, retailers and other stakeholders. This activity would build on the information gathered in the Tier I assessment including the related gap analysis.

6.3.2.1. Gathering of information on uses of SCCPs in metal working fluids

The information gathered should include the amount of MWFs containing SCCPs and MWFs containing CPs with unknown concentration of SCCPs. These information should be gathered from a) Producers of MWFs; b) imports and companies trading and selling MWFs c) companies using MWFs. For the survey the questionnaire in Appendix 7 can be used.

The information on the total production, import and use of SCCP containing MWFs would be compiled for an overview on

- Total production amount of MWFs containing SCCPs or contaminated with SCCPs >1%
- Total amount of MWFs imported containing SCCPs or CPs contaminated with SCCPs >1%
- Total amount of MWFs used in metal production containing SCCPs or CPs contaminated with SCCPs >1%
- End-of-life management and fate of MWFs in the different use sectors.
- Releases of SCCPs from MWFs at the metal production companies and related contamination (see also Chapter 9);
- Alternative MWFs not containing SCCPs used in the different uses of MWFs.

Estimating total amount of SCCP containing MWFs and related SCCP content

When compiling the information on production, import and use volumes, no double counting in the total inventory should be done but data of import/production and the final use volumes should be compared and inconsistencies and gaps described and addressed.

In addition to the total amount of MWFs containing SCCPs also the total amount of SCCPs within this volume should be assessed. Depending on the use of individual MWFs the SCCP concentration could vary considerably. Concentration of SCCPs (or other CPs) in MWFs can significantly vary. For oil-based fluids, the chlorinated paraffin content of the fluid ranges from about 5% wt. for light machining up to 70% wt. for heavy drawing processes (metal forming fluids) (BUA, 1992). An assessment for the average CP content of CP containing MWFs concluded for the UK that these MWFs contained in average about 50% CPs (ECB 2005).

In the inventory process the SCCP content of the major used MWFs would be gathered (e.g. by using the questionnaire in Appendix 7). If the data on content of SCCP in the SCCP containing MWFs are still few then an estimate of an average content of 50% is recommended as a reasonable middle bound approach.

One particular challenge is the assessment of SCCPs in CP mixtures where the SCCP content is unknown. For MCCPs with certified SCCP content ≤1% the upper estimate would be 1% or if a particular concentration is certified then this concentration would be chosen for calculation. For other MCCPs and other CP mixtures without any information on SCCP content, the concentration can vary significantly. The range of SCCPs content in CPs released from 12 kitchen food blenders were between 4 and 59% with an average of 28% SCCPs and an average MCCP content of 72% (Yuan et al. 2017). The average percentage of SCCPs to global production is estimated to at least 16.5% (Glüge et al. 2016). Therefore, a reasonable middle bound estimate for CP mixtures of unknown homologue composition might be an average SCCP content of 20% unless no other certified information is available. Considering an average content of 50% CPs in oil based MWFs then middle bound estimate would be 10% of SCCPs in oil-based CP containing MWFs.

The CP concentration in emulsion-based metal working fluids in the final emulsified fluid is normally <1% (BUA (1992)). With the above middle bound SCCP estimate (20% in CPs of unknown composition) the SCCP content in emulsion-based metal working fluids containing CPs is in average <0.2%.

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

TQSCCPs = TQfluid x CSCCPs

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

(action plan development). In case that large gaps exist the inventory would be called “preliminary” and appropriate activities would be formulated in the action plan to close these gaps.

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

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

The calculation would be compiled for those MWF and lubricants (see below) for which concentrations are known and also estimated for those CPs for which SCCP concentrations are unknown and estimated based on the above considerations and compiled in Table 6-1.

The uncertainty for those MWFs containing CPs were SCCP concentration were only estimated should be highlighted in the inventory for further assessment during NIP update if currently no measurement capacity is available. If SCCP measurement capacity is available then the inventory can be refined by a Tier III inventory by analysing major individual MFAs and lubricants containing CPs with unknown composition.

Table 6-1: Sample table - Inventory of SCCP use in metal working fluids for the inventory year or period

Type of MWF	Concentration	Total consumption of MWFs (tonnes)	Total quantity of SCCPs (tonnes)
Oil-based MWF containing SCCPs	Known concentration (or assumed 50%)		
Oil-based MWF containing CPs with known SCCP content	Known concentration		
Oil-based MWF containing CPs with unknown composition	Average 10% SCCP		
Emulsion-based metal working fluids with SCCP	1 %		
Emulsion-based containing CPs with unknown composition	0.2 %		

For a more robust assessment of SCCPs in the MWFs, a Tier III inventory could be initiated including measurements of SCCPs in major MWFs (see below).

Gathering information on alternatives for MWFs

In the Tier II approach also the availability and use of alternatives to SCCPs in MWFs in the different uses of MWFs would be gathered and compiled (Table 6-2). This information will also be important to decide if an exemption for the use of SCCPs in MWFs might be needed and for what particular use would then be registered.

Table 6-2: Sample table - Information gathered on alternatives for SCCPs-uses in MWFs

Uses of SCCP in MWFs	**Please note alternatives used**	**Comments regarding availability, performance and cost**
Cutting		
Grinding		
Extreme pressure additive for stamping		
Extreme pressure additive deep drawing		
Others (please note)		
Others (please note)		

Assessment and inventory of end-of- life management of MWFs containing SCCPs

Within Tier II it is also expected that the volume of waste generated for the respective inventory year is assessed and estimated. Information on the end-of-life management in production and use would be noted and information is compiled in Chapter 8. This would include the amount of SCCP containing waste from production and use of MWFs. The questionnaire in Appendix 7 contains a section to gather information on the management of wastes in MWF production and use.

Information on the recycling, reuse, treatment, destruction and disposal of SCCP containing MWFs should be gathered. Since recycling of SCCPs is not allowed according the Stockholm Convention listing, specific technologies might be needed for material recycling of MWFs to avoid the (cross) contamination with SCCPs. Related information should be compiled in the inventory.

6.3.2.2. Gathering of information on uses and quantity of SCCPs in lubricants

The information gathered would include the different use areas of lubricants (except MWFs) in the country and an assessment if lubricants containing SCCPs or other CPs with unknown content of SCCPs are used in these applications. These information would be gathered from a) Producers of lubricants; b) imports and companies trading and selling lubricants c) users of lubricants. For the survey the questionnaire in Appendix 7 can be used.

The information on the total production, import and use of SCCP containing lubricants would be compiled for an overview on:

- Total production volume of lubricants containing SCCPs or contaminated with SCCPs >1%
- Total amount of lubricants imported containing SCCPs or CPs contaminated with SCCPs >1%
- Total amount of lubricants in different use sectors containing SCCPs or CPs contaminated with SCCPs >1%
- End of life management and fate of lubricants in the different use sectors.
- Releases of SCCPs from lubricants in the different use sectors and related contamination (see also Chapter 9);
- Alternative lubricants not containing SCCPs used in the different uses.

Estimating total amount of SCCP containing lubricants and related SCCP quantity

The use of SCCPs in lubricants has been generally exempted with a particular listing for engines of automobiles, electric generators and wind power facilities, and for drilling in oil and gas exploration, petroleum refinery to produce diesel oil. Therefore, all lubricant use areas (see above) would be assessed for SCCP use.

Information should be compiled for a) production, b) import, c) distribution/sales and d) uses of SCCP containing lubricants for the relevant uses of lubricants in the country. Care need to be taken that no double counting in the final inventory is done. Data of import/production and the final use volumes should be compared and inconsistencies and gaps described and addressed.

Currently in particular information on SCCP and other CP use in automotive is available while for other lubrication even for the mentioned SC exempted uses is scarce or non-existing. Therefore, an assessment should be made if SCCPs or other CPs possibly containing SCCPs are used in the major lubricant

- Automotive for consumer market (e.g. engine oils, transmission fluids and gear oils),
- Industrial automotive (e.g. heavy duty vehicles; agricultural equipment, construction and other earth moving equipment; military) rail, ships;
- Power generation (e.g. wind power facilities; electric generators);
- Industrial machinery (e.g. machine bearings, centrifuge, rotary/air compressors), including machinery in food & beverage;
- Drilling in oil and gas exploration, petroleum refinery.
- Other uses

For the inventory the information would be summarized in a table (see example Table 6-3).

For the assessment, (major) companies producing, importing and trading/selling lubricants should be approached for providing information. The questionnaire for MWF in Appendix 7 can, in a slightly modified way, be used as questionnaire for lubricants. Also, an assessment of different end users of lubricants should be conducted.

In addition to the total volume of lubricants containing SCCPs also the total amount of SCCPs within this volume should be assessed. For the calculation the same calculation formula for Total Quantity of SCCPs (TQ_{SCCPs}) as described above in 6.3.2.1 for MWFs should be taken.

Depending on the use of individual lubricants, the SCCP concentration can vary. Automotive oils with low concentration (1 to 3% CPs) and up to 60% CPs have been discovered on the market and patents for automotive oils have been granted with up to 70% CPs (Sloan 1986). In the inventory process the SCCP (and CP) content of lubricants on the market/in use would be gathered (e.g. by using the questionnaire in Appendix 7).

For lubricants containing CPs with unknown SCCP content, the same approach might be taken as for MWFs described above (in average 20% SCCPs in CPs of unknown composition).

Table 6-3: Sample table - Inventory for SCCPs in lubricants

Lubricant use	SCCP concentration in the individual lubricants	Total quantity of SCCP containing lubricants (t)	Total quantity of SCCPs (t)
Automotive for consumer market			
Industrial automotive			
Power generation			
Industrial machinery			
Drilling in oil and gas exploration			
Petroleum refinery			
Other lubricant uses			

For a more robust assessment of SCCPs in lubricants, a Tier III inventory could be initiated including measurements of SCCPs in major lubricants (see below).

Gathering information on alternatives

In the Tier II approach also the availability and use of alternatives to SCCPs in the individual lubricant use and in particular in the different exempted uses of lubricants (Table 1-1) would be gathered and compiled. This information will also be important to decide if an exemption for the use of SCCP in lubricants is needed and for what particular use.

Assessment/inventory of end-of-life management of SCCP containing lubricants

Within Tier II it is also expected that the volume of waste generated is assessed and where possible quantified for the respective inventory year (see also Chapter 8 on waste). The questionnaire for MWFs in Appendix 7 can in a slightly modified way be used as questionnaire for lubricants. It contains a section to gather information on the management of wastes. In this assessment it should be noted if an certain lubricant application should be categorized as “Total Loss Lubricants” or “Partial Loss Lubricants” or closed application which might have ”Accidental losses” (see European Commission 2018).

In the end-of-life evaluation, information on the recycling, reuse, treatment, destruction and disposal of SCCP containing lubricants would be gathered. Since recycling of SCCPs is not allowed according the Stockholm Convention listing, specific technologies might be needed for recycling of lubricants to avoid the (cross) contamination with SCCPs. Related information should be compiled in the inventory.

6.3.3. Tier III: In-depth inventory of SCCPs in MWFs and lubricants

A basic uncertainty of an SCCP inventory is the SCCP content of chlorinated paraffins with unknown composition and without a certified content of SCCPs. While in the Tier II inventory some suggestions for reasonable estimates have been given, such estimates have considerable uncertainties. Therefore, in a Tier III inventory MWFs and lubricants containing CPs with unknown composition or MCCPs without a certified SCCP content would be priority samples to clarify. Samples would be selected in such a way that the monitoring results close major gaps from Tier II assessment.

A monitoring could be performed for MWFs and lubricants with unknown composition which are suspected to contain SCCPs. A useful approach is a pre-screening of MWFs with XRF for chlorine content (Secretariat of the Stockholm Convention 2017b). MWFs and lubricants with concentration above 1% chlorine in such a screening test would be further assessed for SCCPs and possibly other chlorinated compounds.

In a Tier III screening sensitive lubricant uses in the food and beverage sector or lubricant uses in the agricultural sector (tractors and other machinery) would be further assessed by analysis.

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.

The refined data from the Tier III monitoring and assessment should be included or update the Tables 6-1 and 6-2 and included in information/data in the inventory report.

6.4. Step 4: Managing and evaluating data; Step 5 inventory report

In the data evaluation **Step 4** the data need to be assessed for completeness and plausibility, possibly including a comparison with data from other countries in the region.

Data gaps may (partly) be filled by extrapolation of available statistical data. If the quality of the data is considered unsatisfactory, additional data collection (Tier II+III) or screening (Tier III) might be undertaken.

The compiled data (draft inventory) should be assessed by stakeholders and possibly by an external expert. Depending on comments further information might need to be gathered or finalized.

Another useful approach to evaluate data could be the development of a material and substance flow analysis (SFA) (Eriksson et al. 2012; Bolliger and Randegger-Vollrath 2003) possibly using free software (http://www.stan2web.net/).

As last **Step 5** the compiled information and evaluated data for SCCPs use in MWFs and lubricants would be compiled in a chapter within the inventory report. This should include:

- the methodology used in compilation of the data
- the calculations made
- assumptions made in the calculations
- all country-specific adjustments and estimates would be noted and described.
- the gaps and uncertainties of the data
- possibly further inventory tasks in a next stage (in the NIP implementation)

The data in the inventory report should serve for the NIP and action plan development and for article 15 reporting. New information on SCCPs in particular on the use of SCCPs in lubricants should be reported to the secretariat for update of the inventory guidance.

7. Inventory of SCCPs in products, use and stocks

In this chapter major products in which SCCPs might be added as plasticizer or flame retardant such as products made from (soft) PVC, rubber, water proof paints, adhesives/sealants, leather or textiles. For these products an inventory should be compiled for SCCP containing products imported, on the market/sold and in use/stock.

Some of these products are mainly used on the consumer market (e.g. toys or leather furniture) others mainly used in the industry or in production (e.g. conveyor belts or industry rollers), others are used for both (e.g. water proof paints; rubber hoses) others are first used by industries but end up in consumer products (PVC cables or other plastic parts in electronics or buildings).

One inventory approach is to contact those stakeholders which might know the SCCP content in the products or which can ask producers or suppliers for this information. The information generated in the inventory of SCCP use in the manufacturing of products (Chapter 5) is one relevant source of information on products on the market and in use. In addition some monitoring of articles on the market and in use might be useful or needed. Also the monitoring results from other countries could be utilized for information (e.g. the EU RAPEX system[10]).

According to the Stockholm Convention, all products containing SCCPs concentration >1% SCCPs are POPs products. In some regions more stringent limits might apply such as in the European Union where only products with SCCP content <0.15%[11] are allowed on the market (European Commission 2015b).

Some of the uses have long service life such as sealants and cables in construction which might be used for 50 years or longer.

In some of these uses other POPs have been used in the past in particular PCBs and PCNs in cables, sealants, paints/coatings and rubber. In an inventory of SCCPs in these uses also PCNs and PCBs should be considered in the inventory of stocks (see inventory guidance for PCNs and PCBs in open applications Secretariat of the Stockholm Convention 2017). Cables and intumescent paints might also contain brominated flame retardants listed as POPs (DecaBDE and HBCD) which could also be addressed within the inventory.

These product sectors would be assessed for the current and past use of SCCPs.

Please note that the inventory of SCCP in manufacturing of products are described in Chapter 5. Care need to be taken that there is no double counting of the use of SCCPs in products and use (this Chapter 7) and manufacturing of products (Chapter 6).

7.1. Products on the market, in use/stocks containing SCCPs

For the major products containing SCCPs or possibly containing SCCPs an inventory should be developed for developing an action plan for control, substitution and waste management.

7.1.1. PVC and other plastic containing SCCPs

Flexible PVC has many applications such as electrical cable sheathing, in plumbing, conveyor belts, imitation leather, flooring, signage, inflatable products or tubes for outdoor decoration bulbs. The articles containing SCCPs are mainly soft plastic items made of PVC (i.a. toys, beauty cases, exercise mats made of PVC plastic, stickers for wall decoration, dress costumes, etc.) (BTHA, 2016).

The monitoring of SCCPs in consumer products on the European market revealed that a wide range of PVC products and some plastic/polymer products made from Ethylene-vinyl acetate (EVA) foam are contaminated with SCCP above the EU limit of 0.15% and a range of products also above the Stockholm Convention limit of 1% (Appendix 1). Several of the products contained cables, cords or extension lead where the PVC/plastic was above regulatory limit (up to 4.7%). A range of PVC parts in toys were contaminated with SCCPs such as bath toys (1.34% SCCPs), bathtub pillow (1.7% SCCPs) or toys with cables and cords. Other PVC and Ethylene-vinyl acetate (EVA) polymer products contaminated with SCCPs >1% were yoga mats (up to 6.9% SCCP) (Appendix 1; UNEP 2018b). One source of SCCP and MCCP release from food blenders were polymer parts and polymer coatings (Yuan et al. 2017).

For the compilation of information, steps described in Chapter 7.2 to 7.4 below should be taken. For inventory development the retailers importing PVC products should be approached to clarify on the SCCP content of the imported products. In a Tier III inventory selected products can be analysed for SCCP contamination (see below).

[10] https://ec.europa.eu/consumers/consumers_safety/safety_products/rapex/alerts/?event=main.weeklyOverview&web_report_id=2652&lng=en

[11] The limit of 0.15% SCCP has been derived from the use of MCCP (EU Commission 2015), with an allowed 1% SCCP and a content of 15% of MCCP in the product which is the upper use volumes for most products.

Within the assessment of the life cycle of PVC and EVA products, also the end of life treatment and in particular the recycling of these products should be assessed. For the recycling of PVC products see also Chapter 5.1.1. Information on waste management of SCCP containing products are compiled considering information in Chapter 8.

7.1.2. Rubber products possibly containing SCCPs

A range of rubber products are on the market and in use which might contain SCCPs. Some of the major products are used in specific industries such as:

- conveyor and transmission belts (e.g. mining, mineral industries, farms);
- rubber cables (construction; electricity grid)
- rollers, industrial roller coverings and industrial sheeting (diverse industries).

Furthermore CPs are added to shoe soles, rubber hose, pipe seals, rubber sheet and some fire resistant rubber products. The CP content used in such applications is compiled in Table 5-1.

Flame retarded rubber applications are also used in the transport sector (cars, busses, trains, airplanes).[12]

Products on the consumer market which might contain SCCPs are e.g. rubber hoses or shoe soles. However also toys can contain rubber parts with SCCPs content >1% as revealed by monitoring on the European market (e.g. 1.7% SCCP in tyres of radio controlled car) (Appendix 1). SCCPs above regulatory limit were also found in handle/grip of hammers (Appendix 1).

These products are either produced in the country (see Chapter 5.1.2) or are imported by retailers.

For the individual products the service life is relevant for the assessment of the likely volume of the total stocks currently in use. The service life of products is also relevant to decide if other POPs which have been used in rubber application earlier (PCBs and PCNs) are still present in use or waste. PCNs were used in specific rubber application such as chloroprene rubber for example in Neoprene FB until 2000 (Yamamoto et al. 2016; Secretariat of the Stockholm Convention 2017a) while the use of PCBs in open applications was largely phase out by ca. 1975.

For the compilation of information, steps described in Chapter 7.2 to 7.4 below should be taken. Within the assessment of the life cycle of rubber products, also the end of life treatment and in particular the recycling of rubber products should be assessed. For the recycling of rubber products see also Chapter 5.1.2. Information on waste management of SCCP containing products are compiled considering information in Chapter 8.

7.1.3. Waterproofing and fire-retardant paints or coating containing SCCPs

The specific exemptions for SCCPs include waterproofing and fire-retardant paints.

SCCPs (and other CPs containing SCCPs) are used as plasticizers and flame retardant in waterproofing and fire-retardant paints. These paints are mainly used by professional painters but are to some extent also used in private households. The main types of paints that are likely to contain chlorinated paraffins are those based on chlorinated rubber, vinyl copolymers and acrylic based paints and coatings (ECHA 2008b).

Chlorinated rubber-based paints are typically used in aggressive environments such as marine, industrial applications or liquid manure pit. Vinyl copolymer-based paints are used mainly for exterior masonry (ECHA 2008b).

Applications of paint formulations containing SCCPs or other CPs include:

- road marking paints;
- anti-corrosive coatings for metal surfaces (e.g. for metal bridges, ships, pressure pipes, water sluices, electricity poles, tanks (outdoor and indoor) and machinery);
- coatings for swimming pools, dams, water tanks and fishponds;
- decorative paints for internal and external surfaces;
- masonry paints;
- intumescent coatings; and
- textile printing inks.

[12] SCCPs/CPs are not added to tires but granulates from tires SCCPs have been detected at low levels (Brandsma et al. 2018).

While only waterproofing and fire-retardant paints are listed as exemptions (Table 1-1), also other paints might contain SCCPs or other CPs containing SCCPs and can be assessed as appropriate.

The percentage of chlorinated paraffins in paints depends on the type of paint and application and is between 1 and 30% (main 2.5 to 10%) by weight in paints based on resins such as chlorinated rubber, vinyl copolymers and acrylics (see Table 5-2).

The use of PCBs in such paints was a major open application of PCBs until the 1970s and possibly early 1980s (Jartun et al. 2009; Wagner et al. 2014). For Switzerland it is estimated that at least 20% of swimming pools contain PCB paints (Knechtenhofer 2009) and an inventory is developed for all public pools (AGIR 2013). Similar assessments have not been reported for SCCPs but could be combined within one monitoring program (including also PCNs).

For the compilation of information, steps described below in Chapter 7.2 to 7.4 should be taken.

In this assessment also the removal approach of these paints, and regulations on removal of paints should be assessed. The unsafe removal of PCB containing paints from a bridge over the river Elbe has resulted in the releases of some hundreds of kg to tonnes of PCBs into the environment with associated contamination of the Elbe river (ELSA 2016), and during the abrasive blasting of a painted concrete bridge in Norway ca. 1600 kg of PCBs have been released with associated contamination of the environment (Jartun et al. 2009).

7.1.4. SCCPs in adhesives and sealants on the market and in use

Adhesives/sealants formulations that can contain SCCPs include polysulphide-, polyurethane- and acrylic based products which come in one- or two-parts (two-part products appear to be more common) (RPA 2010);

Such adhesives are used e.g. for:

- road marking tapes (RPA 2010),
- artificial grass (RPA 2010)
- military uses (RPA 2010).
- flooring (e.g. parquet, carpet) where they have substituted the former use of PCBs in adhesives (ARGUK 2017; Wagner et al. 2015)

Therefore, the assessment of such professional uses would be a priority for adhesives. However also adhesives on the consumer market e.g. in do-it-yourself stores might contain SCCPs. Such sealants (normally one-part) are supplied in the form of cartridges typically containing around 500 g of sealant (U.K. Environment Agency 2009).

The assessment should include retailers and end professional users.

For sealants, there is a wide range of applications including (RPA 2010):

- filling of expansion and movement joints (either horizontal or vertical);
- filling of gaps around doors, windows, arches;
- sealants for water storage applications (reservoirs) and for protecting areas from oil and fuel spillages, areas around petrol stations, sewage treatment works;
- sealants for underground facilities such as basements and subways but also for the
- waterproofing of constructions such as bridges and culverts;
- sealants for automotive windows and sealants that may act as intumescent (fire protection) coatings;
- sealants in waterproof roof coating;

SCCPs content may vary widely and can be as low as 2% (in the adhesive for road marking strips) and up to 95% in accelerators for two-part sealants. The most common concentrations shown in MSDS are 10-30% (RPA 2010).

For the compilation of information, steps described below in Chapter 7.2 to 7.4 should be taken.

Since sealants can have long service life of 50 years and longer (e.g. in buildings, reservoirs, sewage treatment works, culverts) the quantity of SCCP containing sealants in use is of particular interest. Some adhesives applications also have long service life (e.g. in flooring). In the assessment of sealants in use also the amount of PCBs or PCNs in sealants and adhesives should be assessed (Secretariat of the Stockholm Convention 2017). Therefore, sealants and adhesives should be assessed in the end of life of buildings and other structures (construction & demolition waste) for SCCPs, PCBs and PCNs (see also Stockholm Convention 2017).

7.1.5. SCCPs in leather on the market and in use/stock

Chlorinated paraffins including SCCPs are used in leather treatment for light-fastness and a dry surface feel mainly in leathers for the top end of the quality range (Entec 2008). This might include leather used for furniture, clothing or car seats. Different CP formulations are used in leather treatment and SCCPs were already phased out in some regions (e.g. EU).

The final CP content in treated leather products is approx. 1% of the leather weight.

In the European market survey leather consumer products containing SCCPs were baseball gloves (3.7% SCCPs) and boxing gloves (0.4% SCCPs).

Also PVC leather clothes might contain SCCPs or other CPs containing SCCPs.

Also the SCCPs in imported fat liquoring agents or shoe polish should be included in the assessment.

For the compilation of information, steps described below in chapter 7.2 to 7.4 should be taken.

Since the CPs are relatively strongly bound to the leather (Entec 2008), SCCP treated leather products retain most SCCPs and products in use with decade long service life such as leather furniture or clothes should be considered in the inventory.

7.1.6. Textiles treated with SCCPs

The current use of SCCPs in textiles is not exempted and is considered low. In the European monitoring only one textile (the print on a sweater) contained SCCPs (0.23%). Therefore, it is recommended not to initiate an own inventory activity for the assessment of SCCP in textiles but to assess all POPs currently and formerly used in the textile industry (decaBDE, HBCD, PFOS, PFOA, and SCCPs). This includes e.g. backcoated textiles in furniture upholstery, seating upholstery in transport applications, and interior textiles such as blinds and curtains as well as industrial protective clothing and tents (military and commercial). For SCCPs additionally the prints on textiles with plastisol[13] screen printing inks for textiles on PVC basis can be a major source of SCCPs contamination of textiles. Since paints and PVC application received an exemption, SCCP containing paint and PVC-plastisols might still be used on textiles and should be assessed. Also the use of SCCPs and other CPs containing >1% in textile finish should be assessed/stopped and stakeholder informed that there is no exemption for this use.

7.2. Step 1: Planning the inventory of SCCPs in products, use and stocks

This first step focuses on defining the scope of the inventory, identifying stakeholders and developing a work plan (see section 3.1).

To narrow the scope of an initial assessment, the inventory team can identify the mayor types of articles or products on the consumer market and products used in industries that possibly contain SCCPs for further inventory activities. The inventory of SCCP in the consumer products, use and stocks is expected to address the following:

- quantity of PVC products containing SCCPs on the marked and in use/stocks;
- quantity of rubber products containing SCCPs on the marked and in use/stocks;
- waterproofing and fire-retardant paints containing SCCPs on the marked and in use/stocks;
- leather treated with SCCPs on the marked and in use/stocks;
- adhesives and sealants containing SCCPs on the marked and in use/stocks;
- Status of labelling of products containing SCCPs;
- End of life management and fate of SCCPs containing products.

Appropriate members of the inventory task team need to be selected to conduct the inventory of the individual sectors. Specific stakeholders for the inventory of SCCPs are listed in Table 3-1 and are selected according to the country situation. The NIP coordinator or task team leader can decide which stakeholders would be included in an inventory team and which stakeholders would just be contacted for an interview or with a questionnaire (Questionnaires are in Appendix 9). The inventory task team can be extended as appropriate during the inventory process.

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

7.3. Step 2 and 3: Choosing data collection methodologies and collecting data

7.3.2. Tier I: Initial assessment of SCCPs in products on the market and in use

Expected outputs of the initial assessment include:

- *Priority list of products on the consumer market that might contain SCCPs*
- *A list of relevant large importer, retailers and suppliers of the identified products*
- *Average service life of the identified products*
- *A preliminary list of industries that might use products containing SCCPs;*
- *A preliminary list of supply chain stakeholders for the individual products*
- *Product categories in the same uses which might additionally contain PCBs or PCNs from former uses (rubber, cables, paints, sealants/adhesives; see Secretariat of the Stockholm Convention 2017a).*
- *Compilation of information as basis for Tier II assessment*

Identify the articles or products on the market and in use containing SCCPs

Desk study of existing information on products imported, sold and in use:

- Gathering information about existing past and current national data on products potentially containing SCCPs in national bureau of statistics, and national central bank; internet searches, specific industry and import/export reports, published literature in scientific journals, technical reports or notes, commissioned research reports.
- Compile available information on the individual products potentially containing SCCPs:
    - PVC products
    - Rubber products
    - Paints/coatings
    - Adhesives/sealants
    - Leather
- Compile a list of retailers trading and selling these products
    - Compile a list of industries which might use products containing SCCPs (in particular construction, mining, painting)
- Consider the information on manufacturing of products (Chapter 5) for the assessment
- Inform the inventory development of manufacturing of products (Chapter 5) with relevant findings from the assessment on products on the market

Compile all information and information gaps for the Tier II assessment.

7.3.2. Tier II: Basic inventory of SCCPs in products on the market and in use

Expected outputs of the preliminary inventory include:

- *Detailed information/quantity on the products imported, sold and in use containing SCCPs and potentially containing SCCPs.*
- *Contact established to the retailers and supply chain and downstream users and other relevant stakeholders;*
- *Overview on domestic supply chain networks;*
- *Major retailers and their supply chain, customs and other relevant stakeholders approached and questionnaires filled out with the responses of identified companies and possibly other stakeholders (associations; related research institutes);*
- *Compilation of information and data on total yearly import, current use/stock of products containing SCCPs;*

- *Gaps on SCCP content in product categories identified/documented and need for Tier III inventory elaborated;*
- *Additional stakeholders identified and contacted.*

The assessment should cover the life cycle of products containing SCCPs including:

- the products containing SCCPs imported;
- the products containing SCCPs on the market/sold for the inventory year;
- the products containing SCCP in use/stock.

The inventory of products in the market/sold consists of a) the quantity of the products manufactured in the country (Chapter 5) which are sold in the domestic market and b) respective products imported.

For the total inventory it needs to be clearly stated that the volume produced in the country and then sold on the domestic market is not double counted. A material and substance flow diagram might clarify this in the inventory report.

- Ask the stakeholders to identify the downstream retailers and upstream suppliers.

Collect information and data

Following information might be gathered from customs statistics on product quantity:

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

Following information might be gathered from retailers, industry and customs:

- Sales of rubber, PVC; production and individual products and information on SCCP/CP use;
- Material and safety data sheets for suspected products
- 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);
- Amount 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 and other lubricants containing SCCPs or CPs mixtures with SCCP content >1%; production of fatliquors containing SCCPs.

Comparing information on products containing SCCPs on the market and national production, amount of SCCP containing products (chapter 5) and amount of imported/exported products and assessment if quantities match each other:

Contact the major retailers and users in each sector (as identified in the initial assessment) by phone, mail/letter, or visit and inform them about the purpose of the inventory and its process. The following information should be collected and compiled:

- Amount of products of the present product categories containing SCCPs or possibly containing SCCPs;
- Downstream users and sales of products and upstream suppliers;
- Information if products containing SCCPs are labelled;
- End of life management and fate of SCCPs/CPs in the individual use sectors;

Please link information generated from other inventory sector on upstream suppliers (producers or importers see Chapter 4) and downstream users/sales (see Chapter 5 and 6) in the collected information.

Information on the import of the products containing or possibly containing SCCPs from customs.

The gathering of information in Tier II can have in the early phase a national sensitization and information workshops on the Stockholm Convention and SCCP use (and possibly use of other new listed industrial POPs). Also details on exemptions and restrictions would be communicated and discussed.

Such workshops can have breakout groups on the individual sectors to be investigated further. Further stakeholder meetings can be included in a work plan targeting these sectors with a need for further investigation.

Evaluate the information

The evaluation is intended to

- Identify gaps
- Identify actions for filling the gaps
- Implementing actions

If more information is needed:

- Identify additional stakeholders to be contacted or other sources of use for the inventory (see Chapter 3).
- Further assessment in industries where the use of SCCPs in processes is uncertain
- Identify the national supply chain for each industrial sector from information gathered in the previous steps.
- Conduct parallel investigations downstream and upstream in the national supply chain of the industrial sectors and compare the results. For example, compare the total amount of SCCPs in PVC or rubber production delivered to the respective manufacturers, as provided by suppliers, and the total amount used in manufacture of PVC and rubber, as provided by manufacturers. If there are gaps in the data, investigate them further in cooperation with the respective industries and industry associations.

Estimate the current quantity of products in use containing SCCPs

The estimate of the current use/stock of products containing SCCPs is challenging and includes

- the assessment of former products sold/purchased containing SCCPs which are still in use or stock and
- the quantity which has (likely) entered end of life.

Such an assessment needs to consider the service life of the products in the countries.

The products containing SCCPs entering the waste stream would also be estimated (Chapter 8). This estimate can be based on the current use/stock of the respective products and the service life of the products (dynamic substance flow analysis as has been conducted for PCBs (Glüge et al. 2016), HBCD (Li et al. 2016) or PBDEs (Morf et al. 2007).

In a Tier I and Tier II approach for a first conservative estimate, chlorinated paraffins used in the manufacturing of products would be considered potentially SCCP containing or contaminated until companies can prove that the SCCP content is ≤1% (e.g. by a certificate from the supplier or an accredited laboratory).

If providers or users of chlorinated paraffins can proof that the SCCP content is ≤1% then the respective chlorinated paraffin mixture or product is not restricted and can be further used. Also their use and management should be noted in the inventory in particular since different qualities of MCCPs might be on the market with SCCPs content ≤ 1% (Euro Chlor 2018) and also content considerable above 1% (Table A-4; Yuan et al. 2017; Gallistl et al. 2018) and companies might switch the provider. Furthermore, also the use and management of MCCPs should be controlled due to their persistence and bio-accumulation (Glüge et al. 2016).

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

$$TQ_{SCCPs} = TQ_{product} \times C_{SCCPs}$$

TQ_{SCCPs} = Total quantity of SCCPs in products per year or period

$TQ_{product}$= Total quantity of respective product containing SCCPs (e.g. PVC, rubber, paint, adhesive containing SCCPs)

C_{SCCPs} = SCCP concentration or % of SCCP in the respective product

The total volume of products is also of high relevance since this is the volume which will finally be managed at end of life in an environmentally sound manner.

The summary of inventory information should be compiled in Table 7-1 possibly with modifications. Where data are available, an inventory should cover the use of SCCPs in the production of a longer period, best for the period of the

product lifetime or service life of a product. Generating this data set would allow an estimate of products in use produced in the country (when considering also export and import of the products; see Chapter 7).

Table 7-1: Sample table - Total amount of products containing SCCPs in the inventory year on the market and/or in use or end of life (or for the period where information is available)

Products containing SCCPs	Total quantity of products containing SCCPs (t)	Concentration of SCCP in the products	Total Quantity of SCCP in products
PVC* imported (sold)			
PVC* in use/stock			
PVC* entering end of life			
Rubber* products imported			
Rubber* products in use/stock			
Rubber* entering end of life			
Paints* imported (in sale)			
Paints* in use			
Adhesives*/sealants* in sale			
Adhesives*/sealants* in			
Leather* in import			

*containing SCCPs

Assessment and inventory of end-of-life management from SCCP containing products

Within Tier II it is also expected that the volume of generated waste products containing SCCPs is assessed and estimated and data then compiled (see Chapter 8 on waste).

In the end of life evaluation, information on the recycling, reuse, treatment, destruction and disposal of SCCP containing wastes would be gathered. Since recycling of SCCPs is not allowed according the Stockholm Convention listing, specific management of SCCPs might be needed that products/materials containing SCCPs do not negatively impact recycling and to avoid (cross) contamination of the recyclates (e.g. PVC, rubber). Related information should be compiled in the inventory.

7.3.3. Tier III: In-depth inventory of SCCPs in products on the market and in use

For many products imported, on the market and in use, the SCCP content might not be determined in the Tier II inventory. Therefore, in a Tier III inventory, products containing SCCPs or CPs mixtures with unknown composition should be analysed 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. Therefore, such monitoring might be developed in a regional approach in collaboration with an experienced laboratory.

The data from the Tier III monitoring and assessment should be used to refine and update Table 7-1. The inventory report should include all relevant information such as sampling and the screening and analytical methods used.

A Tier III inventory might also establish a material and substance flow analysis to best visualize and understand the stocks and flows of SCCPs in the individual product groups. With a dynamic substance and material flow analysis and the information on the current use/stock of the respective products and the service life of the products, the products entering the waste stream can be estimated and calculated for Chapter 8. Such dynamic substance flow analysis has been conducted for SCCPs (Eriksson et al., 2012; Bolliger and Randegger-Vollrath 2003), for HBCD (Li et al. 2016) or PBDEs (Morf et al. 2007; Abbasi et al. 2015). Based on dynamic substance flow analysis also emissions of POPs can be estimated as shown for PCBs (Glüge et al. 2017).

7.4. Step 4: Managing and evaluating data; Step 5: inventory report

In the evaluation **Step 4** the data compiled in the inventories is assessed for completeness and plausibility, possibly including a comparison with data from other countries in the region.

Data gaps may (partly) be filled by extrapolation of statistical data. If the quality of the data is considered unsatisfactory, additional data collection or screening might be undertaken.

The compiled data (draft inventory) should be assessed by stakeholders and possibly by an external expert. Depending on comments further information might need to be gathered.

Another useful approach to evaluate data could be the development of a material and substance flow analysis of SCCPs in products (for other POPs see e.g. Babayemi et al 2016; 2018 Li et al. 2016; Morf et al. 2007, 2008) possibly utilizing free software (http://www.stan2web.net/).

As last **Step 5** the compiled information and evaluated data for SCCPs use in products would be compiled in a chapter within the inventory report. This should include:

- the methodology used in compilation of the data
- the calculations made
- assumptions made in the calculations
- all country-specific adjustments and estimates would be noted and described.
- the gaps and uncertainties of the data
- possibly further inventory tasks in a next stage (in the NIP implementation)

The data in the inventory report should serve for the NIP and action plan development and for article 15 reporting. The inventory report might contain a chapter with (preliminary) suggestions

New information on SCCPs in particular on the use of SCCPs in lubricants should be reported to the secretariat for update of the inventory guidance.

8. Inventory of wastes containing SCCPs

Paragraph 1(d)(iii) of Article 6 of the Convention requires each Party to take appropriate measures such that wastes consisting of, containing or contaminated with a chemical listed in Annex A, B or C are not permitted to be subjected to disposal operations that may lead to recovery, recycling, reclamation, direct reuse or alternative uses of persistent organic pollutants.

Therefore, a robust inventory for SCCP containing wastes should be developed as a basis for the environmentally sound management (ESM) of these wastes. This assessment should be combined with activities for the Basel Convention in a synergistic approach. For these activities also the "*Draft technical guidelines on the environmentally sound management of wastes consisting of, containing or contaminated with short-chain chlorinated paraffins*" has been developed by the Basel Convention (UNEP 2018b) as well as the "*Methodological guide for the development of inventories of hazardous wastes and other wastes under the Basel Convention*" (UNEP 2015b). The generated data should also serve for reporting under the Basel Convention (UNEP 2009).

8.1. Step 1: Planning the inventory of waste containing SCCPs

This first step focuses on defining the scope of the inventory, identifying stakeholders and developing a work plan (see section 3.1).

SCCP containing wastes are generated from the industrial production of SCCPs (Chapter 4), the manufacturing of SCCP containing articles (Chapter 5), the use of SCCP containing lubricants and metal working fluids in industry (Chapter 6) and from SCCP containing consumer products and products used in industry (Chapter 7) when they enter end-of-life.

Therefore from the start of inventory development, all team members working in the different sectors – SCCP production, use of SCCPs in industry and SCCP in products on the consumer or professional market – need to be alerted/educated that they gather information of waste generated in these different sectors including information how the waste is treated and where the waste is disposed or if the waste is exported.

Specific stakeholders for the inventory of SCCPs are listed in Table 3-1 and are selected according to the country situation. The NIP coordinator or task team leader can decide which stakeholders would be included in an inventory team and which stakeholders would just be contacted for an interview or with a questionnaire (Questionnaires in Appendices 4-9). The inventory task team can be extended as appropriate during the inventory process.

8.2. Step 2 and 3: Choosing data collection methodologies and collecting data

The inventory team should take a tiered approach and gather the information generated in other inventory activities for production, use and products. While the tiered approach taken in Chapters 4 to 7 impacts the tier taken for the inventory of waste. However, some Tier III elements to monitor major waste fractions can be included to get an initial understanding of the presence of SCCPs (and PCNs and PCBs) to which extent these POPs are present and to estimate the relevance.

8.2.1. Tier I: Initial assessment of SCCPs in wastes

Expected outputs of the initial assessment include:

- *List of relevant stakeholders*
- *Present larger waste fractions containing SCCPs from relevant sectors (see Table 8-1)*
- *How are these waste fractions managed*
- *How are related Basel Waste Categories (Table 8-2) managed, exported or imported*
- *Yearly amount of wastes in the identified categories*

In the initial assessment, the inventory team can identify the major waste types of articles or products on the consumer market and products used in industries that possibly contain SCCPs for further inventory activities. The inventory of SCCP in the consumer products, use and stocks is expected to address the following:

Identify relevant stakeholders:

- Perform a desk study of existing information and identify additional stakeholders to be contacted. Use the following list of waste authorities and waste operators:
    - 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

Access the data from the sector analysis in the industrial sector (production of SCCPs) and the consumer market or other relevant sector analysis on existing waste fractions containing SCCPs, waste quantities and treatment.

- Identify if there might be larger quantities of waste fractions containing SCCPs generated or traded inside the country. Use the data collected in the other key sector inventories.
- Compile the information with an initial priority list for detailed assessment in Tier II

Table 8-1. 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

8.2.2. Tier II: Basic inventory of SCCPs in wastes

Expected output of the basic inventory include:

- *Compilation of all waste related data gathered from inventory activities for production and use of SCCP in production and SCCP containing consumer products*
- *Yearly amount of wastes in the identified categories*
- *Compilation of managed of individual waste fractions and assessment of recycling*
- *Prioritization of waste fractions representing a potential risk*
- *List of additional relevant stakeholders*
- *Gap assessment and suggestions and need for Tier III inventory activities*

Compilation of information on SCCP/POPs waste

All data on wastes from SCCP production, use in industry and SCCPs in consumer products during the inventory activities in Chapter 4 to Chapter 8 (Table 8-1) should be compiled. For the waste fraction where PCBs and PCNs have been used in the past, also their presence and quantity should be assessed.

Assessment of the waste management of the waste fractions containing or possibly containing SCCPs

- Quantity of SCCP containing wastes generated in the production of SCCPs and other CPs (within the assessment of inventory of production of SCCP; Chapter 4)
- Quantity of wastes generated in the manufacturing of products with SCCPs (Chapter 5.1)
- Quantity of wastes from the use of metal working fluids and other lubricants (Chapter 6.1);
- Wastes from consumer products and products used by professional users (Chapter 7.1)
    - Quantity of PVC and EVA waste fractions and SCCP contents;
    - Quantity of rubber waste fractions and SCCP content;
    - Waste paints
    - Leather wastes containing SCCPs or other POPs (e.g. PCP, PFOS);
- 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);
- 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.

Major information should come from the assessments/inventory conducted in Chapters 4 to 7. The questionnaires used for these inventories contained also a section on generated wastes and waste management. Additionally, information should be gathered from identified waste authorities and waste operators using the questionnaire in Appendix 4 to 9 to collect more information.

The assessment/inventory should also evaluate waste management companies managing SCCP containing wastes. In particular if the companies have appropriate licenses, storage conditions and environmentally sound disposal technologies.

Assessment of recycling

Within the assessment of waste management also the practice of recycling of rubber, PVC, EVA leather and lubricants/MWFs should be documented and the approaches taken to control the contamination from SCCPs and other POPs. Recycling of products and materials are key for developing a (more) circular economy which at the same time should assure that hazardous chemicals are not recycled into products with exposure risk along the life cycle. Within a Tier II assessment the products produced and recycling products and related exposure risks would be assessed.

Import and export of SCCP containing waste categories

Import and export of SCCP-containing wastes may take place for the purpose of environmentally sound disposal in accordance with the Basel Convention procedures for transboundary movement of hazardous wastes. A "*Draft technical guidelines on the environmentally sound management of wastes consisting of, containing or contaminated with short-chain chlorinated paraffins*" has been developed (UNEP 2018b).

Basel Convention waste categories possibly containing or being contaminated with SCCPs are compiled in Table 8-2. Basel list Annex I includes some of the wastes which may consist of, contain or be contaminated with SCCPs. Also list A of Annex VIII of the Basel Convention includes some wastes or waste categories that have the potential to contain or be contaminated with SCCPs (see Table 8-2). Also list B of Annex IX of the Basel Convention includes some wastes or waste categories that have the potential to contain or be contaminated with SCCPs (Table 8-2).

Some of these waste categories might also contain PCNs or PCBs[14] where a similar list has been developed (Stockholm Convention Secretariat 2017; UNEP 2017).

The import and export of such wastes should be recorded in the inventory including description of the wastes and information on the respective environmentally sound disposal. Notifications of import and export of wastes listed in the Basel Convention Annexes require the import/export procedure documents. This information can be used for the inventory purpose of potentially SCCP contaminated waste imports or exports. The notifications might include specific information on POPs content such as PCN, PCB or other POPs content.

Within the Tier II assessment a simple material and substance flow analysis might be established.

Finally, the inventory team should:

- compile gaps and options and **strategies to address gaps**
- **elaborate priorities** which gaps should be addressed by a Tier III inventory based on high risk fractions with emissions to environment and exposure to humans and fractions which are recycled

Table 8-2: Basel Convention waste categories that might contain or might be contaminated with SCCPs*

Basel Conv. Annex category	Category	Type of waste
Annex 1	Y8	Waste mineral oils unfit for their originally intended use
	Y9	Waste oils/water, hydrocarbons/water mixtures, emulsions;
	Y12	Wastes from production, formulation and use of inks, dyes, pigments, paints, lacquers, varnish
	Y13	Wastes from production, formulation and use of resins, latex, plasticizers, glues/adhesives
	Y18	Residues arising from industrial waste disposal operations;
	Y41	Halogenated organic solvents.
	Y45	Organohalogen compounds other than substances referred to in this Annex (e.g. Y39, Y41, Y42, Y43, Y44)
List A of Annex VIII	A1190	Waste metal cables coated or insulated with plastics containing or contaminated with coal tar, PCBs, lead, cadmium, other organohalogen or Annex I compounds to exhibit Annex III characteristics;
	A3040	Waste thermal (heat transfer) fluids;
	A3170	Wastes arising from the production of aliphatic halogenated hydrocarbons
	A4140	Waste consisting of or containing of specification or outdated chemicals corresp. to Annex I categories and exhibiting Annex III haz. characteristics;
List B of Annex IX	B1040	Scrap assemblies from electrical power generation not contaminated with lubricating oil, PCB or PCT to an extent to render them hazardous;
	B3040	Rubber wastes ((i) Waste and scrap of hard rubber (e.g., ebonite); (ii) Other rubber wastes (excluding such wastes specified elsewhere).

*The provisional suggested low POP content for SCCPs is 10,000 mg/kg or 100 mg/kg (UNEP 2018b)

8.2.3. Tier III: In-depth assessment of SCCPs in wastes

Expected outputs of in-depth inventory include:

- *Validation of data collected in previous steps and refining*
- *Inventory gaps of Tier II inventory addressed by measurement of selected wastes;*
- *Clarification of the contamination and relevance of SCCPs in major waste fractions, and the presence/ PCNs and PCBs where these POPs have been used in the past;*
- *Detailed assessment of waste fractions going into recycling possibly containing SCCPs;*
- *Assessment which waste fractions are above the low POPs content for SCCPs (and PCNs and PCBs) and if there are methods to separate SCCP treated products/materials to facilitate recycling of the respective waste fraction;*

[14] Since the amount of industrial PCBs is ca. 10 times largest than PCNs, the major contaminants are normally PCBs.

- *Monitoring of waste management companies managing SCCP containing wastes;*
- *Assessment of releases from landfills and dumpsites (leachates; air releases) with priority of landfills from producers and users of SCCPs*
- *Detailed quantification of yearly amount of wastes in the identified categories*
- *Dynamic substance and material flow analysis*

A strategic assessment of representative composite samples of selected waste fractions can give a good indication on the presence of SCCPs and other POPs possibly present in specific use sectors (PCNs, PCBs, decaBDE, HBCD). The assessment of major/selected waste fractions can also lead to an (initial) understanding to which extent SCCP or other POPs are present in current use/stock and by this can inform if further assessments of SCCPs and other POPs monitoring in respective uses sectors is needed by e.g. a Tier III inventory of products on the market and in use (Chapter 7).

For a Tier III inventory, selected waste fractions with high risk of SCCP contamination such as certain fractions of PVC, rubber, waste oils and waste lubricants should be assessed. In particular when these materials are used in recycling. Also, other waste fraction such as construction & demolition waste possibly containing SCCPs, PCBs, and PCNs in sealants paints and adhesives would be screened to avoid that the POPs containing fractions enter recycled and contaminate recycling materials.

The selection of samples should consider inventory gaps of the Tier II inventory compilation.

The sampling and monitoring approach need to consider the low POPs content for SCCPs (and for PCNs and PCBs).

The assessment should also include the evaluation if there are methods to separate SCCP treated products from the bulk materials to facilitate recycling of the respective waste fraction.

The assessment would further refine the evaluation of waste management companies managing SCCP containing wastes:

- Assessment of releases from landfills and dumpsites (leachates; air releases) with priority of landfills from producers and users of SCCPs
- Detailed quantification of yearly amount of wastes in the identified categories

A dynamic material and substance flow analysis would provide information which can be used for prediction of future waste quantities containing SCCPs.

8.3. Step 4: Managing and evaluating data; Step 5 inventory report

In the data evaluation **Step 4** the data compiled in the inventories need to be assessed for completeness and plausibility, possibly including a comparison with data from other countries in the region.

Data gaps may (partly) be filled by extrapolation of available statistical data. If the quality of the data is considered unsatisfactory, additional data collection (Tier II+III) or screening (Tier III) might be undertaken.

The compiled data (draft inventory) should be assessed by stakeholders and possibly by an external expert. Depending on comments further information might need to be gathered or the inventory be finalized.

Another useful approach to evaluate data could be the development of a material and substance flow analysis of SCCPs (Eriksson et al. 2012; Bolliger and Randegger-Vollrath 2003; or for other POPs see e.g. Babayemi et al 2016; 2018; Li et al. 2016; Morf et al. 2007, 2008) possibly utilizing free software (http://www.stan2web.net/).

As last **Step 5** the compiled information and evaluated data for waste containing SCCPs would be compiled in a chapter within the inventory report. This should include:

- the methodology used in compilation of the data
- the calculations made
- assumptions made in the calculations
- all country-specific adjustments and estimates would be noted and described.
- the gaps and uncertainties of the data
- details on measurements if undertaken

- possibly further inventory tasks in a next stage (in the NIP implementation)

The data in the inventory report should serve for the NIP and action plan development and for article 15 reporting. The inventory report might contain a chapter with (preliminary) suggestions

New information on SCCPs on the presence and levels of SCCPs in waste fractions could be reported to the secretariat for update of the inventory guidance.

9. Inventory of sites contaminated by SCCPs

9.1. Scope and background information

In accordance with the provisions of Article 6 (1) (e), Parties shall endeavour to develop appropriate strategies for identifying sites contaminated by chemicals listed in Annex A, B or C. Creating and maintaining an inventory and database of sites contaminated by POPs[15] is an important step for a regulatory agency in formulating a strategy for the management of contaminated sites.

This chapter aims at giving step-by-step guidance for identifying and establishing an inventory of sites contaminated by SCCPs in a tiered approach.

The inventory team is recommended to consider the step-by-step approach of UNIDO's "*Persistent Organic Pollutants: Contaminated Site Investigation and Management Toolkit"* (UNIDO 2010), which contains the identification of POP-contaminated sites (not specific to SCCPs), assessing related risks and setting priorities. Furthermore, the UNEP BAT/BEP group is developing a guidance for POPs contaminated sites which should be available shortly.

The inventory should compile information collected during the site investigation from Module 2, preliminary site investigation, stage 1 and/or stage 2, of the UNIDO Toolkit. This information includes the site profile, past and present activities, spill releases, and site owners.

Contaminated sites might be generated during the entire lifecycle of POPs, including their production, manufacturing of products containing POPs, use, recycling and their end-of-life.

Production sites and related landfills and sites where SCCPs have been used in production might be contaminated with SCCPs. Landfills may be the ultimate destination of SCCP-containing products and materials in many countries without appropriate destruction capacity. Even for the EU it is estimated that 67% of SCCPs were landfilled largely in products for the period 1994 to 2010 (ESWI 2011). Monitoring of leachates at 19 municipal waste landfills in Nordic countries revealed a median release of 339 µg/l (Harstad 2006).

To carry out the inventory of contaminated sites, the team should use the information collected through activities described in Chapters 4 to 8 and in particular examine the solid waste management of the (former) producers of SCCPs (Chapter 4), producers of SCCP containing products/articles (Chapter 5), users of SCCPs as metal working fluids and lubricants (Chapter 6) and the management of SCCP containing products in the country (Chapter 7).

A site is generally considered contaminated by POPs when the concentration of one or more contaminants exceeds the regulatory criteria or poses a risk to humans and/or the environment. Since currently no regulation limits for SCCPs in soil exist, contamination might be compared with regulatory limits for PCBs. Above the provisional low POPs content of [50 mg/kg or 10,000 mg/kg] for SCCPs (UNEP 2018), soil would be considered POPs waste.

9.2. Planning the inventory (Step 1)

Information from the identified sectors (chapters 4 to 8) could be used to identify sites potentially contaminated by SCCPs and then set priorities for securing and possibly for remediation.

The first step focuses on defining the scope of the inventory and developing a work plan (see Chapter 3.1.).

An inventory of sites contaminated by SCCPs should include an assessment of releases and related contamination along the life cycle (see Table 9-1), namely:

- Current and former production sites of SCCPs;
- Production sites of products containing SCCPs (e.g. PVC, rubber, leather);
- Sites where SCCP containing products like oils and lubricants were used;
- End-of-life treatment sites (e.g. recycling sites; landfills and open burning sites).

Appropriate members of the inventory task team need to be selected to conduct or compile the inventory of this sector. Specific stakeholders for the inventory of SCCPs are listed in Table 3-1. The core inventory team could be extended as appropriate.

[15] It is recommended to integrate the POPs contaminated site database in a general database on contaminated sites.

Identification of stakeholders

Identification of stakeholders could consider all those listed in Table 3-1, in addition to personnel from local government such as municipal wastewater treatment plants, those responsible for disposal of biosolids, farmers, landfill owners, and the general public.

Authorities and other stakeholders that might provide valuable information on identified contaminated sites that might contain SCCPs:

- Environmental protection agencies;
- Ministries of environment;
- Ministries of industry;
- Municipal authorities;
- State governments;
- (Former) producers of SCCPs;
- Paint, rubber, PVC producing companies;
- Users of lubricants and metal working fluids:
- Property development companies.

Environmental contamination from releases from processes and deposits can affect air, water/sediments and land as well as biota including food. Therefore, the investigation is necessary to identify the relevant sectors involved, manufacturing and wastes being disposed, biosolids application, methods of waste disposal or treatment, and recycling and related waste disposal locations and related releases.

Sites potentially contaminated by SCCPs are listed in Table 9-1 below. Also other POPs potentially present at these sites and depending on their (former) use are listed in Table 9-1. The step-by-step approach in the *Contaminated Site Toolkit* (UNIDO 2010) can then be followed to systematically identify such sites, keep records, develop a registration system, and perform risk assessment and prioritization for the management of the sites contaminated by SCCPs.

9.3. Selecting data collection methodology (Step 2) & collecting data (Step 3)

9.3.1. Tier I: Initial assessment of sites potentially contaminated with SCCPs

The expected output of the initial assessment includes:

- *List of relevant stakeholders in the country;*
- *Compilation of information on sites (potentially) contaminated by SCCPs;*
- *List of locations of sites potentially contaminated by SCCPs;*
- *Compilation of gaps from Tier I assessment to be addressed by Tier II.*

In the first step an overview of information on sites potentially contaminated by SCCPs would be compiled (internet and literature survey and phone interviews).

Contamination at (former) production sites of SCCPs

Major POPs contaminated sites are at and around respective POPs production sites (Kocan et al. 2001; USEPA 2016; Weber et al. 2008, 2017; Vijgen et al 2011). From monitoring studies it is known that for former production companies of PCBs - having similar volatility and liquid/handling properties as SCCPs and a similar use pattern - the production sites and surroundings can be highly contaminated (Kocan et al. 2001; USEPA 2016; Weber et al. 2018; Wimmerova et al. 2015). It has been found that the wider environment around such production sites has been contaminated including the food chain in the local surroundings (Turrio-Baldassarri 2009) with elevated levels reported in humans (Turrio-Baldassarri et al. 2008; Wimmerova et al. 2015).

SCCPs assessments on and around SCCP production sites have been conducted in China (Wang et al. 2018) and on sediments in Europe (European Chemicals Bureau 2008; CEFAS 1999); (see Table 2-4).

For production sites of SCCPs the major assessments would include the production site, the related landfills, river sediments and soils in the surrounding. Also wildlife and the food chain in the area with a radius of ca. 10 km[16] would be assessed for SCCP contamination and exposure risk (See Table 9-1).

The largest volume of POPs at former production sites are normally stored at landfills from the disposal of production waste (Götz et al. 2012; Weber et al. 2011; Vijgen et al. 2011).

Sites where SCCPs have been used

Contamination by POPs is found at and around factories where the respective POPs have been used for the manufacturing of goods or used within production processes as documented e.g. for PCBs (Weber et al. 2018). Therefore, factories which have used SCCPs in the manufacturing of products such as production of rubber, soft PVC, paints and coatings, treated leather and textiles would be assessed for contamination by SCCPs. Also, productions which are using SCCPs in MWF or lubricants might have resulted in contamination at and around the site (see Table 9-1).

From the removal of PCBs containing paints from bridges, other metal construction or swimming pools it is known that related PCBs contamination of the wider environment has occurred (Jartun et al. 2009; ELSA 2016). SCCPs have also been used in paints on metal construction and swimming pools and therefore at sites where such paints might be removed, e.g. by sand blasting or air blasting. By such removal SCCP contamination can be generated. Contaminated sites might be at ship yards where paints of ships are or have been removed which is normally done by abrasive blasting with related release of pollutants.

Please note: For most of uses of SCCPs also other POPs have been used in the past, in particular PCBs and PCNs (e.g. additives in PVC and cables, paints, cutting oils) or DDT (ship paint). Therefore at the respective potentially contaminated sites, all POPs which have potentially contributed to contamination should be monitored.

Sites where waste containing SCCPs has been disposed of

Dump sites and landfills where SCCPs containing waste has been disposed are potentially contaminated. Leachates from 19 municipal landfills in Norway contained median SCCPs concentration of 339 µg/L leachates (Harstad 2006). Higher levels might be expected at landfills from (former) production and use sites with associated disposal and would be assessed as priority.

[16] Higher PCB levels were detected in humans up to 50 km in the prevailing wind direction of a former PCB factory (Wimmerova et al. 2013). Therefore at least 10 km around production plants and related landfills should be assessed for impact on the environment and the food chain.

Table 9-1: 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	Landfills 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

9.3.2. Tier II: Basic Inventory of sites potentially contaminated by SCCPs

The expected output of the initial assessment of SCCPs contaminated sites includes:

- *Gathering information on individual site type in the country in particular sites of (former) production and use (Table 9-1);*
- *Detailed locations of potentially contaminated sites (GIS; Table 9-1);*
- *Information by site visits of selected potentially contaminated sites (Table 9-1);*
- *Information on the potentially SCCP contaminated sites allowing prioritisation;*
- *Information on possible human exposure (e.g. if measurements of SCCP in food producing animals exist similar to the assessment around PCB production and use sites (Turrio-Baldassarri et al. 2008, 2009, Weber et al. 2018a,b);*
- *Compilation of gaps from Tier II assessment to be possibly addressed by Tier III.*

Information would be collected by direct contacts, by questionnaire approach or by site visits from (selected) sites listed in Table 9-1.

Site investigation, comprising preliminary site investigation (PSI) and detailed site investigation (DSI), provides valuable information on a site, including:

- The nature and location of contaminants with respect to the soil and groundwater table;
- Potential pathways for contaminant migration;
- The location of nearby sensitive receptors;
- Potential for direct human exposure to the contaminants;
- Potential of food and feed contamination.

Carrying out the PSI stages 1 and 2 for those locations of potential SCCP contamination listed in Table 9-1 is suggested for the purposes of the inventory.

The objective of PSI stage 1 is to gather sufficient information to estimate the likelihood of POPs contamination that may be present at a site. Sampling relevant environmental media and investigations of subsurface conditions are not required at this stage.

A PSI stage 1 includes the following activities (see *Contaminated Site Toolkit* (UNIDO 2010)):

- **Historical review:** review of a site's historical use and records to determine current and past activities or uses. This would include information such as:
    - How long have SCCPs been produced or used at the site?
    - What other polluting processes or chemicals were and are present? Please note: Often PCBs and PCNs have been used for the same purpose as SCCPs before 1980s. Therefore at factories or other uses where SCCPs have been used (e.g. metal processing with metal working oils, paint factories) SCCP, PCN and PCB contamination should be assessed together.
    - Information on accidents and spills;
    - Practices and management relating to potential contamination at the site and at adjacent sites (including related landfills or thermal treatment of wastes);
    - Waste water treatment;
    - Possible releases to surface water and related sediment and flood plain contamination.
- **Site visits:** one or more walk-through site visits to verify and complete the information gathered during the literature review for indicators or presence of contamination; in these site visits also exposure risk to livestock, fish and humans in the vicinity would be noted.
- **Interviews:** interviews to verify and complete information by asking current or former owners, occupants, neighbours, managers, employees, and government officials who can, with reasonable attempts, be contacted about information on activities that may have caused contamination.

It should be noted, however, that while the information that is required in PSI stage 1 might be accessible in industrial countries, it is not always available or accessible in developing countries.

One outcome of Tier II assessment would also be a gap assessment of further information needed for selected sites and a prioritization of possible Tier III assessment of selected sites (in particular considering the source strength of sites and the risks to humans).

9.3.3. Tier III: In depth inventory of potentially SCCP contaminated sites

Tier III would include PSI stage 2 assessments and measurements of SCCPs (and possibly PCB, PCN and other POPs or heavy metals or mineral oils where appropriate; see Table 9-1) contamination if such studies can be conducted (see *Contaminated Site Toolkit* (UNIDO 2010)).

PSI stage 2 would be conducted only if stage 1 indicates that there is a likelihood of SCCPs (and other POP) contamination at the site or if there is insufficient information to conclude that there is no potential for SCCP contamination. The objective of stage 2 is to confirm the presence or absence of the suspected contaminants identified in stage 1 and to obtain more information about them. To achieve this objective, site investigators would carry out the following activities:

- Development of a conceptual site model;
- Development of a sampling plan;
- Sampling of relevant environmental media and laboratory or field instrumental analysis of sampled and selected environmental media for substances that may cause or threaten to cause contamination.

Key elements of a conceptual site model include:

- Site history and setting;
- Potential contaminants of concern – contaminant properties and behaviour;
- Potential areas of environmental concern (Source Zones);
- Geology and stratigraphy;
- Regional and local;
- Overburden – sedimentary, glaciology, depositional processes;
- Bedrock – fracture networks, representative elementary volume;
- Hydrogeology and surface waters;
- Aquifers and aquitards;
- Groundwater levels and elevations;
- Hydraulic gradients and velocities;
- Boundaries;
- Plumes and pathways;
- Groundwater and vapour;
- Environmental transport and attenuation processes;
- Receptors (animals and humans) and risk.

9.4. Managing and evaluating data (Step 4)

The information on the different potentially SCCP contaminated sites would be compiled and evaluated. The compilation would best be done according to the life cycle of SCCPs (Table 9-1).

The contaminated sites data would best be included in a national contaminated site database. If such a database does not exist then the different POPs contaminated site inventories might be compiled in one national database (SCCPs, PCBs, PCDD/F, PCNs, PFOS, POP-Pesticides, POP-BFRs etc.) and be used as basis to develop an overall database of contaminated sites in the country.

Based on the data collected, a conceptual site model (CSM) can be developed to establish the relationship between the contaminants, exposure pathways and receptors. The CSM, which would be developed at the very beginning of

PSI stage 2, identifies the zones of the site with different contamination characteristics (i.e., whether contaminants in the soil are likely to be at the surface or at deeper levels, distributed over an entire area or in localized "hot spots" such as landfills).

Exposure pathways and receptors would be identified, where appropriate, for both current and future uses of the site. The CSM is based on a review of all available data gathered during stage 1, and would be continuously modified as more information becomes available during stage 2 and the detailed site investigation. See *Contaminated Site Toolkit* (UNIDO 2010).

Clearly, the accuracy of the information gathered and analysed during the investigation is vitally important because it forms the basis for the risk assessment phase, for making decisions on the need for, and type of, securing and remedial action and, eventually, for the design and implementation of necessary actions.

During a site investigation, every item of information collected must be recorded properly in words, along with photographs of the site and the surrounding area (depending on the size of the site). Reporting is essential for each stage of the investigation as site-specific information is invaluable to decision makers in their efforts to protect the environment and human health.

It is suggested that contaminated site inventories would be established on national level. Data collection and compilation, data management, and evaluation could refer to the *Contaminated Site Toolkit* (UNIDO 2010).

9.5. Inventory report writing and other reporting (Step 5)

Report documentation and other reporting is essential for each stage of the investigation as site-specific information is invaluable to decision-makers in their efforts to protect human health and the environment and to understand the related risks.

Relevant findings would be included in the inventory report, the NIP and the national contaminated sites database. Also further activities needed for assessing and possibly securing or cleaning of contaminated sites would be included in the NIP.

Information which might be compiled for individual (relevant) contaminated sites would be included in the inventory report and in the national contaminated sites database.

The PSI stage 1 report would identify potential contamination:

- Potential source of contamination;
- Potential contaminants of concern;
- Areas of potential environmental concern (potential lateral extent, vertical extent and media).

If for (selected) sites a PSI stage 2 assessment has been conducted, a report would identify contamination and potential contamination including:

- Source of contamination;
- Contaminants of concern (i.e. types of POPs);
- Areas of environmental concern (potential lateral extent, vertical extent, media);
- Recommendations for action.

For further information on reporting, refer to the *Contaminated Site Toolkit*.

The inventory of contaminated sites could include:

- Types and quantities of SCCPs and SCCP-containing materials disposed;
- Other pollutants at the site;
- The names and addresses of entities responsible for disposal of SCCPs and SCCP-containing materials; The names and addresses of entities responsible for disposal of other pollutants at the site;
- Details of the treatment of waste before disposal;
- Records of site contamination;
- Details of the clean-up process (if any) once a site has been registered as being contaminated;
- Information on the monitoring of contaminated sites;

- Records of on-going monitoring and research.

As mentioned above, a contaminated site management policy requires established “maximum permissible levels” and “levels of concern” (values that trigger action) in corresponding media such as e.g. soil, sediment or water. Such permissible levels are, however, not established for SCCPs at a national or international level. Therefore for the time being, SCCP levels at contaminated sites might be compared to background levels and other contaminated sites reported in literature (see Table 2-4). For further assessment of exposure risk and possible needed securing or remediation activities such “maximum permissible levels” and “levels of concern” would need to be defined. For this toxicological information and information on risk management on SCCPs would be consulted (UNEP 2016).

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Appendix 1. Consumer products containing SCCPs on the EU market

Consumer products assessed in European Union members states and Norway between 2013 and 2017 and found to contain SCCPs levels above regulatory limits (1500 mg/kg).

Table A-1. Consumer products containing SCCPs on the EU market 2013-2017 (UNEP 2018b)

Year	Product	SCCP content mg/kg
2017	Sports equipment: Boxing gloves	4400
	Sports equipment: Gym ball	8500
	Toy pistol (plastic cord)	7000
	Bathtub pillow	17 000
	Electric shaver (cable)	9800
	Hobby/sports equipment: Hot pack	4000
	Hobby/sports equipment: Exercise tube	90 000 (handles)
	Speaker (cord)	10 000
	Radio controlled car (tyres)	17 000
	Claw hammer (Handle)	7000
	In-ear headphones (USB cord)	3000
	LED candle (cord)	13 000
	Power cord	26 000
	Table cloth	6 000
	Selfie stick (cord)	45 700
	USB cable	16 000
	Bath toy	13 400
	Game controller	43 000
	Plastic doll	8 600
	Babies' sleeping bag/footmuff (packaging)	40 000
	Babies' sleeping bag (anti-slip knobs)	18 000
	Handle (cycle parts)	3 500
	Breastfeeding pillow (packaging)	60 000
	Hammer (handle)	2 800
	Sports equipment: Yoga mat	8 000
	Erotic article	4 400
2016	Lighting chain (cord)	7 000
	Sports equipment: Yoga mat	2 300
	Sports equipment: Abs trainer	4000
	Steering wheel cover	4 600
	Long sleeved sweater (print)	2 300
	Steering wheel cover	3 000
	Motor vehicle sidelight (cable)	2 600

Year	Product	SCCP content mg/kg
	USB-cord	2 570
	Selfie Stick	1 600
	Digital thermometer (cable)	1 100
	Stickers (toys)	9 000
	Stickers (toys)	14 000
	Mobile phone case	4 400
	Sports equipment: Baseball glove	13 600
	All-purpose mat	3 600
	Sports equipment: Yoga mat	6 400
	Sports equipment: Yoga mat	5 400
	Sports equipment: Yoga mat	32 000
	Sports equipment: Yoga mat	69 000
	Sports equipment: Yoga mat	3 500
	Sports equipment: Fitness gloves	1 800
	Rain cover for pushchair	7 300
	Extension lead	47 000
	Extension lead	17 000
2015	Kettle (cable)	36 400
	Game Controller (cable)	19 000
	Rubber knife	2 600
	Mobile phone cover	2 600
	Cloche cover (garden equipment)	4 000
	Toilet seat for children	710
	Plastic doll	3 170
	Toy doctor set (stethoscope)	49 100
	Electric kettle (cord)	5 000
	Beach ball	3 100
	Bouncy toy	5 000
	Bathmat	5 200
	Shower curtain	4 900
	Stickers (toys)	15 000
	Stickers (toys)	2 000
	Bathmat	5 300
	Shower hose	47 000
	Earphones	2 800
2014	Wallet (artificial leather)	1 300

Year	Product	SCCP content mg/kg
	Handbag (artificial leather)	14 000
	Mobile phone bag (artificial leather)	1 100
	Brush case black (artificial leather)	3 500
	Toiletry bag	11 700
	Handbag (artificial leather)	3 800
	Handbag (artificial leather)	3 200
	Bag (artificial leather)	2 700
	Small bag / purse (artificial leather)	1 700
	Wallet case for smartphones (artificial leather)	1 800
	Purse (artificial leather)	2 000
	Pencil case (artificial leather)	5 000
	Handbag (artificial leather)	10 000
	Toiletry bag (artificial leather)	1 300
	Toy car (tyres)	8 300
	Sports equipment: Exercise mat	16 000
	Sports equipment: Exercise mat	49 000
	Sports equipment: Jump rope	22 000
	Plastic cooking set (plastic bag)	8 800
2013	Beauty case	12 000
	Squeeze toy (chicken)	100 000
	Plastic bath toy	71 000
	Pirate slap-on bracelet	31 000
	Doll with accessories	15 000
	Police costume (transparent plastic pocket)	57 000
	Replaceable wall decorative stickers	18 000
	Pirate costume for children	2 800 (belt) and 1900 (vest)
	Plastic toy figures	83 000

Appendix 2. Examples of tables to compile information

Table A-2: Sample table - Production, import/export, use in manufacturing of products, use in MWFs and lubricants and products containing SCCPs and other chlorinated paraffins containing SCCPs.

Use of SCCPs	Total quantity of products (t)	SCCP content (%)	Total quantity of SCCPs (t)
Production of SCCPs		**	
Production of chlorinated paraffins*			
Import of SCCPs		**	
Import of other chlorinated paraffins *			
Export of SCCP		**	
Export of other chlorinated paraffins *			
SCCPs in manufacturing of products			
Production of PVC			
Production of rubber			
Fire-retardant and water- proofing paint			
Fatliquoring in leather			
Production of adhesives and sealants			
Metal working fluids (MWF)			
Oil based MWF based on SCCPs		Average 50%	
Oil based MWF containing chlorinated paraffins with known/measured SCCP content		Known/measured concentration	
Oil based MWF containing chlorinated paraffins with unknown composition		Average 10%	
Emulsion-based metal working fluids with SCCP		1 %	
Emulsion-based MWF containing chlorinated paraffins* with unknown composition		0.2 %	
Lubricants			
Automotive for consumer market			
Industrial automotive			
Power generation			
Industrial machinery			
Drilling in oil and gas exploration			
Petroleum refinery			
Other lubricant uses			
Products containing SCCPs			
PVC imported (in sale)			
PVC in use/stock			
PVC entering end of life			
Rubber products imported (in sale)			
Rubber products in use/stock			
Rubber entering end of life			
Paints imported (in sale)			
Paints in use/stock			
Adhesives/sealants imported (in sale)			
Adhesives/sealants in use/stock			

*Containing SCCPs; if no information and certificate on the SCCP content can be provided by producers or importers, then 20% SCCP content may be assumed (considering that 165000 t of SCCPs are produced/year (Glüge et al., 2016)).

**100% or measured concentration.

Table A-3: Sample table – Information on alternatives to SCCPs.

Use of SCCPs	Alternatives	Comments regarding performance and cost
Manufacturing of products		
Production of PVC		
Production of rubber		
Fire-retardant and water- proofing paint		
Fatliquoring in leather		
Adhesives and sealants		
Metal processing		
Cutting		
Grinding		
Extreme pressure additive for stamping		
Extreme pressure additive deep drawing		
Others (please note)		
Others (please note)		

Appendix 3. Overview of sampling and analysis of SCCPs

A five-step approach is suggested to determine the occurrence and quantities of POPs in chemicals, products, wastes and materials (UNEP, 2018d). This five-step approach can also be applied for SCCPs in different products, including consumer products or samples from industrial processes, chemical formulas and industrial blends consumer products, arriving at the boarders and wastes or contaminated sites and is shortly described in this Appendix. Such surveys might be conducted by the customs, authorities responsible for consumer protection and market survey or by other relevant authorities or research institutions.

Step 1: Survey of products and articles containing respective POPs

Before collecting samples, a survey should be conducted to determine the availability of articles that possibly contain or have been contaminated with SCCPs. For selection of samples the need for Tier III inventory information would be assessed along the life cycle. Relevant stakeholders contacted during inventory development would be contacted for support and input and for samples. Following areas would be assessed:

(a) SCCPs and other CP mixtures produced and imported;

(b) SCCPs in manufacturing of products;

(c) SCCPs in consumer goods and industrial uses and stocks; see also Appendix 1 on SCCPs in consumer products detected on the European market:

  (i) PVC;

  (ii) Rubber products;

  (iii) Paints and coatings;

  (iv) Sealants and adhesives;

  (v) Leather and fatliquors;

  (vi) Textiles;

(d) Lubricants and metal working fluids;

(e) Wastes possibly containing SCCPs:

  (i) Wastes generated in production, manufacturing and use;

  (ii) Waste categories;

(f) Sites contaminated with SCCPs (e.g. soils, sediments, sludge).

If access to samples is easy then the team conducting the study might take the samples. Otherwise stakeholders would be included in the sampling as appropriate.

Step 2: Sample collection and pre-screening

Standard sampling procedures should be established and agreed upon before the start of the sampling campaign.

The pre-screening of samples can include specific approaches:

(a) Considerations on the different use areas and products:

  (i) Production of SCCPs and other chlorinated paraffins;

  (ii) Products manufactured with SCCPs or other chlorinated paraffins;

  (iii) Metal working fluids and lubricants possibly containing SCCPs;

  (iv) Products on the market possibly containing SCCPs;

(b) CAS numbers, chemical names or product names (see Table 2-1).

(c) Certain risk criteria (e.g. HS codes, importing company, receiving company or use for a specific purpose) or certain chemical properties or performance (lubricant; flame retardant).

Sampling should comply with specific national legislation, where it exists, or with international regulations and standards. Where no standard procedure exists, the sampling procedure should be documented including the documentation of the storage and shipment until reaching a laboratory accredited for the respective POPs or otherwise accredited for performing an adequate analysis of the respective sample and selected POPs.

A sampling protocol is to be used and should contain the following information:

(a) Type of sample;

(b) Location of sampling;

(c) Any relevant information on the sample.

The sample should be wrapped in aluminium foil and transferred into a vessel or container (e.g. glass or another inert material) with a cap or screw top. The vessel should be labelled (readable, persistent against solvents and water, with unique information e.g. code related to sampling protocol, if the sample represents any hazard this should be noted, and the sample labelled respectively). The collected samples should be stored adequately (e.g. appropriate temp.; possibly exclusion of light).

Specific care should be given to cross contamination in the laboratory. Samples of pure chemicals or products with high SCCP/POPs content should not contaminate the laboratory when also samples containing trace quantities (e.g. air samples) are analysed. Procedural blanks, which are blanks that are treated exactly like the samples, provide good indication if there are background or crossover contamination.

Step 3: Screening in the laboratory

Products, materials or wastes can be screened for the presence of chlorine including X-ray fluorescence XRF or sliding spark spectroscopy (UNEP, 2018d). These mobile screening methods can be used during the field sampling. The non-destructive XRF method might even be used for selections of samples in stores and shops. The sensitivity of the screening methodology should cover the regulatory limit for a respective POP for a certain sample category. Some XRF might reach detection limits for chlorine of approx. 100 mg/kg while others might reach only a limit of 1 g/kg. Additionally, there are laboratory equipment, usually being more sensitive, compared to the mobile equipment used in the field.

When screening methods are applied, it needs to be ensured that the detection limit of the screening method is more sensitive than the legislation limit required for the content of SCCPs.

Step 4: Quantification

Usually quantification requires that the chemical is extracted from the sample and the extract subjected to a clean-up procedure. Extraction methods and the clean-up procedures should be validated and where available taken from standard norms (see below available ISO standards for SCCPs). If own procedures are used, they should have proven to lead to correct results and being robust against modifications in the sample matrix.

Extractions and clean-up can be relatively simple. Similar to PCBs, SCCPs can be extracted from the sample matrix by organic solvents by means of different techniques. Various extraction and clean-up methods for polymers are described in the guidance for monitoring of POPs in products (UNEP, 2018d) which can be used for such matrices containing SCCPs. SCCPs can be cleaned by sulfuric acid and different clean-up columns. A clean-up procedure for all POPs is described in the monitoring guidance using Florisil (see Figure A-1). If samples are analysed which also might contain PCBs and PCNs (sealants, adhesives, paints, coatings, waste oils) such a monitoring should be combined with the screening of PCBs and PCNs in these applications. Here an aliquot of the extract can be subjected to another clean-up and analysis (see Figure A-1).

Finally, instrumental analysis with appropriate sensitivity to achieve the required detection limits needs to be used for the data acquisition and quantification. Currently, several different methods are available for the instrumental quantification of SCCPs. Most of them are based on gas chromatography with mass spectrometry with negative ion chemical ionization (GC/MS-NCI) (Tomy et al. 1997; Reth et al., 2005; Yuan et al., 2017; Krätschmer et al., 2018; Sprengel & Vetter 2019). Both low resolution setups (Reth et al., 2005; Sprengel und Vetter 2019) and high resolution (Tomy et al. 1997; Yuan et al., 2017; Krätschmer et al., 2018) has been shown to be suitable for this task. Details can be found in the respective publications.

Quantification is either done with internal standards (e.g. isotope labelled standards, such as carbon ^{13}C-labelled chemicals for mass spectrometric detection) or other appropriate analytical standards, or by external calibration via commercially available CP mixture standards. Recently, it has been reasoned that the selection of appropriate standards is integral to the quantification procedure (Schinkel et al., 2018).

The detection limits in products and in wastes is between 1 mg/kg (German Federal Environment Agency 2015) and up to 10 mg/kg (ESWI, 2011).

International standards for analysis of SCCPs

Three ISO standard methods are available including one for leather. A new standard for analysis of SCCPs in textiles is under development (ISO/NP 22818). These are:

(a) **ISO 12010:2012:** Water quality – Determination of short-chain polychlorinated alkanes (SCCPs) in water – Method using gas chromatography-mass spectrometry (GC-MS) and negative-ion chemical ionization (NCI);

(b) **ISO 18219:2015:** Leather – Determination of chlorinated hydrocarbons in leather – Chromatographic method for short-chain chlorinated paraffins (SCCP);

(c) **ISO 18635:2016:** Water quality – Determination of short-chain polychlorinated alkanes (SCCPs) in sediment, sewage sludge and suspended (particulate) matter – Method using gas chromatography-mass spectrometry (GC-MS) and electron capture negative ionization (ECNI);

(d) **ISO/NP 22818:** Textiles – Determination of SCCP and MCCP in textile products out of different matrices by use of GC-ECNI-MS (under development).

Challenges with analysing SCCPs

There are a range of analytical difficulties regarding SCCP measurements, such as complex compositions (thousands of isomers and homologues); unviability to quantify individual components; instrument detector response; lack of reference substances matching commercial products; poor description of reference materials; high detection limits (when compared to other POPs) and elevated analytical cost (UNEP, 2018b).

Step 5: Documentation and reporting/inventory

The results would contribute to Tier III inventory in the different chapters and improve the reliability of the inventory. This should be described in the reporting and in integration into the inventory report.

The result of the screening would be documented in an appropriate form. The reporting might include the compilation in the form of a report on the monitoring study including scope, samples, procedures, and results. Also gaps and further suggested monitoring can be included.

New results contributing to the improvement of this inventory guidance can be reported to the Secretariat of the Stockholm Convention.

Case studies on screening SCCPs in products

In recent years some monitoring studies of SCCPs and other chlorinated paraffins were conducted and an assessment of the analytical and sampling approaches taken might be useful.

(a) A study on 16 kitchen food blenders revealed high release of SCCPs and MCCPs from most of the assessed kitchen blenders into food (Yuan et al, 2018). SCCPs had a high share of the releases (see Table A-4). The monitoring of components after dismantling revealed that self-lubricating bearings and/or polymer components disassembled from the hand blenders were the source of the chlorinated paraffins (Yuan et al 2018). The CP leakage showed no decreasing levels after 20 times of hand blender usage (Yuan et al., 2018) indicating long term exposure for consumers.

(b) In a screening of chlorinated paraffins and other flame retardants in 21 baking ovens in Germany, high levels of chlorinated paraffins (1000 mg/kg in fat in the oven) mainly of MCCPs and lower levels of SCCPs were detected inside of 10 of the backing ovens while the other 11 ovens were virtually free of chlorinated paraffins (Gallistl et al., 2018). The exceptionally high concentrations and exclusive presence of chlorinated paraffins in half of the samples produced strong evidence that these compounds were released from the baking oven itself. This hypothesis was supported by detection of chlorinated paraffins at even higher concentrations in the inner components of one dismantled baking oven.

(c) Unintentional POPs in chlorinated paraffins. A monitoring of chlorinated unintentional POPs in chlorinated paraffin mixtures and products revealed high levels of PCBs, PCNs and PeCBz.

(d) Within the screening of SCCPs on the European market (RAPEX system), the most common sources of SCCP in toy material are secondary plasticizer in PVC (BTHA 2016). An analysis of the levels of SCCP identified in PVC materials (including toy figures, sheet PVC and faux leather) indicates a typical range of 0.3% to 10%. PVC containing SCCPs may also be used as a backing sheet for hook and loop fasteners and the backs of plastic stickers. Rubber used in toy car tyres has contained SCCP. Furthermore, SCCP have been found in EVA foam yoga mats up to 7% (see Appendix 1). The toys using similar materials may need checking for compliance.

Table A-4: Chain length categories of chlorinated paraffins (SCCP, MCCP and LCCP) released from commercial kitchen hand blenders and related average chlorination degree (Yuan et al., 2017).

Product	Purchased	SCCP	MCCP	LCCP	Average chlorine (%)
Hand blender	2014	9	91		54
Hand blender	2014	19	81		55
Hand blender	2016	12	88		52
Hand blender	2016	59	35	6	57
Hand blender	2014	33	67		55
Hand blender	2016	33	67		56
Hand blender	2014	9	91		53
Hand blender	2014	4	92	4	54
Hand blender	2014	12	88		51
Hand blender	2014	56	44		56
Hand blender	2014	52	48		56
Hand blender	2016	53	47		56

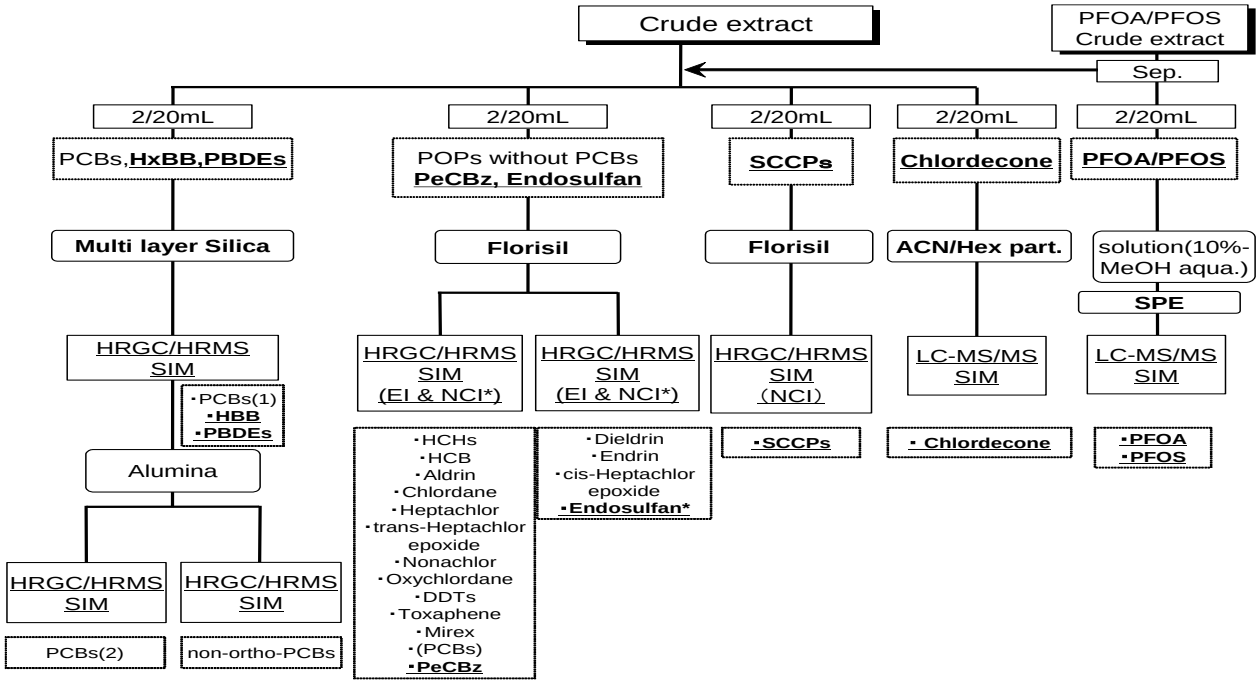

Figure A-1: Clean-up of an air sample and instrumentation for analysis of all listed POPs in air (courtesy Dr. Takumi Takasuga; Shimadzu Techno Research, Japan) (UNEP, 2018d).

Appendix 4. Questionnaire for compiling information on the production and import/export of SCCPs and other chlorinated paraffins possibly containing SCCPs

Persistent organic pollutants (POPs) are toxic chemicals that adversely affect human health and the environment. They persist for long periods of time in the environment and can accumulate in the food chain and finally contaminate people. The Stockholm Convention is a global treaty which supports the phase out of POPs.
In 2017 Short-Chain Chlorinated Paraffins (SCCPs)[17] with a chain length of C10-13 and a chlorine content of >48% were listed as POPs in Annex A, with specific exemptions. Additionally, a limit for the presence of SCCPs in medium-chain chlorinated paraffins (MCCPs) and other chlorinated paraffin mixtures (CPs) was set at 1% by weight otherwise these are also POPs.

Therefore the government is assessing the current production, import, export and use of SCCPs[19] and other chlorinated paraffin mixtures containing more than 1% SCCPs[18] Based on the assessment of the current use and alternatives available for SCCPs in lubricants, the government will decide on further steps to restrict the use of SCCPs or to grand exemptions for continuing use and gradual phase out of SCCPs.

The following survey has been developed to gather relevant information from producers and importer and export of SCCPs and other chlorinated paraffins.

Name of establishment Registration number	
Address	
Name of respondent	
Position	
Telephone/Mobile	
Email	
Signature/date	

This questionnaire is divided in 4 sections

- **Section A: General**
- **Section B: For producer of SCCPs and other CPs**
- **Section C: Import of SCCPs**
- **Section D: Export of SCCPs**
- **Section E: Waste management and recycling**

Please fill in the section(s) below which are relevant for your activity domain (manufacturer/importer/user/recycler/waste manager etc.).

[17] SCCPs: Short Chain Chlorinated Paraffins (molecule: $C_xH_{(2x-y+2)}Cl_y$ where x = 10-13; y = 3-12; Cl >48%).

Section A: General

1. **Do you produce ☐ or import ☐ or trade/sell ☐ and/or import ☐ ?**

2. **Are you aware that SCCPs are listed as POPs in the Stockholm Convention and will be restricted with the option of continued use after exemptions have been registered by the government? Your action?**

   - ☐ Yes
   - ☐ No
   - ☐ We have stopped the production ☐ the import ☐ of SCCPs in _____year
   - ☐ We are planning to stop the production ☐ the import ☐ of SCCPs in _____month/year
   - ☐ We plan to continue production ☐ the import ☐ of SCCPs and will ask for exemption.

3. **Are you aware that medium chain chlorinated paraffins (MCCPs) and other CP mixtures with a content of more than 1% SCCPs is a POP and may be restricted depending on exemptions?[18]**

   - ☐ Yes
   - ☐ No
   - ☐ We can guarantee that the MCCPs/CPs contain less than 1% SCCPs (please attach certificates).
   - ☐ We do not know the SCCPs content of MCCPs and other CPs produced ☐ imported ☐
   - ☐ We plan to measure the SCCPs content of the MCCPs/CPs produced ☐ imported ☐

[18] CP mixtures which contain SCCPs >1% (chlorine content >48%) as impurity are considered POPs.

Section B: <u>For producer</u> of chlorinated paraffins

4. Since when do you produce chlorinated paraffins?

_____

_____

_____

_____

5. Do you produce or import any of the following chemicals?

Chemical Abstracts Service (CAS) Numbers of SCCPs and other CPs which may contain SCCPs or which may be contaminated with SCCPs. **Please tick those you produce or import.**

85535-84-8 (SCCPs (C10-13))		71011-12-6 (Alkanes, C12-13, chloro) 108171-26-2 (Alkanes, C10-12, chloro)	
85536-22-7 (Alkanes, C12-14, chloro)[20] 85681-73-8 (Alkanes, C10-14, chloro)[20]		84082-38-2 (Alkanes, C10-21, chloro)[20] 97659-46-6 (Alkanes, C10-26, chloro)[20] 84776-06-7 (Alkanes, C10-32, chloro)[20]	
68920-70-7 (Alkanes, C6-18, chloro)[20]		61788-76-9 (Alkanes, chloro)[20] 63449-39-8 (Paraffin waxes and Hydrocarbon waxes, chloro)[20] 97553-43-0 (Paraffins, normal C>10, chloro)[20]	
Other chlorinated paraffins[20] (**CAS number?**_____)		85535-85-9 (MCCPs; C14-18, chloro)[20]	

6. Do you guarantee the CPs produced or imported that they contain less than 1% SCCPs.

_____

_____

Which SCCP concentration limit is guaranteed?

_____

Which analytical method do you use to measure SCCP in CP mixtures?

_____

_____

_____

_____

What is the limit of detection of SCCPs in other CPs?

_____

_____

Section C I: Production of SCCPs or other CPs

7. Please fill the table below on the quantities of SCCPs and other CPs produced, chain length

Year (can be modified)	A) SCCPs produced (t/a; Chain length)	Chlorine content	CAS		B) Other CPs produced (t/a; Chain length)	% SCCPs	Chlorine Content	CAS
2020 (estimate)								
2019 (estimate)								
2018								
2016								
2015								

*Can be modified as appropriate

Section C II: Export of SCCPs or other CPs

8. Please fill the table below on the quantities of exported SCCPs and other CPs

Year (can be modified)	A) SCCPs exported (t/a; Chain length)	Chlorine content	CAS		B) Other CPs exported (t/a; Chain length)	% SCCPs	Chlorine Content	CAS
2020 (estimate)								
2019 (estimate)								
2018								
2016								
2015								

Section D: Importation of SCCPs or other CPs

9. a) Please fill the table below on the quantities of imported SCCPs and other CPs

Year (can be modified)	A) SCCPs imported (t/a; Chain length)	Chlorine content	CAS		B) Other CPs imported (t/a; Chain length)	% SCCPs	Chlorine Content	CAS
2020 (estimate)								
2019 (estimate)								
2018								
2016								
2015								

Section E: Recycling and waste management of SCCPs

10. Do you recycle/reuse any SCCPs or other CPs from any use?

- ☐ No
- ☐ Yes_ From which uses? _____

_____

11. Please elaborate on the waste management of waste from production and use.

a. What wastes are generated from SCCP/CP production and how are they managed?

_____

_____

_____

_____

_____

b. Do you contribute to the end of life management and treatment of SCCPs/CPs you sold? How?

_____

_____

_____

_____

_____

_____

12. Have you ever conducted an environmental audit? If yes, please elaborate more (date, internal, external, consultancy firm….)

_____

_____

_____

13. Do you have ISO 14001? Yes___ No___ Or a similar certificate_____

_____

Appendix 5. Questionnaire for compiling information on the use of SCCPs in the manufacturing and import of PVC products

Persistent organic pollutants (POPs) are toxic chemicals that adversely affect human health and the environment. They persist for long periods of time in the environment and can accumulate in the food chain and finally contaminate people. The Stockholm Convention is a global treaty which supports the phase out of POPs. In 2017 Short-Chain Chlorinated Paraffins (SCCPs)[19] with a chain length of C10-13 and a chlorine content of >48% were listed as POPs in Annex A, with specific exemptions. Additionally, a limit for the presence of SCCPs in medium-chain chlorinated paraffins (MCCPs) and other chlorinated paraffin mixtures (CPs) was set at 1% by weight otherwise these are also POPs.

SCCPs are used as plasticizers in flexible PVC (e.g. secondary plasticizers in flexible PVC). The use of SCCPs as secondary plasticizers in flexible PVC has been exempted (except in toys and children's products) in the Convention but will need to be phased out after a certain period.

Therefore the government is assessing the current production, import and use of SCCPs[19] and other chlorinated paraffin mixtures containing more than 1% SCCPs[19]. Based on the assessment of the current use and alternatives available for SCCPs as additive in PVC, the government will decide on further steps to restrict the use of SCCPs or to grand exemptions for continuing use and gradual phase out of SCCPs.

The following survey has been developed to gather relevant information that will support these activities.

Name of establishment Registration number	
Address	
Name of respondent	
Position	
Telephone/Mobile	
Email	
Signature/date	

This questionnaire is divided in 4 sections

- **Section A: General**
- **Section B: For producer of PVC products**
- **Section C: Imported PVC**
- **Section D: Alternatives to SCCPs**
- **Section E: Waste management and recycling**

Please fill in the/those section(s) below which is/are relevant for your activity domain (manufacturer/importer/user/recycler/waste manager etc.).

[19] SCCPs: Short Chain Chlorinated Paraffins (molecule: $C_xH_{(2x-y+2)}Cl_y$ where x = 10-13; y = 3-12; Cl >48%).

Section A: General

1 Do you produce ☐ or import ☐ or trade/sell ☐ or use ☐ PVC products?

2 Are you aware that SCCPs are listed as POPs and will be restricted with the option of continued use after exemptions have been registered by the government? Your action?

- ☐ Yes
- ☐ No
- ☐ We have stopped the use of SCCPs in _____year
- ☐ We are planning to stop the use of SCCPs in _____month/year
- ☐ We plan to continue use of SCCPs and will ask for exemption for the use

3 Are you aware that medium chain chlorinated paraffins (MCCPs) and other CP mixtures with a content of more than 1% SCCPs may be restricted depending on exemptions?[20]

- ☐ Yes
- ☐ No
- ☐ We have a guarantee that the MCCPs/CPs contain less than 1% SCCPs
- ☐ We do not know the SCCPs content of the MCCPs and other CPs used
- ☐ We plan to measure the SCCPs content of the MCCPs/CPs used

[20]CP mixtures which contain SCCPs >1% (chlorine content >48%) as impurity are considered POPs.

Section B: <u>For producers</u> of PVC products

4 What type of PVC products do you produce?

_____

_____

_____

_____

5 Do you use any of the following chemicals/CAS in the production of PVC?

Chemical Abstracts Service (CAS) Numbers of SCCPs and other CPs which may contain SCCPs or which may be contaminated with SCCPs. **Please tick those you use.**

85535-84-8 (SCCPs (C10-13))		71011-12-6 (Alkanes, C12-13, chloro) 108171-26-2 (Alkanes, C10-12, chloro)	
85536-22-7 (Alkanes, C12-14, chloro)[20] 85681-73-8 (Alkanes, C10-14, chloro)[20]		84082-38-2 (Alkanes, C10-21, chloro)[20] 97659-46-6 (Alkanes, C10-26, chloro)[20] 84776-06-7 (Alkanes, C10-32, chloro)[20]	
68920-70-7 (Alkanes, C6-18, chloro)[20]		61788-76-9 (Alkanes, chloro) [20] 63449-39-8 (Paraffin waxes and Hydrocarbon waxes, chloro)[20] 97553-43-0 (Paraffins, normal C>10, chloro)[20]	
Other chlorinated paraffins[20] (**CAS number?**_____)		85535-85-9 (MCCPs; C14-18, chloro)[20]	

Please describe here if you have a guarantee for any of the CPs used that they contain less than 1% SCCPs.

_____

_____

Which SCCP concentration limit is guaranteed?_____

6 What function do the SCCPs have in the PVC?

- ☐ Plasticizer
- ☐ Flame retardant
- ☐ Solvent
- ☐ Other_____

7 What other chemicals and additives do you use in PVC production?

Plasticizers: _____

Antioxidants: _____

Other chemicals: _____

8 Please list below* the amount of SCCPs and MCCPs (other chlorinated paraffins listed in question 5) used in the production of PVC

PVC Product (type; name)	**% of SCCPs in the PVC**	**% MCCPs in the PVC**	**CAS numbers**	**Country/company of origin of SCCPs/ MCCPs or other CPs if imported (and HS Code)**	**Company/Source of SCCPs/MCCPs/other CPs if locally purchased (and contact)**	**Use of the PVC**	**Year (can be modified)**	**Quantity Produced (tonnes)**
							≤ 2016	
							2017	
							2018	
							2019 (estimate)	
							≤ 2016	
							2017	
							2018	
							2019 (estimate)	
							≤ 2016	
							2017	
							2018	
							2019 (estimate)	

*Please feel free to provide more information on separate sheet

Section C: Importation of PVC products

9 a) Please fill the table below on the quantities of imported PVC containing SCCPs

Year (can be modified)	Total quantity/type of imported PVC per year (tonnes) containing SCCPs	% of SCCPs in PVC	CAS numbers of SCCPs	Total quantity sold/used locally (tonnes)	Total quantity exported (tonnes)
2019 (estimate)					
2018					
2016					

8 b) Please fill the table below regarding the quantities of PVC containing MCCPs or other chlorinated paraffins possibly contaminated by SCCPs in imported products

Year (can be modified)	Total quantity/ type of imported PVC containing MCCPs or other CP (tonnes)	% of MCCPs or other CPs in PVC	CAS number of chlorinated paraffin	Total quantity sold locally (tonnes)	Total quantity exported (tonnes)
2019 (estimates)					
2018					
2017					

Section D: Alternatives to SCCPs

10 Are you aware of any alternatives to SCCPs in PVC?

- ☐ No
- ☐ Yes, please list known alternatives_____
- ☐ Are you using alternatives? Please list_____

11 Are you interested and willing to switch to an alternative for SCCPs (please keep in mind that SCCPs will have to be phased out over time)?

- ☐ Yes
- ☐ No, not at the moment. If no, then please elaborate more on the reasons:

Economic Reasons

Technical Reasons

Other Reasons

12 What are your requirements/needs to switch to an alternative to SCCPs or other CPs contaminated by SCCPs?

Section E: Recycling and waste management of PVC

13 Do you use recycled PVC for your production □ in your PVC product imports □ ?

- □ Yes, if yes then please go to question number 14
- □ No, if no then please go to question number 19
- □ I do not know

14 In which products do you use recycled PVC or are recycled PVC used? (please list)

_____

15 Do you mix PVC from recycling with virgin PVC (what %)?

_____

16 What are the sources of PVC for recycling or the recycled products?

- □ From your premises, what %: _____
- □ Collection from the local market, what %: _____
- □ Others _____

17 What are additives of concern and concentration in the recycling of or in recycled PVC?

SCCP contents (%): _____

Other additives of concern (content %)_____

18 What is the quantity of PVC products produced □ imported □ from recycled PVC*?

Total quantity of PVC produced □ imported □ from recycled PVC per year*	
Year (can be modified))	Quantity (tonnes and/or quantity units**)
2016	
2017	
2018	
2019 (estimates)	

*details can be compiled in a separate sheet/table for other years or years modified

**like number of window frames, doors etc.

19 Please elaborate more on your internal waste management procedure regarding the PVC waste in production.

a) PVC waste stockpiles

b) PVC waste sold:

Locally:

Exported:

c) PVC waste reused in the same company: _____

20 Please elaborate on the waste management of PVC from end-of-life products.

21 How is PVC from end of life from housing and construction managed?

22 How is the end-of-life treatment of PVC in other product and waste categories (please describe for individual product/waste category)

23 Have you ever conducted an environmental audit? If yes, please elaborate more (date, internal, external, consultancy firm….)

_____

_____

24 Do you have ISO 14001? Yes___ No___ Or a similar certificate_____

Appendix 6. Questionnaire for compiling information on the use of SCCPs in the manufacturing and import of SCCPs in rubber

Persistent organic pollutants (POPs) are toxic chemicals that adversely affect human health and the environment. They persist for long periods of time in the environment and can accumulate in the food chain and finally contaminate people. The Stockholm Convention is a global treaty which supports the phase out of POPs. In 2017 Short-Chain Chlorinated Paraffins (SCCPs)[21] with a chain length of C10-13 and a chlorine content of >48% were listed as POPs in Annex A, with specific exemptions. Additionally, a limit for the presence of SCCPs in medium-chain chlorinated paraffins (MCCPs) and other chlorinated paraffin mixtures (CPs) was set at 1% by weight otherwise these are also POPs.

SCCPs are used as additive, process oils or flame retardants in rubber. The use of SCCPs in additives in the production of transmission belts in the natural and synthetic rubber industry and in spare parts of rubber conveyor belts in the mining and forestry industries have been exempted in the Convention but will need to be phased out after a certain period.

Therefore the government is assessing the current production, import and use of SCCPs[21] and other chlorinated paraffin mixtures containing more than 1% SCCPs[22]. Based on the assessment of the current use and alternatives available for SCCPs as additive in rubber, the government will decide on further steps to restrict the use of SCCPs or to grand exemptions for continuing use and gradual phase out of SCCPs.

The following survey has been developed to gather relevant information that will support these activities.

Name of establishment Registration number	
Address	
Name of respondent	
Position	
Telephone/Mobile	
Email	
Signature/date	

This questionnaire is divided in 5 sections:

- **Section A: General**
- **Section B: Rubber produced in the country**
- **Section C: Imported rubber**
- **Section D: Alternatives to SCCPs**
- **Section E: Waste management and recycling**

Please fill in the section(s) below which is/are relevant for your activity domain (manufacturer/importer/user/recycler/waste manager etc.).

[21] SCCPs: Short Chain Chlorinated Paraffins (molecule: $C_xH_{(2x-y+2)}Cl_y$ where x = 10-13; y = 3-12; Cl >48%).

Section A: General

1 Are you aware that short chain chlorinated paraffins (SCCPs) are listed as POPs and become restricted?

- ☐ Yes
- ☐ No
- ☐ We have stopped the use of SCCPs in _____Year
- ☐ We are planning to stop the use of SCCPs in _____Year
- ☐ We plan to continue use of SCCPs and will ask for use exemption_____

2 Are you aware that medium chain chlorinated paraffins (MCCPs) with a content of more than 1% SCCPs can become restricted?[22]

- ☐ Yes
- ☐ No
- ☐ We have a guarantee that the MCCPs contain less than 1% SCCPs
- ☐ We do not know the SCCPs content of the MCCPs used
- ☐ We plan to measure the SCCPs content of the MCCPs used

3 Do you produce ☐ or import ☐ or use ☐ rubber/rubber articles containing SCCPs or other chlorinated paraffins (CPs) listed in the table in question 5 which could contain SCCPs under the specific exemptions granted under Stockholm Convention?

- ☐ Additives in the production of transmission belts in the natural and synthetic rubber industry
- ☐ Spare parts of rubber conveyor belts in the mining and forestry industries
- ☐ Other rubber products. Please specify

[22] CP mixtures which contain SCCPs >1% (chlorine content >48%) as impurity are considered POPs.

Section B: Rubber/rubber articles produced in the country

4 What type of rubber and what kind of rubber articles do you produce?

_____

_____

_____

5 Do you use any of the following chemicals in the production process

Chemical Abstracts Service (CAS) Numbers of SCCPs and other CPs which may contain SCCPs or which may be contaminated with SCCPs. **Please tick those you use.**

85535-84-8 (SCCPs (C10-13))		71011-12-6 (Alkanes, C12-13, chloro) 108171-26-2 (Alkanes, C10-12, chloro)	
85536-22-7 (Alkanes, C12-14, chloro)[22] 85681-73-8 (Alkanes, C10-14, chloro)[22]		84082-38-2 (Alkanes, C10-21, chloro)[22] 97659-46-6 (Alkanes, C10-26, chloro)[22] 84776-06-7 (Alkanes, C10-32, chloro)[22]	
68920-70-7 (Alkanes, C6-18, chloro)[22]		61788-76-9 (Alkanes, chloro)[22] 63449-39-8 (Paraffin waxes and Hydrocarbon waxes, chloro)[22] 97553-43-0 (Paraffins, normal C>10, chloro)[22]	
Other chlorinated paraffins[22] (**CAS number?**_____)		85535-85-9 (MCCPs; C14-18, chloro)[22]	

Please describe here if you have a guarantee for any of the CPs used that they contain less than 1% SCCPs.

_____

_____

Which SCCP concentration limit is guaranteed?_____

6 What function do the SCCPs have in the rubber?

- ☐ Additive
- ☐ Flame retardant
- ☐ Other_____

7 What other additives or flame retardants do you use in rubber production?

_____

_____

8 Please list below* the amount of SCCPs and MCCPs (other chlorinated paraffins listed in question 2) used in the production of rubber

Rubber/Rubber article (type; name)	% of SCCPs in the rubber/rubber article	% MCCPs in the rubber/rubber article	CAS numbers	Country/company of origin of SCCPs/ MCCPs or other CPs if imported (and HS Code)	Company/Source of SCCPs/MCCPs/other CPs if locally purchased (and contact)	Use of the rubber/rubber article	Year (can be modified)	Quantity Produced (tonnes)
							2017	
							2018	
							2019	
							2020 (estimate)	
							2017	
							2018	
							2019	
							2020 (estimate)	
							2018	
							2019	
							2020	

*Please feel free to provide more information on separate sheet

Section C: Imported rubber/rubber articles

9 a) Please fill the table below on the quantities of imported rubber/rubber articles containing SCCPs

Year (can be modified)	Total quantity/type of imported rubber/rubber articles per year (tonnes) containing SCCPs	% of SCCPs in rubber/rubber article	CAS numbers of SCCPs	Total quantity sold/used locally (tonnes)	Total quantity exported (tonnes)
2018 (estimate)					
2017					
2016					

8 b) Please fill the table below regarding the quantities of imported rubber/rubber article containing MCCPs or other CPs possibly contaminated with SCCPs

Year (can be modified)	Total quantity/type of imported rubber/rubber articles containing MCCPs/other CPs (t)	% of MCCPs or other CPs in rubber	CAS number of chlorinated paraffin	Total quantity sold locally (tonnes)	Total quantity exported (tonnes)
2020 (estimates)					
2019					
2018					

Section D: Alternatives to SCCPs in rubber production

10 Are you aware of any alternatives to SCCPs in rubber production?

- ☐ No
- ☐ Yes, please list known alternatives_____
- ☐ Are you using alternatives? Please list_____

11 Are you interested and willing to switch to an alternative to SCCPs (please keep in mind that SCCPs will have to be phased out over time)?

- ☐ Yes
- ☐ No, not at the moment. If no, then please elaborate more on the reasons:

Economic Reasons

_____

_____

Technical Reasons

_____

_____

Other Reasons

_____

_____

12 What are your requirements/needs to switch to an alternative to SCCPs or CPs contaminated by SCCPs?

_____

_____

_____

_____

_____

Section E: Waste management and recycling

13 Do you use recycled rubber for your production?

- ☐ Yes, if yes please go to question number 13
- ☐ No, if no please go to question number 18

14 In which products do you use recycled rubber? (please list)

_____

15 Do you mix rubber from recycling with virgin rubber (what %)?

_____

16 What are the sources of rubber for recycling?

- ☐ From your premises, what %: _____
- ☐ Collection from the local market, what %: _____
- ☐ Others (e.g. import) _____

17 What are additives/flame retardants of concern in the recycling of rubber (please list)

_____

_____

18 What is the quantity of rubber articles produced from recycled rubber*?

Total quantity of rubber produced from recycled rubber per year*	
Year(can be modified)	Quantity (tonnes and/or quantity units**)
2015	
2016	
2017	
2018 (estimates)	

***details can be compiled in a separate sheet/table**

**like number of rubber articles etc.

19 Please elaborate more on your internal waste management procedure regarding the rubber waste in production.

a) Rubber waste stockpiles

_____

_____

b) Rubber waste sold:

Locally:

_____

_____

Exported:

c) Rubber waste reused in the same company

20 Please elaborate on the waste management of rubber from end-of-life products.

21 How is rubber from end of life from transportation and conveyor belts managed?

22 How is the end-of-life treatment of rubber in other product and waste categories (please describe for individual product/waste category)

23 Have you ever conducted an environmental audit? If yes, please elaborate more (date, internal, external, consultancy firm….)

Appendix 7. Questionnaire for compiling information on the production, import and use of SCCPs in metal working fluids[23]

Persistent organic pollutants (POPs) are toxic chemicals that adversely affect human health and the environment. They persist for long periods of time in the environment and can accumulate in the food chain and finally contaminate people. The Stockholm Convention is a global treaty which supports the phase out of POPs. In 2017 Short-Chain Chlorinated Paraffins (SCCPs)[24] with a chain length of C10-13 and a chlorine content of >48% were listed as POPs in Annex A, with specific exemptions. Additionally, a limit for the presence of SCCPs in medium-chain chlorinated paraffins (MCCPs) and other chlorinated paraffin mixtures (CPs) was set at 1% by weight otherwise these are also POPs.

SCCPs are used as additives as metal working fluids in a range of processes (stamping, milling, thread cutting/rolling, boring). The use of SCCPs in metal processing has been exempted in the Convention but will need to be phased out after a certain period.

Therefore the government is assessing the current production, import and use of SCCPs[24] and other chlorinated paraffin mixtures containing more than 1% SCCPs[25]. Based on the assessment of the current use and alternatives available for SCCPs in metal working fluids, the government will decide on further steps to restrict the use of SCCPs or to grand exemptions for continuing use and gradual phase out of SCCPs.

The following survey has been developed to gather relevant information that will support these activities.

Name of establishment Registration number	
Address	
Name of respondent	
Position	
Telephone/Mobile	
Email	
Signature/date	

This questionnaire is divided in 5 sections:

- **Section A: General**
- **Section B: Metal working fluids produced in the country**
- **Section C: Imported metal working fluids**
- **Section D: Alternatives to SCCPs**
- **Section E: Waste management and recycling**

Please fill in the section(s) below which is/are relevant for your activity domain (manufacturer/importer/user/recycler/waste manager etc.).

[23] The questionnaire can in a slightly modified way be used as questionnaire for lubricants

[24] SCCPs: Short Chain Chlorinated Paraffins (molecule: $C_xH_{(2x-y+2)}Cl_y$ where x = 10-13; y = 3-12; Cl >48%).

Section A: General

1 Are you aware that short chain chlorinated paraffins (SCCPs) are listed as POPs and will be restricted?

- ☐ Yes
- ☐ No
- ☐ We have stopped the use of SCCPs in _____Year
- ☐ We are planning to stop the use of SCCPs in _____Year
- ☐ We plan to continue use of SCCPs and will ask for use exemption

2 Are you aware that medium chain chlorinated paraffins (MCCPs) with a content of more than 1% SCCPs will be restricted?[25]

- ☐ Yes
- ☐ No
- ☐ We have a guarantee that the MCCPs contain less than 1% SCCPs
- ☐ We do not know the SCCPs content of the MCCPs used
- ☐ We plan to measure the SCCPs content of the MCCPs used

3 Do you produce ☐ or import ☐ or use ☐ metal working fluids containing SCCPs or other chlorinated paraffins (CPs) listed in the table in question 5 which could contain SCCPs? If yes please list below the name of metal working fluids.

_____

_____

_____

[25] CP mixtures which contain SCCPs >1% (chlorine content >48%) as impurity are considered POPs

Section B (for producer): Metal working fluids produced in the country

4 What type of metal working fluid do you produce?

_____

_____

_____

5 Do you use any of the following chemicals in the production of metal working fluids?

Chemical Abstracts Service (CAS) Numbers of SCCPs and other CPs which may contain SCCPs or which may be contaminated with SCCPs. **Please tick those you use.**

85535-84-8 (SCCPs (C10-13))		71011-12-6 (Alkanes, C12-13, chloro) 108171-26-2 (Alkanes, C10-12, chloro)	
85536-22-7 (Alkanes, C12-14, chloro)[25] 85681-73-8 (Alkanes, C10-14, chloro)[25]		84082-38-2 (Alkanes, C10-21, chloro)[25] 97659-46-6 (Alkanes, C10-26, chloro)[25] 84776-06-7 (Alkanes, C10-32, chloro)[25]	
68920-70-7 (Alkanes, C6-18, chloro)[25]		61788-76-9 (Alkanes, chloro)[25] 63449-39-8 (Paraffin waxes and Hydrocarbon waxes, chloro)[25] 97553-43-0 Paraffins, normal C>10, chloro)[25]	
Other chlorinated paraffins[25] (**CAS number?**_____)		85535-85-9 (MCCPs; C14-18, chloro)[25]	

Please describe here if you have a guarantee for any of the CPs used that they contain less than 1% SCCPs.

_____

_____

6 Which SCCP concentration limit is guaranteed?_____

7 What other chemicals and additives do you use in metal working fluids production?

_____

_____

8 Please list below* the amount of SCCPs and MCCPs (other chlorinated paraffin listed in question 2) used in the production of metal working fluids

Metal working fluid Product (name; type)	% of SCCPs in the metal working fluid	% MCCPs in the metal working fluid	CAS numbers	Country/company of origin of SCCPs/ MCCPs or other CPs if imported (and HS Code)	Company/Source of SCCPs/MCCPs/other CPs if locally purchased (and contact)	Use of the metal working fluid	Year (can be modified)	Quantity Produced (tonnes)
							2017	
							2018	
							2019	
							2020 (estimate)	
							2017	
							2018	
							2019	
							2020 (estimate)	
							2017	
							2018	
							2019	
							2020 (estimate)	

*Please feel free to provide more information on separate sheet

Section C (Importers): Imported metal working fluids with SCCPs or other CPs

9 a) Please fill the table below* regarding the quantities of imported metal working fluids containing SCCPs

Year (can be modified)	Total quantity of imported metal working fluid containing SCCPs (tonnes per year)	% of SCCPs in metal working fluid	CAS numbers of SCCPs	Total quantity sold/used in country (tonnes)	Total quantity exported (tonnes)
2019 (estimate)					
2018					
2017					

*Please feel free to provide more information on separate sheet

**The years can be modified as appropriate

9 b) Please fill the table below regarding quantities of imported metal working fluids containing MCCPs or other chlorinated paraffins possibly contaminated by SCCPs

Year*	Type and quantity of imported metal working fluid containing MCCPs or other CPs (tonnes per year)	% of MCCPs or other CPs in metal working fluid	CAS number of chlorinated paraffin	Total quantity sold/used locally (tonnes)	Total quantity exported (tonnes)
2020 (estimates)					
2019					
2018					

Section D: Alternatives to SCCPs in metal working fluids (MWF)

10 Are you aware of any alternatives to SCCPs?

- ☐ No
- ☐ Yes, please list known alternatives (which MWF use)_____

  _____
- ☐ Are you using alternatives? Please list_____

11 Are you interested and willing to switch to an SCCP alternative (please keep in mind that SCCPs will have to be phased out over time)?

- ☐ Yes
- ☐ No, not at the moment. If no, then please elaborate more on the reasons:

Economic Reasons

Technical Reasons

Other Reasons

12 What are your requirements/needs to switch to an alternative to SCCP (please detail for individual MWF uses)?

Section E: Waste management and recycling

13 Please elaborate on your waste management procedure regarding the MWFs.

a) Empty containers of raw material and metal working fluid

b) Obsolete raw material

c) Obsolete metal working fluids stockpiles

14 Please elaborate on the waste management on the used metal working fluids

a) Recycling (please describe)

b) Final disposal (please describe)

c) Release during use (please describe)

15 Have you ever conducted an environmental audit? If yes, please elaborate more (date, internal, external, consultancy firm….)

16 Do you have ISO 14001? Yes___ No___ Or a similar certificate_____

Appendix 8. Questionnaire for compiling information on the use of SCCPs in the production, import or use of SCCPs in paints and coating*

Persistent organic pollutants (POPs) are toxic chemicals that adversely affect human health and the environment. They persist for long periods of time in the environment and can accumulate in the food chain and finally contaminate people. The Stockholm Convention is a global treaty which supports the phase out of POPs. In 2017 Short-Chain Chlorinated Paraffins (SCCPs)[26] with a chain length of C10-13 and a chlorine content of >48% were listed as POPs in Annex A, with specific exemptions. Additionally, a limit for the presence of SCCPs in medium-chain chlorinated paraffins (MCCPs) and other chlorinated paraffin mixtures (CPs) was set at 1% by weight otherwise these are also POPs.

SCCPs are used in specific paints and coatings (e.g. waterproofing paints/coating; corrosion protection; fire-retardant paints). The use of SCCPs in waterproofing and fire-retardant paints is exempted in the Convention but will need to be phased out after a certain period.

Therefore the government is assessing the current production, import and use of SCCPs[26] and other chlorinated paraffin mixtures containing more than 1% SCCPs[27]. Based on the assessment of the current use and alternatives available for SCCPs in paints and coatings*, the government will decide on further steps to restrict the use of SCCPs or to grand exemptions for continuing use and gradual phase out of SCCPs.

The following survey has been developed to gather relevant information that will support these activities.

***This questionnaire can also be used to gather information on adhesives/sealants by modification of "paints and coatings" to "adhesives and sealants".**

Name of establishment Registration number	
Address	
Name of respondent	
Position	
Telephone/Mobile	
Email	
Signature/date	

This questionnaire is divided in 4 sections:

- **Section A: Paints/coatings produced in the country**
- **Section B: Imported paints/coatings**
- **Section C: Alternatives to SCCPs in paints/coatings**
- **Section D: Waste management**

Please fill in the/those section(s) below which is/are relevant for your activity domain (e.g. manufacturer, importer, user, recycler, waste manager).

[26] SCCPs: Short Chain Chlorinated Paraffins (molecule: $C_xH_{(2x-y+2)}Cl_y$ where x = 10-13; y = 3-12; Cl >48%).

Section A: Paints/coatings produced in the country

1. What type of paints or coating do you produce

_____

_____

_____

2 Are you aware that short chain chlorinated paraffins (SCCPs) are listed as POPs and will be restricted?

- ☐ Yes ☐ No
- ☐ We have stopped the use of SCCPs in _____Year
- ☐ We are planning to stop the use of SCCPs in _____Year
- ☐ We plan to continue use of SCCPs and will ask for use exemption

3. Are you aware that medium chain chlorinated paraffins (MCCPs) with a content of more than 1% SCCP will be restricted?[27]

- ☐ Yes ☐ No
- ☐ We have a guarantee that the MCCPs contain less than 1% SCCPs
- ☐ We do not know the SCCPs content of the MCCPs used
- ☐ We plan to measure the SCCPs content of the MCCPs used

4. Do you use any of the following chlorinated paraffins in the production process?

Chemical Abstracts Service (CAS) Numbers of SCCPs and other CPs which may contain SCCPs or which may be contaminated with SCCPs**. Please tick those you use.**

85535-84-8 (SCCPs (C10-13))		71011-12-6 (Alkanes, C12-13, chloro) 108171-26-2 (Alkanes, C10-12, chloro)	
85536-22-7 (Alkanes, C12-14, chloro)[25] 85681-73-8 (Alkanes, C10-14, chloro)[25]		84082-38-2 (Alkanes, C10-21, chloro)[25] 97659-46-6 (Alkanes, C10-26, chloro)[25] 84776-06-7 (Alkanes, C10-32, chloro)[25]	
68920-70-7 (Alkanes, C6-18, chloro)[25]		61788-76-9 (Alkanes, chloro)[25] 63449-39-8 (Paraffin waxes and Hydrocarbon waxes, chloro)[25] 97553-43-0 Paraffins, normal C>10, chloro)[25]	
Other chlorinated paraffins[25] (**CAS number?**_____)		85535-85-9 (MCCPs; C14-18, chloro)[25]	

Please describe here if you have a guarantee for any of the CPs used that they contain less than 1% SCCPs.

_____

5. What function do the SCCPs have in the paint/coating?

a. Plasticizer
b. Flame retardant
c. Solvent
d. Other Please specify:_____

[27] CP mixtures which contain SCCPs >1% (chlorine content >48%) as impurity are considered POPs

6. **Please list below* the amount of SCCPs and MCCPs (other chlorinated paraffin listed in question 2) used in the production of paints/coatings**

Paint/coating **Product (name; type)**	**% SCCPs in the paint/ coating**	**% MCCPs in the paint/ coating**	**CAS numbers**	**Country/company of imported SCCPs/ MCCPs/ other CPs** **(HS Code)**	**Source of SCCPs/MCCPs/other CPs if locally purchased (contact)**	**Use of the paint or coating**	**Year** **(can be modified)**	**Quantity Produced (tonnes)**
							2015	
							2016	
							2017	
							2018 (estimate)	
							2015	
							2016	
							2017	
							2018 (estimate)	
							2015	
							2016	
							2017	
							2018 (estimate)	

***Please feel free to provide more information on separate sheet**

Section B: Imported paints or coatings

7. a) Please fill the table on quantities of imported paints/coatings containing SCCPs

Year (can be modified)	**Total quantity of imported paint per year (tonnes) containing SCCPs**	**% of SCCPs in paint**	**CAS numbers of SCCPs**	**Total quantity sold/used locally (tonnes)**	**Total quantity exported (tonnes)**
2020 (estimate)					
2019					
2018					
2017					

7b) Please fill the table below regarding the quantities of imported paints/coatings containing MCCPs or other chlorinated paraffins possibly contaminated by SCCPs

Year (can be modified)	**Total quantity of imported paint per year containing MCCPs or other CPs (tonnes)**	**% of MCCPs or other CPs in paint (% of SCCP if known)**	**CAS number of chlorinated paraffin**	**Total quantity sold/used locally (tonnes)**	**Total quantity exported (tonnes)**
2020					
2019					
2018					
2017					

Section C: Alternatives to SCCPs in paints/coatings

8. Are you aware of any alternatives to SCCPs?

a. No

b. Yes, please list known alternatives_____

c. Are you using alternatives? Please list_____

9. Are you interested and willing to switch to an SCCP alternative (please keep in mind that SCCPs will have to be phased out over time)?

a. Yes
b. No, not at the moment. If no, then please elaborate more on the reasons:

Economic Reasons

_____

_____

Technical Reasons

_____

_____

Other Reasons

_____

_____

10. What are your requirements/needs to switch to an alternative to SCCPs or CPs contaminated by SCCPs?

_____

_____

_____

_____

_____

_____

Section D: Waste Management

11. Please elaborate on your internal waste management procedure regarding the paints products.

a) Empty containers of raw material

b) Obsolete raw material

c) Obsolete paint stockpiles

12. Please elaborate on the waste management on the painted objects in use.

a) How are painted objects managed when paints are renovated or renewed? Are there any procedures to prevent the release of the old paint when it is removed?

b) How is the end of life treatment of the painted objects (please describe for individual applications)

Appendix 9. Questionnaire for compiling information on products containing SCCPs in import, retail or sale.

Persistent organic pollutants (POPs) are toxic chemicals that adversely affect human health and the environment. They persist for long periods of time in the environment and can accumulate in the food chain and finally contaminate people. The Stockholm Convention is a global treaty which supports the phase out of POPs. In 2017 Short-Chain Chlorinated Paraffins (SCCPs)[1] with a chain length of C10-13 and a chlorine content of >48% were listed as POPs in Annex A, with specific exemptions. Additionally, a limit for the presence of SCCPs in medium-chain chlorinated paraffins (MCCPs) and other chlorinated paraffin mixtures (CPs) was set at 1% by weight otherwise these are also POPs.

SCCPs and other CPs containing SCCPs are used in following products:

- PVC in particular soft PVC (see list of products detected with SCCPs in Appendix 1)
- Rubber products in particular conveyor and transmission belts
- Fatliquoring of leather and related fatliquors and treated leather products
- Specific paints and coatings in particular waterproofing paints/coating; fire-retardant paints.
- Adhesives and sealants
- Metal working fluids and other lubricants

The use of SCCPs has been exempted in the Stockholm Convention in these products but will need to be phased out after a certain period.

Therefore the government is assessing the production, import and use of products containing SCCPs[1] and other chlorinated paraffin mixtures containing more than 1% SCCPs[2].

The following survey has been developed to gather relevant information that will support these activities. Please fill in the/those section(s) below which is/are relevant for your activity domain.

Name of establishment Registration number	
Address	
Name of respondent	
Position	
Telephone/Mobile	
Email	
Signature/date	

1. What is your main business:

a) Importer/wholesaler☐

b) Importer/distributor ☐

c) Retailer ☐

e) Other trading/selling☐ Please describe_____

[1] SCCPs: Short Chain Chlorinated Paraffins (molecule: $C_xH_{(2x-y+2)}Cl_y$ where x = 10-13; y = 3-12; Cl >48%).

[2] CP mixtures which contain SCCPs >1% (chlorine content >48%) as impurity are considered POPs

2. Do you import or sell any of the following products?

a) Products made of soft PVC Yes □ No □

b) Rubber products Yes □ No □

c) Metal working fluids Yes □ No □

d) Lubricants Yes □ No □

e) Paints/coatings Yes □ No □

f) Adhesives/sealants Yes □ No □

g) Fatliquors for leather Yes □ No □

i) Leather products Yes □ No □

3. To your knowledge do any of the products/articles you sell contain or has been treated with SCCPs or other CPs?

a) Contain SCCPs

Yes □ No □ Don't know □

b) Contain other chlorinated paraffins

If yes, please specify and detail the type of products:

Type of product	Type of chlorinated paraffin	SCCP content (wt %) (if available)	Trade name	CAS Nr (if available)	Sale per year

4. Do you take back wastes potentially containing SCCPs? What type of treatment?

Type of waste/products	**Waste treatment* (company/location)**

***(e.g. recycling, disposal to landfill; incineration, export, unknown)**

5. Do you have stockpiles of products treated with or containing SCCPs or other CPs possibly containing SCCPs?

Type of products	Name/type of CPs	CAS number (if available)	Quantity	Content of SCCP (wt %) (if available)	Storage conditions	Location

6. Supplier of the commercial products you sell or import containing SCCPs or other CPs

Name of company	Product	Contact information

7. Remarks