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Pollutants**

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**Technical work: review of information related to specific
exemptions for decabromodiphenyl ether and short-chain
chlorinated paraffins**

**Draft report on the review of information related to specific
exemptions for short-chain chlorinated paraffins**

Note by the Secretariat

As is mentioned in the note by the Secretariat on the review of information related to specific exemptions for decabromodiphenyl ether and short-chain chlorinated paraffins (UNEP/POPS/POPRC.16/5), the annex to the present note sets out a draft report on the review of information related to specific exemptions for short-chain chlorinated paraffins prepared by the intersessional working group on short-chain chlorinated paraffins. The present note, including its annex, has not been formally edited.

* Reissued for technical reasons on 19 October 2020.

** UNEP/POPS/POPRC.16/1.

Annex

Draft report on the review of information related to specific exemptions for short-chain chlorinated paraffins

May 2020

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Executive summary

1. At its eighth meeting, the Conference of the Parties to the Stockholm Convention on Persistent Organic Pollutants (POPs) adopted decision SC-8/11, by which it amended Annex A to the Convention to list short-chain chlorinated paraffins (SCCPs) with various specific exemptions. In addition, the Conference of the Parties adopted decision SC-8/14 on the review of information related to specific exemptions for SCCPs and invited Parties to report to the Secretariat, by December 2019 justifying their need for the registration of these exemptions.
2. This report compiles the information received in response to the call for information and/or during the review of the draft report and supplements it with information from national implementation plans (NIP) addressing amendments made at the eighth meeting of the Conference of Parties in 2017, and information extracted from the Risk Profile (UNEP/POPS/POPRC.11/10/Add.2), Risk Management Evaluation (UNEP/POPS/POPRC.12/11/Add.3), and additional information related to the draft Risk Management Evaluation (UNEP/POPS/POPRC12/INF/7).
3. As of 20 April 2020, no Party for whom the amendment is in effect had registered for any of the specific exemptions, including some of the known producing countries of chlorinated paraffins (CPs). A total of 21 Parties/countries provided information either in their response to the call for information or in their comments on the draft report. Of these, four indicated that SCCPs are currently or have recently been in use and one identified a need for a specific exemption, though it appears that it is for a use that does not fall under one of the listed exemptions. Seven Parties indicated the need to undertake an inventory of potential sources of SCCPs in their respective countries, including presence of SCCPs in articles and open applications before being able to assess the need for specific exemptions. In addition, three Parties identified the need for additional guidance on methodologies to quantify the presence and importation of SCCPs in products.
4. The Secretariat has received two notifications for articles in use that contain SCCPs, one from Japan and the other from New Zealand. New Zealand noted that it is possible that existing fire-resistant clothing and equipment may contain SCCPs. Colombia, Guatemala, the Gambia, Kiribati, Trinidad and Tobago, and Vanuatu noted that it was too early to determine if a notification was required as an assessment of SCCPs sources had yet to be undertaken or completed in their country.
5. SCCPs may be released from products and articles during their use as well as after their disposal. Many applications of SCCPs have long service lives and materials containing SCCPs have been recycled or reused (e.g. plastics, rubber and textiles, and building joint sealants). SCCPs have been found in consumer products (toys, sports accessories, electric cables of kitchen equipment) and articles in waste.
6. None of the Parties that responded to the call for information indicated any current production of SCCPs. While the production of commercial SCCP products has decreased globally, commercial CPs may contain some SCCPs. The most current data available in 2007 and 2013 suggests that the largest volume producer of CPs was China accounting for about 20%-30% of global production. Annual CP production in China was estimated at 600 000 t (metric tons) in 2007 and 1 000 000 t in 2009. CPs may still be produced in Brazil, India, Japan and the Russian Federation.
7. In their response to the call for information, eight of the Parties provided information on control actions. Canada, Denmark, the European Union (EU), Germany and New Zealand indicated that use of SCCPs in their countries has been severely restricted.
8. The Risk Management Evaluation for SCCPs (UNEP/POPS/POPRC.12/11/Add.3) and additional information related to the Risk Management Evaluation (UNEP/POPS/POPRC12/INF/7) concluded that technically feasible alternatives are commercially available for all known uses of SCCPs. A common replacement for SCCPs is medium-chain chlorinated paraffins (MCCPs). Although current research suggests that MCCPs pose a lower environmental and human health risk than SCCPs, a number of jurisdictions, globally, have found MCCPs to be toxic to aquatic life. A recent evaluation concluded that MCCPs contain constituents that meet persistence, bioaccumulation and toxicity criteria under the EU REACH regulations, and that some constituents could be considered very persistent and very bioaccumulative.
9. Limited information was received on the efficacy and efficiency of possible control measures for SCCPs, the status of control and monitoring capacity for SCCPs, and progress made in building capacity for the safe transfer to alternatives, and on building the capacity of countries to transfer safely to reliance on alternatives to SCCPs.
10. No Parties have registered specific exemptions. This may indicate that: there is no longer a need for specific exemptions for SCCPs; the listing of SCCPs has not yet been ratified by opt-in countries Parties or acted upon by Parties that are producers/importers/users of SCCPs; there are knowledge gaps about domestic situations (i.e., inventories); or there is non-compliance with the requirements of the Convention.
11. Possible ways forward include:
 - (a) Continue to evaluate the need for exemptions until 2023;

- (b) Recommend that Parties provide information to the Secretariat on the composition of commercial CPs that include homologues with C₁₀-C₁₃ chain length;
- (c) Encourage Parties to promote the transition to alternatives; and/or
- (d) Recommend that specific exemptions are no longer needed in accordance with paragraph 9 of Article 4 of the Convention.

1. Introduction

12. At its eighth meeting, the Conference of the Parties to the Stockholm Convention on Persistent Organic Pollutants (POPs) adopted decision SC-8/11, by which it amended Annex A to the Convention to list short-chain chlorinated paraffins (SCCPs) with various specific exemptions. In addition, the Conference of the Parties adopted decision SC-8/14 on the review of information related to specific exemptions for SCCPs. Specifically, the Conference of the Parties:

13. Invited each Party listed in the register of specific exemptions for SCCPs listed in Annex A to the Stockholm Convention to report to the Secretariat, by December 2019, justifying its need for the registration of that exemption;

(a) Invited each Party listed in the register of specific exemptions for SCCPs listed in Annex A to the Convention, as well as observers, to provide to the Secretariat, by December 2019, information on the following:

- (i) Production;
- (ii) Uses;
- (iii) Efficacy and efficiency of possible control measures;
- (iv) Information on the availability, suitability and implementation of alternatives;
- (v) Status of control and monitoring capacity;
- (vi) Any national or regional control actions taken;

(b) Invited all Parties to provide to the Secretariat, by December 2019, information on progress made in building the capacity of countries to transfer safely to reliance on alternatives to SCCPs.

14. In line with paragraphs 1 to 3 of decision SC-8/14, the Secretariat sent out letters dated 12 June 2019 and 10 October 2019 inviting Parties and observers to provide information on specific exemptions for SCCPs by 2 December 2019. This information would then be compiled and made available to the POPs Review Committee (POPRC) by January 2020.

15. The Conference of the Parties requested the Committee, subject to the availability of resources, to analyse the information received from Parties and observers and any other pertinent and credible information available and to prepare a report, including any recommendations, for consideration by the Conference of the Parties.

16. At its fifteenth meeting, the Committee adopted decision POPRC-15/4, which established an intersessional working group on SCCPs to prepare a report on the review of information related to specific exemptions for SCCPs and adopted a work plan to implement this activity.

17. This report compiles the information received in response to the call for information¹ and supplements it with information from national implementation plans (NIP) addressing amendments made at the eighth meeting of the Conference of Parties in 2017,² and information extracted from the Risk Profile (UNEP/POPS/POPRC.11/10/Add.2), Risk Management Evaluation (UNEP/POPS/POPRC.12/11/Add.3) and additional information related to the draft Risk Management Evaluation (UNEP/POPS/POPRC12/INF/7).

2. Register of specific exemptions

18. In its Decision SC-8/11 the Conference of the Parties amended Annex A of the Stockholm Convention to list SCCPs with the following specific exemptions:

Production:

As allowed for the Parties listed in the Register

Use:

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

¹ As of 20 April 2020, the Secretariat had received 14 responses to the request for information, 11 Parties (Belarus, Canada, Egypt, the European Union, Ghana, Germany, Monaco, New Zealand, Qatar, Romania, and Senegal) and three observers (Canadian Vehicle Manufacturers' Association, European Automobile Manufacturers' Association, and International Pollutants Elimination Network (IPEN) with the Alaska Community Action on Toxics. The information is available at <http://chm.pops.int/tabid/8255/Default.aspx>. In addition, during the comment period the Secretariat received information from additional 10 Parties/countries: China, Colombia, Guatemala, Kyrgyzstan, Mexico, Spain, Sweden, United Kingdom, United States, and Vanuatu

² Relevant information on SCCPs was extracted from the following NIP updates: Cyprus (2019), Denmark (2018), The Gambia (2019), Kiribati (2019), Liberia (2018), Malawi (2019), Morocco (2019), New Zealand (2018), Spain (2019), Trinidad and Tobago (2018), and Vietnam (2017). NIPs are available at <http://chm.pops.int/tabid/253/Default.aspx>.

- (b) Spare parts of rubber conveyor belts in the mining and forestry industries;
- (c) Leather industry, in particular fat liquoring in leather;
- (d) Lubricant additives, in particular for engines of automobiles, electric generators and wind power facilities, and for drilling in oil and gas exploration, petroleum refinery to produce diesel oil;
- (e) Tubes for outdoor decoration bulbs;
- (f) Waterproofing and fire-retardant paints;
- (g) Adhesives;
- (h) Metal processing;
- (i) Secondary plasticizers in flexible polyvinyl chloride, except in toys and children's products.

19. As of 20 April 2020, no Party had registered any specific exemption for SCCPs. In response to the call for information, one Party indicated the need for a specific exemption (see Table 1). Guatemala,³ the Gambia (2019), Kiribati (2019), Trinidad and Tobago (2019), Vanuatu,⁴ and Vietnam (2017) indicated there is currently insufficient information to assess the need for an exemption, and noted the need to undertake an inventory of potential sources of SCCPs in their respective countries, including presence of SCCPs in articles and open applications. Several of these countries identified the need for assistance in undertaking this task and/or for additional guidance on methodologies to quantify the presence and importation of SCCPs in products.

SCCPs in articles in use

20. While no Party had registered any specific exemption for SCCPs, the Secretariat has received two notifications for the exemption in accordance with note (ii) of Annex A to the Convention (articles in use that contain SCCPs), one from Japan and the other from New Zealand (Table 2). Although the exemption in accordance with note (ii) of Annex A (articles in use) is not within the scope of the review as per decision SC-8/14, this section provides brief information on those notifications.

21. New Zealand (2018) notes that it is possible that existing fire-resistant clothing and equipment may contain SCCPs. In their national implementation plan updates, The Gambia (2019), Kiribati (2019), and Trinidad and Tobago (2019) noted that it was too early to determine if a notification was required as assessment of SCCPs sources had yet to be undertaken. Colombia has not identified articles in use that contain SCCPs.⁵ While some applications have been identified as users of chlorinated paraffins, the presence of SCCPs in products still needs to be assessed. Vanuatu noted that it imports products which may contain SCCPs such as lubricants for automobiles, electric generators, paints, adhesives, but that it had insufficient information on the presence of SCCPs to determine if an exemption is needed.

22. The European Chemical Agency (ECHA) has received notifications for SCCPs in articles. This information does not correspond to current manufacturing or import of articles, but articles that were placed on the market in the past and which may still be in use. Notifications were received for the following categories of articles: electrical batteries and accumulators; fabrics, textiles and apparel; leather articles; machinery, mechanical appliances, electrical/electronic articles; paper articles, plastic articles, rubber articles. Examples of specific articles include: accessories for the following product ranges: photo, video, audio, computer, telecommunication (e.g. bags, cables, adapters, tripods, storage media, picture frames, mouse, keyboard, hub, headsets, cleaning agents); cables; downlights; electronic articles; household goods like lamps and microwave dishes; LED strips, luggage and leather goods; plastic faucets, plastic hand bags, plastic manicure set pouches, plastic watch straps; small plastic consumer items; and torch LEDs.⁶

23. The EU provided information on the occurrence and levels of SCCPs in different waste streams (and categories), in recycled articles and in articles currently in use, as well as occurrence and levels in different articles that could be recycled in the near future (Potrykus et al., 2019). Consumer products containing SCCPs above the allowed concentration limits placed on the EU market that are identified by distributors or national authorities are notified to the European Commission Rapid Alert System for dangerous non-food products (RAPEX). The Norwegian Environment Agency provided quantitative information for articles in use showing SCCP concentrations ranging from 250 to 66,000 mg/kg (see Appendix 1). Most of these articles also contained MCCPs.

24. Analyses of Christmas lights and other electric Christmas decorations conducted in 2018 by the Swedish Chemicals Agency (KEMI) detected SCCPs at levels above regulatory limits in ten of 120 products investigated (KEMI, 2018). A report by IPEN (Miller and DiGangi, 2017) identified SCCPs in children's products at

³ Comments on draft received 19 March 2020.

⁴ Comments on draft received 31 March 2020.

⁵ Comments on draft received 30 March 2020.

⁶ <https://echa.europa.eu/documents/10162/c6fe097d-2785-4121-a6d8-fcd237609221> (accessed 2020-11-20).

concentrations ranging from 8.4 to 19,808 parts per million (ppm). A study on hand blenders found leaking of SCCPs and MCCPs during usage, leading to an increased human dietary exposure to these compounds by a factor of up to 26, which may exceed the TDI for Swedish infants with a body weight below 7.2 kg. No decreasing leakage levels were observed after 20 times of blender use. (Yuan et al., 2017). A recent project on enforcement of internet trade funded by the Nordic Council of Ministers found that SCCPs in soft plastic materials sold online were among the most common violations of the EU POPs Regulation (Klar et al., 2020).

Table 1: Responses to the call for information and comments received on the need for registration of a specific exemption for SCCPs (as of 20 April 2020)

Party	Response
Belarus	Not required
Canada	Not applicable
Colombia	Colombia is planning to carry out a project to update its Industrial POP inventory, which includes SCCPs. Up to date, Colombia has found SCCPs used in products in the plastics industry, but substitutes are also known and available. Some companies reported they already undergone a substitution process and hence the country may not need a specific exemption to the Stockholm Convention. Nevertheless, efforts are being conducted in order to assess in a need of any exemption is compulsory in our country.
Egypt	Not Required
Ghana	Ghana has assessed all the chemicals listed under Annexes A and B and did not find the need to apply for any exemption under the Stockholm Convention. No need for exemption currently for SCCPs
Germany	None - registration of specific exemptions is done by the European Commission on behalf of the European member states.
Monaco	Not applicable
New Zealand	Not applicable
Qatar	SCCPs used in construction materials such as sealant and base. ⁷
Romania	Not applicable
Senegal	Not required
Vanuatu	Vanuatu is not able to respond for specific exemptions for SCCPs because at this time, there is no information about the presence of SCCPs for the products imported.

Table 2: Notifications received for articles in use containing SCCPs pursuant to note (ii) of Annex A of the Stockholm Convention (as of 20 April 2020)

Party	Article in use	Date of notification
Japan	<ul style="list-style-type: none"> - Paints (limited to those for waterproof and anti-flammable use) - Plasticizers for resin and rubber - Adhesives and sealing filters - Fat liquoring agent for leather - Flame-retardant treatment agent - Lubricating, cutting and hydraulic oils - Materials for industrial machines - Tubes for outdoor decoration bulbs 	28 Nov 2018
New Zealand	Articles where SCCPs have been used as additives in rubber and plastic goods, in adhesives and sealants, and as water-proofing and flame-retardant agents for textiles – present in New Zealand before 18 December 2018.	14 Dec 2018

⁷ To be verified as it appears that these uses do not fall under one of the listed exemptions.

3. Information on the production and use of SCCPs

25. Among the Parties that responded to the call for information, none indicated any current production of SCCPs (Table 3). In its 2018 NIP update, Denmark indicated there was no production of SCCPs in Denmark. By the end of the 1990s, production of SCCPs in Europe ceased (Spain, 2019). The main producers in Europe were in Germany and the UK. Information provided by the EU indicates that INOVYN Chlorvinyls Limited (UK) ceased the manufacture of SCCPs in 2013 there are no active registrations for EU manufacturers and importers of SCCPs on their own or in mixtures in quantities of one tonne or more per year. No additional information has been submitted by Parties or observers. More information on SCCPs production data can be found in UNEP/POPS/POPRC.11/10/Add.2 and UNEP/CHW/OEWG.11/INF/10.

26. However, one observer, IPEN, pointed to the following potential producers of SCCPs: NCP Chlorchem (South Africa), LEUNA-Tenside GmbH (Germany), JSC Kaustik (Russia), KLJ Group (India), Aditya Birla Chemicals (India), Makwell Group (India), and Altair Chimica SpA (Italy). It also noted the following producers of substitutes such as MCCPs: Dover Chemical Corporation (US), LEUNA-Tenside GmbH (Germany), Química Del Cinco (Spain), Caffaro Industrie S.p.A. (Italy), KLJ Group (India), Qualice, LLC (US), Aditya Birla Chemicals (India), Makwell Group (India), and Altair Chimica SpA (Italy).

27. In their response to the request for information, four Parties indicated recent or current use in various products or articles such as: PVC, textiles, lubricants, hardeners, base, sealants, waterproofing and/or paints (See Table 3). One observer made reference to the uses that were listed in the Risk Profile. According to Denmark's 2018 NIP update, SCCPs were used in sealants and other building materials until 2002. Use of SCCPs has been decreasing from 23.5 t in 2000 to 4.0 t in 2011. There is currently no intentional use of SCCPs in Denmark (Denmark, 2018).

Table 3: Responses to the call for information and comments received on national production and use of SCCPs (as of 20 April 2020)

Party	Production of SCCPs	Uses
Belarus	No	None – Chloroparaffins (CP-66T CP-470A) are used. ⁸
Canada	No	None since 2013. Prior to banning their use SCCPs were used primarily in metalworking applications. Some minor uses were identified in flame retardants, plastics and rubber.
Colombia	-	The following applications have been declared to have been currently used or recently used chlorinated paraffins in Colombia: <ul style="list-style-type: none"> • Coating for poles • EEE polymeric materials • Bands used in mining • Insulating foams of fridges and freezers • Plasticizer in flexible PVC • Pigment concentrates for polymers • Oily lubricants for leather
Egypt	No	Used in PVC, textiles, lubricants, waterproofing and paints.
European Union	No	ECHA received notifications for the following categories of articles: electrical batteries and accumulators; fabrics, textiles and apparel; leather articles; machinery, mechanical appliances, electrical/electronic articles; paper articles, plastic articles, rubber articles. Examples of specific articles include: accessories for the following product ranges: photo, video, audio, computer, telecommunication (e.g. bags, cables, adapters, tripods, storage media, picture frames, mouse, keyboard, hub, headsets, cleaning agents); cables; downlights; electronic articles; household goods like lamps and microwave dishes; LED strips, luggage and leather goods; plastic faucets, plastic hand bags, plastic manicure set pouches, plastic watch straps; small plastic consumer items; and torch LEDs.
Ghana	No	In open and closed applications
Germany	-	No current use

⁸ IPEN noted that these formulations are mixtures of SCCPs, MCCPs, and LCCPs. <http://caustic-south.com/en/chloroorganic-production/chlorinated-paraffin-cp-66t.html> <https://www.kaustik.ru/en/index.php/products/chloroorganic-production/chlorinated-paraffin-cp-470a>.

Party	Production of SCCPs	Uses
Monaco	No	Not used
New Zealand	No	No longer used. Articles in use notification has been made for articles where SCCPs have been used as additives in rubber and plastic goods, in adhesives and sealants, and as water-proofing and flame-retardant agents for textiles – present in New Zealand before 18 December 2018.
Qatar	No	Hardener / Base / Sealant
Romania	No	Not applicable
Senegal	No	Not used

4. Information on the efficacy and efficiency of possible control measures for SCCPs

28. The summary of responses and comments to the question on efficacy and efficiency of possible control measures are found in Table 4. The Risk Management Evaluation (UNEP/POPS/POPRC.12/11/Add.3) and additional information related to the Risk Management Evaluation (UNEP/POPS/POPRC12/INF/7) provide the best available summary of information on the efficacy and efficiency of possible control measures for SCCPs.

29. Between October 2017 and December 2018, 15 EU member states carried out a pilot enforcement project. The project investigated the presence of substances of very high concern (SVHC) in articles placed in the European market.⁹ Of 682 inspected products, 12 contained SCCPs above 0.1% (w/w): 8 articles - wires and cables and electric / electronic accessories and 4 articles - other plastics and rubber material.¹⁰ The pilot project was a test for the compliance with Article 7(2) of REACH (obligation to notify ECHA of the presence of SVHC in articles) and Article 33 of REACH (obligation to provide information on the presence of the SVHC in articles down the supply chain). It was not designed as a programme to measure the dimension of the distribution of SCCPs in articles in the market, neither the compliance with the POPs Regulation.

30. The Risk Management Evaluation notes that: “No party or observer submitted information to propose or justify the need for a specific exemption or acceptable purpose in the listing of SCCPs.” In its submission, the observer IPEN noted the availability of two methods to reduce emissions of SCCPs and other harmful substances from waste. Making reference to the Basel Convention General Technical Guidelines on the environmentally sound management of wastes consisting of, containing or contaminated with persistent organic pollutants (UNEP/CHW.14/7/Add.1/Rev.1) IPEN noted gas phase chemical reduction (GPCR) and super critical water oxidation (SCWO) are non-combustion methods of destruction that could be used. IPEN also suggested that the adoption of a protective low POPs content of level 100 mg/kg to control potential releases of SCCPs due to improper handling of SCCPs-containing wastes.

Table 4: Responses to the call for information and comments received on efficacy and efficiency of possible control measures for SCCPs (as of 20 April 2020)

Party	Comment
Canada	<p>The <i>Prohibition of Certain Toxic Substances Regulations, 2012</i> have prohibited the manufacture, use, sale, offer for sale or import of short-chain chlorinated alkanes (SCCAs, also known as SCCPs) and products that contain them, with limited exemptions, since March 2013.</p> <p>Manufacturers or importers of SCCAs or products containing SCCAs where the SCCA is incidentally present must submit reports on these activities above the reporting thresholds of 1 kg annually and a concentration level greater than 0.5% by weight.</p> <p>The information obtained on SCCAs through these reports will aid in the determination of potential future controls on the incidental presence of these substances.</p> <p>Refer to Canada (2008), Canada (2011) and Canada (2013) for more information.</p>
Colombia	<p>It was estimated that in 2017, an amount of 1,235 tons of unidentified chlorinated paraffins were imported without properly identifying if they were SCCPs. Considering the aforementioned fact, and the limit for the presence of SCCPs in other CP mixtures, set at 1% by weight, imports of SCCPs for industry applications in Colombia is estimated in 12 tons per</p>

⁹ SCCPs are listed in the EU Candidate List of substances of very high concern for Authorisation <https://echa.europa.eu/candidate-list-table/-/dislist/details/0b0236e1807d8f3f> (Accessed 2020-05-16).

¹⁰ https://echa.europa.eu/documents/10162/13577/sia_pilot_project_report_en.pdf/f9fc153b-a322-43be-1ba1-44f4e5cb02c8.

	year. Being so, Colombia needs to extend its knowledge about state of affairs of SCCPs in the country, so that a reasonable concentration level can be set as an enforceable limit.
Ghana	<ul style="list-style-type: none"> • Develop strategy and capacity for monitoring PCBs, PCNs and SCCPs in open applications • Identify the presence of PCBs, PCNs and SCCPs in open applications and development • Assessment of the impact of PCBs, PCNs and SCCPs on recycling cycles and circular economy
Egypt	Some inventories of imported SCCPs
Senegal	Limited capacity

5. Information on alternative to SCCPs

31. The Risk Management Evaluation for SCCPs (UNEP/POPS/POPRC.12/11/Add.3) concluded that technically feasible alternatives are commercially available for all known uses of SCCPs, therefore the POPRC did not recommend any specific exemptions (POPRC-12/3). However, the POPRC has not assessed whether these alternatives meet the Convention's Annex D screening criteria. The Committee noted that co-exposure to some level of MCCPs and LCCPs may increase the risk for any adverse or potential adverse effects observed with SCCPs. Two Parties, Canada and Colombia, provided information on alternatives used to replace SCCPs (see Table 5). In its 2011 review, Canada noted that some substitutes may not be technically suitable for all applications and, in some cases, more costly to use. When selecting an alternative, it is important to assess if it is safer than the chemical it replaces.¹¹

32. Evidence from the UK suggests that a common replacement for SCCPs in metalworking fluids, PVC manufacture and other applications has been MCCPs. In its NIP, Spain notes that while medium and long-chain chlorinated paraffins (LCCPs) have commonly been used as alternatives to SCCPs, they may not be environmentally appropriate alternatives as they may contain traces of SCCPs and break down into SCCPs (Spain, 2019). Further information can be found in the risk management evaluation (UNEP/POPS/POPRC.12/11/Add.3).

33. Although MCCPs pose a lower environmental and human health risk than SCCPs, they are toxic to aquatic life. There is also evidence to suggest that they are endocrine disrupters, have carcinogenic properties and may cause harm to breastfed children. MCCPs are persistent in the environment and toxic to aquatic life. More studies are required to assess their potential to accumulate in the environment (Glüge et al., 2018; Öko Insitut, 2019). The recent evaluation concluded that MCCPs contain constituents that meet persistence, bioaccumulation and toxicity criteria under the EU REACH regulations, and that some constituents could be considered very persistent and very bioaccumulative (UK Environment Agency 2019).

34. The Risk Management Evaluation provides a compilation of available alternatives (see summary in Appendix 2).

Table 5: Responses to the call for information and comments received on the availability, suitability and implementation of alternatives to SCCPs (as of 20 April 2020)

Party	Comment
Canada	<p>Please refer to Section 7.1 of the <i>Proposed Risk Management Approach for Chlorinated Paraffins</i> (Canada 2008).</p> <p><i>Metalworking Fluids</i></p> <p>There are two approaches to minimizing the releases of CPs within the metalworking industry, specifically to: (i) increase the adoption rate of substitutes to CPs among metalworking fluid formulators and end-users; and (ii) increase the adoption of best management practices by end-users of metalworking fluids.</p> <p>Although substitutes to CPs are available to metalworking fluid formulators, several issues need to be considered in their implementation, as some potential alternatives are:</p> <ul style="list-style-type: none"> (a) Not technically suitable for all applications; (b) More costly; and (c) May also pose environmental and health risks. <p><i>Polyvinyl Chloride (PVC)</i></p> <p>In PVC manufacturing, CPs are used primarily in applications where moderate plasticizing and flame-retardant properties are required at low cost. Moreover, it is not anticipated that there would be many technical obstacles if CPs had to be replaced with alternative plasticizers</p>

¹¹ Refer to the General guidance on considerations related to alternatives and substitutes for listed persistent organic pollutants and candidate chemicals ([UNEP/POPS/POPRC.5/10/Add.1](#)).

Party	Comment
	<p>and/or flame retardants. Analysis of CP alternatives suggests that, in many cases, the overall technical characteristics of the PVC product such as flexibility and stability would improve with the use of alternatives. Although technically feasible, the use of these alternatives would likely increase the raw material costs for manufacturers, and they may also pose environmental and health risks.</p> <p><i>Paints and Coatings, Adhesives and Sealants, and Rubber and Elastomers</i></p> <p>Very small quantities of CPs are used annually in Canada in the formulation of paints and coatings, adhesives and sealants, and rubber and elastomers relative to metalworking fluids and PVC. Less than 100 t of both MCCPs and LCCPs were reported to Environment Canada for the year 2001. The favorable characteristics provided by CPs include good compatibility with the resin systems where they are used; they are colourless; they are non-volatile and do not add to volatile organic compounds (VOC) content of a coating system; and they have low viscosity.</p> <p>The use of CPs in the rubber industry has historically involved the utilization of SCCPs to manufacture rubberized conveyor belts for the underground mining industry as well as other technical products such as hoses and gaskets. They are used in these applications because of their superior flame-retardant properties, which are often required in order to meet fire standard codes for products. Technical barriers have been reported for adhesives and sealants substitutes as well; the primary technical issue is that they are more prone to bleeding from the sealant product, thus directly affecting the durability of the sealant and the substrate.</p> <p>The information below is extracted from the <i>Consultation document on chlorinated paraffins</i>, section 3.3 (Canada, 2011).</p> <p><i>Metalworking Fluids</i></p> <p>The Government of Canada believes that the most effective means of minimizing the releases of CPs from the metalworking industry is through the transition to alternatives.</p> <p>Information gathered by the Government of Canada indicates that substitutes to CPs are available to metalworking fluid formulators and certain formulators and end-users have indicated that they would like to move away from the production and use of chlorine-based metalworking fluids. However, for certain applications, the following issues have been identified:</p> <ul style="list-style-type: none"> (a) Some substitutes may not be technically suitable for all applications; (b) Some substitutes may be more costly. <p>Through extensive research, Environment Canada has identified the following class of alternatives for metalworking fluids:</p> <ul style="list-style-type: none"> (a) Sulfur based substitutes (b) Phosphorus based compounds (c) Nitrated compounds (d) Overbased calcium sulfonate (e) Other potential substitutes such as alkanolamides and diisopropyl oleate <p><i>Polyvinyl Chloride</i></p> <p>In the manufacturing of PVC, CPs are used primarily in applications where moderate plasticizing and flame-retardant properties are required at low cost. It is not anticipated that there would be many technical obstacles to the use of alternatives to CPs for use as plasticizers and/or flame retardants. Analysis of alternatives to CPs suggests that, in many cases, the overall technical characteristics of the PVC product including flexibility and stability would improve with the use of alternatives. Although technically feasible, the use of these alternatives may increase the raw material costs for manufacturers.</p> <p><i>Paints and Coatings, Adhesives and Sealants, and Rubber and Elastomers</i></p> <p>Very small quantities of CPs are used annually in Canada in the formulation of paints and coatings, adhesives and sealants, and rubber and elastomers in comparison to metalworking fluids. Approximately 100 t of both medium chain chlorinated paraffins and long chain chlorinated paraffins were reported for these applications for the year 2001 in Canada.</p> <p>Based on information gathered by the Government of Canada, alternatives exist, and companies have indicated that they are ready to phase-out CPs for these applications.</p>
Colombia	MCCPs and LCCPs have been identified as alternatives for SCCPs in the country. To date, three companies reported undergoing substitution processes on plasticizer in flexible PVC,

Party	Comment
	pigment concentrates for polymers and oily lubricants for leather applications, demonstrating the technical and economic feasibility of substitution processes in the country.
Egypt	Medium-chain chlorinated paraffins and some oils have been produced as alternative
Guatemala	Noted that they [SCCPs] can be replaced by medium and long-chain chlorinated paraffins. Guatemala is planning a new update of the National Implementation Plan and we will take as a reference the work carried out by Spain since, through the updating of its NIP, they identified that substitutes for short-chain chlorinated paraffins could be replaced by paraffins medium and long chain chlorinated, but indicate that it is not environmentally correct to have traces of short chain chlorinated paraffins.
Qatar	Some of alternatives are used in Qatar
Romania	Not applicable
Senegal	No concern

6. Information on the status of control and monitoring capacity for SCCPs

35. Table 6 outlines the information received on the status of control and monitoring capacity for SCCPs. Canada has several environmental monitoring initiatives and participates in international monitoring initiatives (see Table 6). Qatar indicates that the Radiation and Chemical Protection Department undertakes monitoring. Egypt has implemented training activities and Senegal indicates it has limited capacity for control and monitoring of SCCPs. Ghana has identified various activities to address the research, development and monitoring needs of the country. In its NIP update, Spain noted that a search of the literature published between 2013 and 2018 did not identify any scientific publications on chlorinated paraffins (Spain, 2019). Recently published articles report on progress made in analytical methods for SCCPs in food: <https://doi.org/10.1016/j.chemosphere.2019.06.022>, <https://doi.org/10.1016/j.chemosphere.2019.04.016> and <https://doi.org/10.1016/j.chroma.2020.460927>.

Table 6: Responses to the call for information on the status of control and monitoring capacity for SCCPs (as of 20 April 2020)

Party	Comment
Canada	Monitoring SCCPs in human populations in the Canadian Arctic is currently being explored for future human biomonitoring under the Northern Contaminants Program. SCCPs may also be added to future cycles of the Canadian Health Measures Survey. SCCPs in beluga whales from the St. Lawrence Estuary are also being studied. Additionally, SCCPs are monitored through several global initiatives, such as the GAPS Megacities project (in publication), the 2014/15 survey of the GRULAC region as part of a GAPS sub-project, as well as a study of global air samples.
Egypt	Capacity Building for Regional Branch Offices (RBOs), relevant industrial sectors and ministries
Ghana	An initial assessment conducted as part of the revised and updated NIP established that Ghana lacks the requisite infrastructure and institutional capacities to handle research, development and monitoring issues relating to POPs in general and SCCPs in particular. The revised/updated NIP has identified various activities in addressing the research, development and monitoring needs of Ghana. The objectives of the programme include: (1) To develop institutional and research capacity to manage POPs (including SCCPs); (2) To identify appropriate laboratories and partners to monitor all POPs (including SCCPs) activities; (3) To monitor levels of concentration of POPs (including SCCPs) in the environment. (4) To develop strategy and capacity for identifying and monitoring SCCPs in open applications. (5) To assess the impact of SCCPs on recycling cycles and circular economy
Norway	SCCP and MCCP have been included in the annual air monitoring program in Norway since 2013 (https://www.miljodirektoratet.no/publikasjoner/2019/august-2019/monitoring-of-environmental-contaminants-in-air-and-precipitation-annual-report-2018/). These substances are also included in other environment monitoring programs such as: Environmental Contaminants in an Urban Fjord (https://www.miljodirektoratet.no/publikasjoner/2019/september-2019/envir-onmental-contaminants-in-an-urban-fjord-2018/), Environmental pollutants in the terrestrial and urban environment (https://www.miljodirektoratet.no/publikasjoner/2018/august-2018/environmental-pollutants-in-the-terrestrial-and-urban-environment-2017/) and

Party	Comment
	Contaminants in coastal waters of Norway (https://www.miljodirektoratet.no/publikasjoner/2018/november-2018/contaminants-in-coastal-waters-of-norway-2017/).
Qatar	Monitoring by Radiation and Chemical Protection Department (Ministry of Municipality and Environment)
Romania	Not applicable
Senegal	Limited capacity

7. Information on the national or regional control actions taken for SCCPs

36. In their response to the call for information, eight of the Parties provided information on control actions (see Table 7). Restrictions on SCCPs are in place in Canada, European Union (including Germany) and New Zealand (details in Table 7). Qatar indicated that a licence is needed to import and store SCCPs. Egypt noted that only MCCPs are produced. There are no regulations in Senegal. In Romania, EU regulations would apply. In its 2018 NIP update, Denmark notes that SCCPs are regulated in accordance to EU regulations. Production, importation and use are currently banned, with exemptions for articles already in use before or on 10 July 2012, mixtures with concentrations up to 1% and for articles with concentrations up to 0.15%. Materials containing 1% or more SCCPs are classified as hazardous wastes.

Table 7: Responses to the call for information on the national or regional control actions taken for SCCPs (as of 20 April 2020)

Party	Comments
Canada	Effective March 2013, the <i>Prohibition of Certain Toxic Substances Regulations, 2012</i> prohibit the manufacture, use, sale, offer for sale or import of short-chain chlorinated alkanes (SCCAs, also known as SCCPs) and products that contain SCCAs, with limited exemptions. Manufacturers or importers of SCCAs or products containing SCCAs where the SCCA is incidentally present must submit reports on these activities above the reporting thresholds of 1 kg annually and a concentration level greater than 0.5% by weight.
Egypt	Produced only MCCP
Germany	European POP regulation does not permit any uses of SCCPs.
European Union	<p>Milestones related to regulatory actions</p> <p>25/06/2002 Restriction under Council Directive 76/769/EEC</p> <p>18/12/2006 Restriction under REACH</p> <p>02/06/2008 Publication in the registry of intentions for substance of very high concern (SVHC) identification under REACH</p> <p>28/10/2008 Inclusion in the Candidate list of substances of very high concern for Authorisation under REACH</p> <p>14/01/2009 Draft recommendation for inclusion in the Annex XIV of REACH for (Authorisation)</p> <p>01/06/2009 Final recommendation for inclusion in the Annex XIV of REACH (Authorisation)</p> <p>19/06/2012 Inclusion in POPs Regulation (Part B of Annex I)</p> <p>13/02/2013 Removal of the restriction under REACH (entry 42 of Annex XVII)</p> <p>13/11/2015 Review of exemptions under POPs Regulation</p> <p>05/05/2017 COP decision listing in SC</p> <p>25/06/2019 Revision of POPs Regulation (Part A of Annex I)</p> <p>Restrictions applying to SCCPs since July 2019 under the POPs Regulation</p> <p>The manufacturing, placing on the market and use of SCCPs, whether on their own, in mixtures or in articles, shall be prohibited, in accordance with Annex I.</p> <p>Derogations from that general prohibition in accordance with Annex I</p> <p>1. By way of derogation, the production, placing on the market and use of substances or preparations containing SCCPs in concentrations lower than 1 % by weight or articles containing SCCPs in concentrations lower than 0,15 % by weight shall be allowed.</p> <p>2. Use shall be allowed in respect of:</p>

Party	Comments
	<p>(c) conveyor belts in the mining industry and dam sealants containing SCCPs already in use before or on 4 December 2015; and</p> <p>(d) articles containing SCCPs other than those referred to in (a) already in use before or on 10 July 2012.</p> <p>3. Article 4(2) third and fourth subparagraphs shall apply to the articles referred to in point 2 above</p> <p>Companies need to notify a substance to the Classification and Labelling (C&L) Inventory within one month from being placed in the market.¹²</p> <p>A description of earlier regulatory action is available in the Submission by the European Union.</p>
New Zealand	SCCPs are listed as a persistent organic pollutant under the Hazardous Substances and New Organisms Act in New Zealand. No SCCPs can be manufactured or imported.
Qatar	According to state of law (30) of the environmental protection and environmental conventions signed by the country, SCCPs is restricted by radiation and chemical protection department (Ministry of Municipality and Environment). It requires a chemical import licence and chemical storage licence.
Romania	Not applicable
Senegal	None

8. Information on the progress made in building the capacity of countries to transfer safely to reliance on alternatives to SCCPs

37. Limited information was provided on progress made in building capacity (see Table 8). Some training on the management of SCCPs has taken place. Insufficient information is available to assess the progress made in building the capacity of countries to transfer safely to reliance on alternatives to SCCPs.

Table 8: Responses to the call for information and comments received on building the capacity of countries to transfer safely to reliance on alternatives to SCCPs (as of 20 April 2020)

Party	Response
Canada	No information available
Egypt	Workshops and seminars for industrial establishment, relevant ministries and Regional Branch Offices
Ghana	Initial priority project proposals are being developed to operationalise the revised/updated National Implementation Plan. The specific objective of the project is to reduce and phase out products/articles containing SCCPs and select sustainable alternatives
Guatemala	We also believe that it is a good initiative to hold workshops, seminars, and work teams by industrial establishments, relevant Ministries and regional offices, to identify alternatives for short-chain chlorinated paraffins (SCCPs) and we believe that it is necessary to consider the need for inventories.
Qatar	As per current practices, hazardous material vehicle licence issued from the Radiation and Chemical Protection Department
Romania	Not applicable
Senegal	No concern

9. Analysis of the information and recommendations

38. In decision SC-8/14 on the review of information related to specific exemptions for SCCPs the COP invited each Party listed in the register of specific exemptions for SCCPs to report to the Secretariat, by December 2019, justifying its need for the registration of that exemption. Four of the nine Parties who responded to the call for information indicated current use (PVC, textiles, lubricants, hardeners, base, sealants, waterproofing and/or paints), one of whom identified a need for a specific exemption, though it appears that it is for a use that does not fall under one of the listed exemptions.

¹² See <https://echa.europa.eu/information-on-chemicals/cl-inventory-database/-/discli/details/95019>.

39. For most Parties, the listing of SCCPs came into effect on 18 December 2018. The specific exemptions are time-limited, and will expire 5 years after the date of entry into force, unless an extension is requested by Parties and granted by the COP. As of 12 December 2019, no Party for whom the amendment is in effect had registered for any of the specific exemptions, including some of the known producing countries of CPs. The lack of registration could be indicative of the following:

- (a) There is no longer a need for specific exemptions for SCCPs;
- (b) The listing of SCCPs has not yet being been ratified by opt-in Parties or acted upon by opt-out countries that are producers/importers/users;
- (c) There are knowledge gaps about domestic situations (i.e., inventories);
- (d) There is non-compliance with the requirements of the Convention.

40. Very few Parties (nine) responded to the call for information. Of these,

- (a) None advised of the need for any of the currently listed specific exemptions. (One Party did express that a particular use was still in place, however, it appears that this use does not fall under one of the listed exemptions);
- (b) Four Parties indicated the need to undertake an inventory of potential sources of SCCPs;
- (c) Others requested guidance on methodologies to quantify the presence and importation of SCCPs in products.

41. Information on presence of SCCPs in wastes suggest that they continue to be present in articles in use. However, as of 12 December 2019, the Secretariat has received notification for articles in use from only two Parties.

42. The Risk Management Evaluation (RME) for SCCPs (UNEP/POPS/POPRC.12/11/Add.3) demonstrated that technically feasible alternatives are commercially available for all known uses. MCCPs are a commonly used alternative that may contain short-chain homologues.

43. As per decision SC-8/8, on implementation plans, the Secretariat has prepared draft general guidance on preparing inventories of persistent organic pollutants (UNEP/POPS/COP.9/INF/19/Add.1), preliminary draft guidance on preparing inventories of SCCPs (UNEP/POPS/COP.9/INF/19) and preliminary draft guidance on alternatives to SCCPs (UNEP/POPS/COP.9/INF/21).

44. Possible ways forward include:

- (a) Continue to evaluate the need for exemptions until 2023: Overall, there is currently limited information available to inform the review of SCCP exemptions, therefore another review cycle may be needed. In addition, four of the nine respondents (Parties) indicated the need to undertake an inventory. Some also requested guidance on quantification methodologies, which is currently under development. Such factors could support the option of continuing to review the need for SCCP exemptions, with the objective of preparing a report for consideration at the eleventh meeting of the COP (in 2023). This would give more time for Parties to seek guidance (as needed), collect more national information, assess their need for exemptions, and register for these in compliance with the Convention obligations. This option would ensure that COP has the necessary information to make an informed decision, in the event that it is asked for a 5-year extension to the current time-limitation;
- (b) Recommend that Parties provide information to the Secretariat on the composition of commercial CPs that include homologues with C₁₀-C₁₃ chain length: Commercial mixtures of MCCPs and LCCPs and other CP products that are neither discreetly SCCPs nor MCCPs (the medium chain homologues) and may include homologues with C₁₀-C₁₃ chain lengths. Information on the extent of presence of these homologues in CPs would help assess the effectiveness of measures to reduce and eliminate the release of SCCPs into the environment;
- (c) Encourage Parties to promote the transition to alternatives: This could include the:
 - (i) Promotion of the use of known alternatives to SCCPs taking into consideration POPs characteristics or other hazardous properties of these alternatives, with the recognition that the POPRC has not assessed whether these alternatives meet the Convention's Annex D screening criteria;
 - (ii) Continued identification of suitable alternative substances/processes and sharing that information with other Parties via the Secretariat which could then be included in guidance documents on alternatives;
 - (iii) Promotion of the use of the preliminary draft guidance on preparing inventories (UNEP/POPS/COP.9/INF/19/Add.1) to collect national information; and
 - (iv) Urging Parties to register for the needed exemption and article in use, in compliance with the requirements under the Convention;

(d) Recommend that specific exemptions are no longer needed: The following factors suggest that this option is viable:

- (i) While in response to the call for information, some Parties indicated on-going use and a possible need for an exemption, no Party has registered for exemptions with the Secretariat;
- (ii) No Party has advised of the need for any of the currently listed exemptions;
- (iii) The Risk Management Evaluation for SCCPs demonstrated that technically feasible alternatives are commercially available for all known uses.
- (iv) A recommendation against continuing specific exemptions for SCCPs is consistent with the original recommendation by the POPs Review Committee for listing SCCPs which did not recommend any specific exemptions.

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Appendix 1: Concentrations of SCCPs in consumer products and articles

Table A-1: Consumer products containing SCCPs notified to RAPEX (Source: Potrykus et al., 2019)

Year	Product	SCCP content (mg/kg)
2017	Sports equipment: Boxing gloves	4,400
2017	Sports equipment: Gym ball	8,500
2017	Toy pistol (plastic cord)	7,000
2017	Toy rifle (cords)	2,000
2017	Toy keyboard (cord)	13,000
2017	Toy Pony	2,500
2017	Power cord	26,000
2017	Shoulder Bag (synthetic leather)	16,000
2017	Training baton	3,700
2017	Bathtub pillow	17,000
2017	Electric shaver (cable)	9,800
2017	Hobby/sports equipment: Hot pack	4,000
2017	Hobby/sports equipment: Exercise tube	90,000 (Handles)
2017	Speaker (cord)	10,000
2017	Radio controlled car (tyres)	17,000
2017	Claw hammer (Handle)	7,000
2017	In-ear headphones (USB cord)	3,000
2017	LED candle (cord)	13,000
2017	Power cord	26,000
2017	Table cloth	6,000
2017	Selfie stick (cord)	45,700
2017	USB cable	16,000
2017	Bath toy	13,400
2017	Game controller	43,000
2017	Plastic doll	8,600
2017	Babies' sleeping bag/footmuff (packaging)	40,000
2017	Babies' sleeping bag (anti-slip knobs)	18,000
2017	Handle (cycle parts)	9,700
2017	Breastfeeding pillow (packaging)	60,000
2017	Hammer (handle)	7,700
2017	Sports equipment: Yoga mat	8,000
2017	Erotic article	4,400
2017	Door gym bar	22,000
2018	Lighting chain (cord)	7,000
2018	Sports equipment: Yoga mat	2,300
2018	Sports equipment: Abs trainer	4,000
2018	Steering wheel cover	4,600
2018	Long sleeved sweater (print)	2,300
2018	Steering wheel cover	3,000
2018	Motor vehicle sidelight (cable)	2,600
2018	USB-cord	2,600
2018	Selfie Stick	1,600
2018	Digital thermometer (cable)	11,000
2018	Stickers (toys)	9,000 and 14,000 (2 Stickers)
2018	Mobile phone case	4,400
2018	Sports equipment: Baseball glove	13,600
2018	All-purpose mat	3,600
2018	Sports equipment: Yoga mats	3,500 – 69,000 (5 Yoga mats tested)
2018	Sports equipment: Fitness gloves	1,800
2018	Rain cover for pushchair	7,300
2018	Extension lead	17,000 and 47,000 (2 Extension leads)

Table A-2: Concentration of SCCPs and MCCPs in articles (Source: Potrykus et al., 2019)

Specification of article	Concentration (mg/kg)
Pullover with print	2,300 (MCCP 9,100)
T-shirt with print	1,300 (MCCP 700)
Sports gloves	250 and 260 (two samples)
Sports textile	4,000 (MCCP 6,500)
Sports yoga mats	2,300 (MCCP 17,000)
Textile car	3,000 (MCCP 3,100)
Textile car	860 (MCCP 1,500)
Textile car	4,600 (MCCP 2,200)
Children product pillow packaging	60,000 (MCCP 27,000)
Children stroller bag plastic anti-slip mats	18,000 (MCCP 130,000)
Children stroller bag packaging	40,000 (MCCP 110,000)
Foam textile children car seat	4,300 (MCCP 12,000)
Reflective bands	6,700 (MCCP 38,000)
Raincoat hat	14,000 (MCCP 73,000)
USB-speaker wire	10,000 (MCCP 16,000)
Reflective bands	4,900
Reflective bands	8,700 (MCCP 7,600)
Reflective bands	2,500 (MCCP 40,000)
Duffy bag plastic	2,800 (MCCP 18,000)
Powerbank wire	32,000 (MCCP 72,000)
Children's Jacket (plastic detail)	66,000
Children's Jacket (plastic detail)	5,100 (MCCP 7,600)
Children's pencil case	1,600 (MCCP 3,400)
Shoe	9,000
Plastic football goal	28,000
Rain hat	43,000
Purse	16,000
Door gym power trainer	22,000
Light chain	29,000 (MCCP 74,000)
Light chain	3,800 (MCCP 56,000)
Light chain	3,200 (MCCP 20,000)
Light chain	4,900 (MCCP 53,000)
Light chain	5,200 (MCCP 48,000)
Light chain	6,800 (MCCP 47,000)
Slippers	7,900 (MCCP 9,100)
Slippers	4,500
Sports wrist band	5,400 (MCCP 3,400)

Potrykus, A, Milunov M, Zotz F, de Brujine E, Weissenbacher J, Kühnl M, Broneder C, and Schöpel M (2019). Study to support the review of waste related issues in Annexes IV and V of Regulation (EC) 850/2004. Report prepared by Ramboll Environment & Health GmbH for the European Commission, DG Environment, Directorate B3 (Also referred to as de Brujine et al 2019 or Ramboll 2019).

Appendix 2: Potential alternatives to SCCPs

1. The following information is primarily extracted from the Risk Management Evaluation (UNEP/POPS/POPRC.12/11/Add.3) and Additional information related to the draft Risk Management Evaluation (UNEP/POPS/POPRC12/INF/7).

2. The RME for SCCPs demonstrated that technically feasible alternatives are commercially available for all known uses. However, some of these may exhibit POPs characteristics or other hazardous properties, although the POPRC has not assessed whether the alternatives meet the Convention's Annex D screening criteria. For example, MCCPs which are commonly used as an alternative, are persistent in the environment and classified in the EU reproductive toxins (H362: "May cause harm to breast-fed children") (Glüge et al. 2018). MCCPs are being considered as substances to be added to list of restricted substances, Annex II of the EU Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS Directive).

1. Metalworking fluids (MWF) applications

Alternative substances

3. In an effort to implement sustainable MWF systems, significant progress has been made by industry through the development of environmentally adapted lubricants (EALs). EALs are highly biodegradable, have low toxicity and their performance is equal to or better than conventional alternatives. There are numerous classes of EALs, including vegetable oil-based (oleo-chemical) ingredients which can be used in traditional water-based and straight-oil formulations in place of conventional fluids. Furthermore, bio-based formulations have the potential to reduce the waste treatment costs for MWF effluents and the occupational health risks associated with petroleum oil-based MWFs. Synthetic and semi-synthetic lubricants, which are often diluted with water rather than VOC solvents, may also serve as alternatives. Some alternatives, for example water-based working or cutting fluids, include additives to control microbial deterioration. Under the EU Biocidal Products Act (BPR) wastes containing such biocides need to be collected and treated as environmentally hazardous waste.¹³

4. Evidence suggests that there are ample alternatives to SCCPs for use as MWFs; however, they may not be suitable for all applications. Some of these may exhibit POPs characteristics or other hazardous properties, although the POPRC has not assessed whether the alternatives meet the Convention's Annex D screening criteria.

5. Potential alternative substances for use of SCCPs in metalworking fluid applications include:

- (a) Alkanol amides (e.g. 2:1 di-ethanolamine (DEA) tall oil fatty acid alkanol amide);
- (b) Isopropyl oleate;
- (c) Long-chain chlorinated paraffins (C₁₈₊) (LCCPs);
- (d) Medium-chain chlorinated paraffins (C₁₄₋₁₇) (MCCPs);
- (e) Nitrated compounds (e.g. Doverlube NCEP- nitrogen containing compound);
- (f) Overbased calcium sulfonates;
- (g) PEP additives;
- (h) Phosphorus based compounds including:
 - (i) alkyl phosphate esters;
 - (ii) Phenol, isopropylated, phosphate (ITAP) (3:1);
 - (iii) Tributyl phosphate (TBP);
 - (iv) Triaryl phosphate;
 - (v) bis(2-ethylhexyl) hydrogen phosphate;
 - (vi) Didodecyl phosphite;
 - (vii) Dimethyl hydrogen phosphite;
 - (viii) 2-ethylhexyl hydrogen phosphate;
 - (ix) Polyethoxy oleyletherphosphate;
 - (x) Zinc dialkyldithiophosphates;

¹³ ECHA (2015). Refinement of the Emission Scenario Document for working or cutting fluid preservatives. European Chemicals Agency, May 2015.

- (xi) Zinc Dialkyl Dithiophosphate (Zinc BDBP);
- (i) Propylene oxide;
- (j) Sulfur based substitutes including:
 - (i) Sulfurized polyisobutene, polypropylene and polystyrene;
 - (ii) Tertiary nonyl polysulfide (TNPS);
 - (iii) Polyolefin sulfide;
 - (iv) Sulfonated fatty acid esters;
 - (v) Polysulfides or alkyl sulfide, sulfurized alkenes/olefins, sulfurized hydrocarbons (i.e., generally of the type di-tertiary alkyl polysulfides, in particular di-tertiary alkyl pentasulfides) - extreme pressure additive.

Alternative materials and techniques

6. Alternative techniques have been developed including the use of gas-based system such as supercritical CO₂. Supercritical CO₂ can be combined with soybean oil to obtain improved performance. Other alternative processes include dry machining, where no cutting fluid is required, and cryogenic machining, where liquefied gases are used. Alternative materials and techniques that have been used as alternatives to the use of SCCPs in metalworking fluids, including the following:

- (a) Material substitution with environmentally adapted lubricants (EALs):
 - (i) Oil-in-water emulsions, vegetable based;
 - (ii) Bio-based lubricant formulations (soybean, pine tree, rapeseed, mustard, grape seed, sunflower, coconut, canola, etc.), with or without additives;
 - (iii) Bio-based lubricants in combination with supercritical CO₂ (scCO₂) (e.g. oil-in-CO₂ dispersion);
 - (iv) Gas-based lubricant system;
- (b) Material substitution with HIGTO(1) (a modified triglyceride - rape seed based) with a zirconium coating;
- (c) Process change to dry machining (no cutting fluids);
- (d) Process change to cryogenic machining (liquid nitrogen);
- (e) Process change to air delivery of lubricants;
- (f) Process change to oil free, low viscosity metal forming lubricants with high solid polymers (HSM);
- (g) Synthetic and semi-synthetic lubricants (vegetable-based methyl esters or polymers of various types) which are often diluted with water rather than VOC solvents, may also serve as alternatives.

2. Polyvinyl chloride processing

Alternative substances

7. Chemical substances that can be used to replace SCCPs in polyvinyl chloride (PVC) applications include:

- (a) Acrylic polymers;
- (b) Alumina trihydrate;
- (c) Aluminum trihydroxide, used in conjunction with antimony trioxide (ATH);
- (d) Aluminum trioxide;
- (e) Antimony trioxide (or Antimony oxide);
- (f) Long-chain chlorinated paraffins (C₁₈₊) (LCCPs);
- (g) Medium-chain chlorinated paraffins (C₁₄₋₁₇) (MCCPs);
- (h) Other organophosphorus flame retardants:
 - (i) Cresyl diphenyl phosphate (CDP);
 - (ii) Tertbutylphenyl diphenyl phosphate (TBDPP);

- (iii) Isopropylphenyl diphenyl phosphate (IPPDPP);
- (iv) Phosphorus based compounds (in general);
- (v) Tricresyl phosphate (TCP);
- (i) Phthalates (generally, including phthalates esters):
 - (i) Di-isononyl phthalate (DINP);
 - (ii) Di-isodecyl phthalate (DIDP);
 - (iii) Bis(2-ethylhexyl) phthalate (DOP aka DEHP);
 - (iv) Butyl benzyl phthalate (BBP);
 - (v) Di-isoundecyl phthalate (DIUP);
- (j) Tri-octyl trimellitate (TOTM);
- (k) Zinc borate.

Alternative materials and techniques

8. Material substitution with other elastic polymers such as polyethylene, polypropylene, rubber, ethylene vinyl acetate (EVA) have been identified as alternative materials that can replace the use of SCCPs in PVC applications.

3. Rubber and plastics (other than polyvinyl chloride)

9. Flame retardants are used in a variety of rubber products including natural rubber, styrene and butadiene rubber, polybutadiene rubber, acrylonitrile and butadiene rubber, butadiene or isoprene rubber and ethylene propylene diene monomer-elastomer. In applications where a non-flammable plasticizer is needed, phosphate esters are viable alternatives to SCCPs. Chemical alternatives to SCCPs are available for use in conveyor belts and include MCCPs and LCCPs.

Alternative substances

10. The following substances have been identified as possible replacement for SCCPs in rubber products:

- (a) Medium-chain chlorinated paraffins (C₁₄₋₁₇) (MCCPs);
- (b) Long-chain chlorinated paraffins (C₁₈₊) (LCCPs);
- (c) Acrylic polymers;
- (d) Aluminum trihydroxide, used in conjunction with antimony trioxide (ATH);
- (e) Antimony trioxide (or Antimony oxide);
- (f) Other organophosphorus flame retardants (in general):
 - (i) Cresyl diphenyl phosphate (CDP);
 - (ii) Tertbutylphenyl diphenyl phosphate (TBDPDP);
 - (iii) Isopropylphenyl diphenyl phosphate (IPPDPP);
- (g) Phosphorus based compounds (in general):
 - (i) Tricresyl phosphate (TCP);
- (h) Phthalates (generally, including phthalates esters):
 - (i) Di-isononyl phthalate (DINP);
 - (ii) Di-isodecyl phthalate (DIDP);
 - (iii) Bis(2-ethylhexyl) phthalate (DOP aka DEHP);
 - (iv) Butyl benzyl phthalate (BBP);
 - (v) Di-isoundecyl phthalate (DIUP);
- (i) Zinc borate.

Alternative materials and techniques

11. SCCPs have been used in mono-ply (solid woven) conveyor belts, also referred to as PVG solid woven conveyor belts, where a textile core is impregnated with PVC and is then covered with a rubber cover. Flame

retardancy can be achieved through the use of alternate techniques, such as using inherently flame-resistant materials, flammability barriers and product re-design. Alternative conveyor types that do not contain SCCPs, such as PVC solid woven and chloroprene (CR) multi-ply, are available.

4. Sealants and adhesives

12. SCCPs are used as plasticizers and in some cases as flame retardants in polysulfide and polyurethane formulations, and in acrylic and butyl sealants. In dam sealants SCCPs act as a plasticizer and can be replaced with high molecular weight plasticizers which are less prone to leakage from the cured polymer. The use of SCCPs in sealants seems to be similar to how PCBs were used as plasticizer in polysulfide-based sealants.¹⁴

Alternatives substances

13. The following substances have been identified as possible replacement for SCCPs used in sealants and adhesives:

- (a) Medium-chain chlorinated paraffins (C₁₄₋₁₇) (MCCPs);
- (b) Long-chain chlorinated paraffins (C₁₈₊) (LCCPs);
- (c) Phosphate esters;
- (d) Phthalates (generally, including phthalates esters):
 - (i) Di-isononyl phthalate (DINP);
 - (ii) Di-isodecyl phthalate (DIDP);
 - (iii) Bis(2-ethylhexyl) phthalate (DOP aka DEHP);
 - (iv) Butyl benzyl phthalate (BBP);
 - (v) Di-isoundecyl phthalate (DIUP);
- (e) Polyacrylate esters.

Alternative materials and techniques

14. Urethane or silicone sealants, which do not contain SCCPs, can be used to replace polysulfide sealants.

5. Paints and coatings

15. SCCPs are used in chlor-rubber and acrylic protective coatings and in intumescent paints. Typical applications include road marking paints, anti-corrosive coatings for metal surfaces, swimming pool coatings, decorative paints for internal and external surfaces, and primers for polysulfide expansion joint sealants. In coatings and paints, MCCPs and LCCPs are identified as potential alternatives to SCCPs. Alternate plasticizers include phthalate esters, polyacrylic esters and diisobutyrate and alternate flame retardants include phosphate and boron containing compounds.

Alternatives substances

16. The following substances have been identified as possible replacement for SCCPs used in paints and coatings:

- (a) Medium-chain chlorinated paraffins (C₁₄₋₁₇) (MCCPs);
- (b) Long-chain chlorinated paraffins (C₁₈₊) (LCCPs);
- (c) Boron- and silicon-based compounds (e.g., phosphorous-boron-nitrogen compounds);
- (d) Diisobutyrate compounds;
- (e) Other organophosphorus flame retardants;
- (f) Phosphate esters;
- (g) Phosphorus based compounds;
- (h) Phthalates (generally, including phthalates esters):
 - (i) Butyl benzyl phthalate (BBP);

¹⁴ Persson NJ, Pettersen H, Ishaq R, Axelman J, Bandh C, Broman D, Zebühr Y, Hammar T (2005). Polychlorinated biphenyls in polysulfide sealants - occurrence and emission from a landfill station. *Environmental Pollution* 138, 18-27.

- (ii) Di-isoundecyl phthalate (DIUP);
- (i) Polyacrylate esters.

Alternative materials and techniques

17. Replacing paints requiring plasticizers with epoxy-based paints eliminates the need for SCCPs. For road marking paints, thermoplastic products (which do not contain SCCPs) rather than paint products can be used since they provide improved durability.

6. Textile applications

18. SCCPs have been used as a flame retardant and in one niche application to provide a flame-retardant, waterproof and rot-proof finish to heavy textiles, such as military tents. Replacing SCCPs with other flame retardants or through the use of less flammable or flame-resistant materials are alternatives to the use of SCCPs in textiles.

19. Antimony trioxide, in combination with halogenated flame retardants, can be used on textiles such as wool, cotton, polyester, polyamide fibres and blends (upholstery fabrics and roof insulating fabric). Brominated flame retardants may be used with antimony trioxide on polyester and cellulosic fibers, modacrylic fibers, non-wovens for drapery, upholstery and textile coatings. Organophosphorus compounds, such as tris(isopropylphenyl) phosphate, are suitable for cellulosic, nylon and polyester fibers (upholstery fabric, garments, flexible ducting). Many alternatives to SCCPs in textile applications are POPs or exhibit POPs characteristics, although the POPRC has not assessed whether the alternatives meet the Convention's Annex D screening criteria.

Alternative substances

20. The following substances have been identified as possible replacement for SCCPs used in textiles:
- (a) Medium-chain chlorinated paraffins (C₁₄₋₁₇) (MCCPs);
 - (b) Long-chain chlorinated paraffins (C₁₈₊) (LCCPs);
 - (c) Acrylic polymers;
 - (d) Aluminum trihydroxide, used in conjunction with antimony trioxide (ATH);
 - (e) Antimony trioxide (or Antimony oxide);
 - (f) Bis (tribromophenoxy) ethane;
 - (g) Decabromodiphenyl ether (c-decaBDE) (halogenated flame retardant), used in conjunction with antimony trioxide;
 - (h) Dibromostyrene;
 - (i) Ethane, 1,2-bis(pentabromophenyl) (EBP), used in conjunction with antimony trioxide; Ethylenebistetra-bromophthalimide;
 - (j) Hexabromocyclododecane (HBCD) (halogenated flame retardant) in combination with antimony trioxide;
 - (k) Hexachlorocyclodecane;
 - (l) Other organophosphorus flame retardants;
 - (m) Phosphate esters;
 - (n) Phosphorus based compounds;
 - (o) Phthalates (generally, including phthalates esters):
 - (i) Tetrabromophthalate ester (TBPH);
 - (ii) Tetrabromophthalate diol;
 - (iii) Tetrabromophthalic anhydride;
 - (p) Tribromophenyl allyl ether.

Alternative materials and techniques

21. Replacement of flame retarded textiles with less flammable fabrics (such as wool, modacrylics and aramide) or leather, or replacing flame retarded materials with inherently flame-resistant materials (for example, by designing polymer backbones with very high heat and flame resistance or by using metal) are alternative materials and techniques to the use of SCCPs in textiles.

7. Leather applications

Alternative substances

22. The following substances have been identified as possible replacement for SCCPs used in leather applications:

- (a) Long-chain chlorinated paraffins (C₁₈₊) (LCCPs);
- (b) Silicon oils;
- (c) Animal and/or vegetable oils and/or mineral oil.

Alternative materials and techniques

23. The use of SCCPs in the leather industry has been replaced by natural animal and vegetable oils. Potential alternatives include nitroalkanes, alkyl phosphate and sulfonated fatty acid esters.

8. Flame retardants

Alternative substances

24. The following substances have been identified as possible replacement for SCCPs used in flame retardants:

- (a) Medium-chain chlorinated paraffins (C₁₄₋₁₇) (MCCPs);
- (b) Long-chain chlorinated paraffins (C₁₈₊) (LCCPs);
- (c) Acrylic polymers;
- (d) Alumina trihydrate;
- (e) Aluminum trihydroxide, used in conjunction with antimony trioxide (ATH);
- (f) Aluminum trioxide;
- (g) Antimony trioxide (or Antimony oxide);
- (h) Bis (tribromophenoxy) ethane;
- (i) Decabromodiphenyl ether (c-decaBDE) (halogenated flame retardant), used in conjunction with antimony trioxide;
- (j) Dibromostyrene;
- (k) Ethane, 1,2-bis(pentabromophenyl) (EBP), used in conjunction with antimony trioxide;
- (l) Ethylenebistetra-bromophthalimide;
- (m) Hexabromocyclododecane (HBCD) (halogenated flame retardant) in combination with antimony trioxide;
- (n) Hexachlorocyclodecane;
- (o) Other organophosphorus flame retardants;
- (p) Phosphate esters;
- (q) Phosphorus based compounds;
- (r) Phthalates (generally, including phthalates esters):
 - (i) Tetrabromophthalate ester (TBPH);
 - (ii) Tetrabromophthalate diol;
 - (iii) Tetrabromophthalic anhydride;
- (s) Tribromophenyl allyl ether;
- (t) Tri-octyl trimellitate (TOTM);
- (u) Zinc borate (in PVC).

Alternative materials and techniques

25. Redesign of products to use inherently flame-resistant materials (for example, by designing polymer backbones with very high heat and flame resistance or by using metal) or substituting flammable materials with mineral products (for example, magnesium oxide).