SUBSPORT Specific Substances Alternatives Assessment – Chloroalkanes

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1. Hazard profile of alkanes, C10-13, chloro

Short Chained Chlorinated Paraffins - in this document called SCCP - have been selected as one of the 10 specific substances or substance groups that are described detailed on SUBSPORT. The reason for this is:

- SCCP is a prioritised substance group of very high concern (SVHC) that is included in Annex XIV of the REACH regulation (8). Documentation for chemical hazards can be seen in (12)
- SCCP is identified as a high priority hazardous substance according to ROHS directive (6).
- SCCP is included in the Annex X on priority substances in the water framework directive (7)

Characterising SCCP based on the inherent hazards is an essential component of conducting an alternatives assessment. The hazard properties are intrinsic to the chemical, which means that regardless of the way that a chemical is used, these characteristics do not change (Table 1 and 2). The goal of the substitution processes is to advance inherently safer chemicals and products.

Table 1: Names and function of alkanes, C10-13, chloro

Alkanes, C10-13, chloro	
Chemical name (IUPAC)	Alkanes, C10-13, chloro
Identification number	CAS 85535-84-8 EC 287-476-5
Trivial names	Chloroalkanes, Short-chained chlorinated paraffins, SCCP, Polychlorinated alkanes, Chlorinated paraffins C10-13, Chlorparaffin, Cloparin, Cloparol, Hordaflam, Hordaflex, Hordalub, Hostaflam, Cerechlor
Substance function	Lubricant,extreme pressure additive, fat liquering agent, flame retardant, plasticizer, binder, water proofing
Classification	Harmonised classification according to Regulation (EC) No 1272/2008 Annex VI Table 3.1: Carc. 2 Aquatic Acute 1 Aquatic Chronic 1 H351 Suspected of causing cancer. H400 Very toxic to aquatic life. H410 Very toxic to aquatic life with long lasting effects. Harmonised classification according to Regulation (EC) No 1272/2008 Annex VI Table 3.2: Carc. Cat. 3; R40 Limited evidence of a carcinogenic effect. R66 Repeated exposure may cause skin dryness or cracking. N; R50-53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Table 2: Hazard characteristics of alkanes, C10-13, chloro

	Properties	Source of information
Physical Hazards		
Explosivity	conclusive but not sufficient for classification	ECHA registred substances, data dossier alkanes C10-13, chloro (17)
Flammability	no Self ignition temperature is > 200 degrees C. Decomposes with release of hydrogen chloride.	ECHA registred substances, data dossier alkanes C10-13, chloro (17)
Oxidizing	conclusive but not sufficient for classification	ECHA registred substances, data dossier alkanes C10-13, chloro (17)
Other properties of reactivity	no	
Human Health Hazards		
Acute toxicity		
Acute toxicity	the acute toxicity by inhalation and dermal routes appears to be low	CLP, List of harmonised classification and labelling of hazardous substances WHO (32)
Skin or eye corrosion / irritation	Can induce minimal irritancy in the skin, but not sensitization.	WHO (32) ECHA registred substances, data dossier alkanes C10-13, chloro (17)
Chronic toxicity		
Carcinogenicity	H351 Suspected of causing cancer Carc. 2 Carc. Cat 3	CLP, List of harmonised classification and labelling of hazardous substances ESIS, Annex I to Directive 67/548/EEC
Mutagenicity	No mutagenicity shown in test on mammalian cells, Ames test,	ECHA registered substances, data dossier Alkanes, C10-13, chloro (17). Handbook of Environmental Chemistry (31)
Reproductive toxicity (including developmental toxicity)	Inconclusive. In rats adactyly and/or shortened digits seen at doses toxic to the mother. In rabbits development toxicity seen at dosis not toxic to the mother.	ECHA registered substances, data dossier Alkanes, C10-13, chloro (17). Handbook of Environmental Chemistry (31)
Endocrine disruption	Endocrine disruptor Cat 1	Subsport Database on Hazardous Chemicals (SDSC) (18)
Respiratory or skin sensitization	Not significant.	ECHA registered substances, data dossier Alkanes, C10-13, chloro (17).
Neurotoxicity	Inconclusive, lack of data.	ECHA registered substances, data dossier Alkanes, C10-13, chloro (17).

	Properties	Source of information
Immune system toxicity	Inconclusive, lack of data.	ECHA registered substances, data dossier Alkanes, C10-13, chloro (17).
Systemic Toxicity	Liver Kidney Thyroid Oral	ECHA registered substances, data dossier Alkanes, C10-13, chloro (17). Canadian Environmental Protection Act, Priority Substance List.
Toxic metabolites	Inconclusive, lack of data	ECHA registered substances, data dossier Alkanes, C10-13, chloro (17).
Environmental Hazards		
Acute/chronic aquatic toxicity	N Dangerous to the environment H400 Very toxic to aquatic life H410 Very toxic to aquatic life with long lasting effects Included in the Annex X on priority substances in the water frame directive SCCP is included in the list of priority substances of the EU Water Framework Directive (23) SCCP is included in the list of substances for priority action of the Convention for the Protection of the Marine Environment of the North-East Atlantic (25)	CLP, List of harmonised classification and labelling of hazardous substances ECHA registered substances, data dossier Alkanes, C10-13, chloro.
Bioaccumulation	Very bioaccumulating The substance is identified as a PBT substance according to Article 57 (d) of Regulation (EC) No 1907/2006 (REACH). SCCP meets all of the UNECE POPs criteria (persistent, bioaccumulative, toxic, and subject to long-range transport) SCCP is on the Canadian Environmental Protection Act, Priority Substance List.	Annex VIII. Support document for identification of alkanes, C10-13, chloro as a substance of very high concern (12)
Persistence	Very persistent The substance is identified as a vPvB substance according to Article 57 (e) of Regulation (EC) No 1907/2006 (REACH). SCCP is under consideration for inclusion in the Stockholm Convention of Persistent Organic Pollutants (24)	Annex VIII. Support document for identification of alkanes, C10-13, chloro as a substance of very high concern (12)
Greenhouse gas formation potential	Not on Annex A	Kyoto Protocol (19)
Ozone-depletion potential	Not on Ozone depleting Substance List	Montreal Protocol (20)
Monitoring – has the substance been found in human or environmental samples?	Yes	Canadian Environmental Protection Act, Priority Substance List.

2. Identification of functions and uses

2.1 SCCP uses

A key first step in identifying appropriate alternatives is to determine the functions, uses and processes associated with SCCP, as potential feasible and safer alternatives often differ from application to application.

Earlier (up to 1990) SCCP has been used as an alternative to polychlorinated biphenyles PCB (2) and therefore is present in sealants in existing buildings.

In the last two decades SCCP has been subject to national and international regulation due to the inherent hazards to humans and environment. Due to this, there has been a significant decrease in the use of SCCP and the use pattern has changed.

Table 3: Use of SCCP in Europe (according to Helcom (22))

	1994		1998	
	tonnes/anno	percentage	tonnes / anno	percentage
Metal working lubricants	9380	71,02	2018	49,5
Paints adhesives and sealants	1845	13,97	713	17,5
Rubber/flame retardants, textile/polymers (other than PVC)	1493	11,31	638	15,7
Leather fat liquors	390	2,95	45	1,1
PVC platiscizers	-		-	
Other	100	0,75	648	15,9
Total	**13208**		**4075**	

Furthermore there has been a big decrease in the use of SCCP in Europa sice 1998. The use in 2004 is estimated to 600 tonnes/year (1).

In the Nordic database on use of substances - SPIN (5) - more information on the recent use, number of products and tonnage for different applications can be found. According to SPIN the use of SCCP in Sweden in 2010 was 6 tonnes – more than a 10-fold reduction from 72 tonnes in 1999. The main use was in the construction industry with 5 products. In total 10 products were registered in Sweden in 2010 against 50 in 1999. Also according to SPIN the use of SCCP in Denmark in 2010 was 5,1 tonnes - a reduction from 23,5 tonnes in 2000. The main uses in 2010 were paints, laquers and varnishes with 4 products. In total 18 products were registered in Denmark in 2010. In 2000 29 products were registered in Denmark.

The reasons to this reduction is multiple and started in some countries already in the middle of the 1980s.

In (22) a survey in different European countries was performed that might explain the reason for these reductions.

In Denmark the start of the reduction was considered to be due to a voluntary agreement of the Danish EPA and the PVC industry in 1991. Discharging licenses had to be granted. Another source of

reduction was the reduction of use of SCCP containing metal cutting fluids in the main metal-processing industries (22).

In Finland the used amount of SCCP decreased about 97 % between 1988 (840 t) and 1997 (27 t) due to breakdown of uses in paper-, paint-, metal-, textile- and rubber industries (22).

In Germany substitution of SCCP started in the middle of the 1980s triggered by pro-active companies, disposal costs and various regulatory instruments. In 1985, 95 % and in 1999, 99 % of metal working fluids did not contain SCCP (22).

In Sweden the use of SCCP has been reduced by 90 % between 1990 and 1998, mainly due to a reduction in the use of metal working fluids and paints (22).

Directive 2002/45/EC (4) restricted from January 2004 placing on the market preparations with more than 1% SCCP in metal working fluids and fat liquoring of leather.

This development has changed the main use of SCCP from metal cutting fluids to other functions. Current data indicates that the main use in Europe now is as a flame retardant in rubber products (1).

According to the chlorine industry SCCP is substituted –primarily with medium chained and long chained chloroalkanes – wherever possible. The industry also informs that the main use of SCCP is in rubber/plastic products and sealants (1).

There has been a joint submission of a registration dossier for REACH on SCCP (Cerechlor) in the tonnage band 1,000-10,000 tonnes. The identified uses in this dossier are: Manufacture of SCCP, flame retardant in rubber formulations, plasticiser in sealing compounds (17).

ECHA estimates the main release of SCCP in Europe in 2004 to come from service life articles (rubber goods, sealants, textiles and articles painted with paints and coatings) and as an impurity in medium-chained chlorinated paraffins (3).

Haz-Map (21) describes that SCCP is used in high-pressure lubricants, flame retardants in plastics and textiles, and plasticizers in plastics, paints, rubber, adhesives, and sealants and also used in detergents.

Table 4: Use of SCCP in descending order according to amount

Sector	Function	Product, article	Source of information
Manufacture of rubber and articles from rubber and plastic	Flame retardant in rubber	Primarely in high density conveyor belts used in the mining industry. Used in a higher percentage in PVC conveyor-belts, but SCCP is not used in PVC in EU. Technical products such as gaskets and hoses	(2)

Sector	Function	Product, article	Source of information
Building and construction	Fire retardant and/or plasticiser.	Primarily used in sealants based on polysulphide, polyurethane and butylrubber. SCCP is not used in silicone sealants	(3)(10)
	SCCP as a fire-retardant and/or plasticizer	Double- and triple-glazed windows	
Paints	Plasticizer. SCCP Improves water resistance, chemical resistance, non-flammability	Paints Primarily in marine primer paints Fire retardant paints Paints for road marking	
Textiles	Flame retardant and water proofing in backcoating	Textiles	
Metal industry	High pressure additive in metal working fluids	For technical reasons, SCCP is most probably not used beneath the legal 1% limit. Therefore the amount used is minimal.	(4)
Leather	Leather fat liquoring	For technical reasons, SCCP is most probably not used beneath the legal 1% limit. Therefore the amount used is minimal.	(4)

2.2 Prioritizing uses

As described in the previous chapter SCCP has three basic uses in Europe:

- as a flame retardant in gaskets and hoses of rubber and plastic (not PVC)
- as a flame retardant and plasticizer in sealents used in the construction and building industry
- in paints, especially flame retarding paints and water- and chemical resistant paints

2.3 Exposure to SCCP

Releases of SCCP to the environment may occur during production, storage, transportation, industrial and consumer usage of SCCP containing products, disposal and burning of SCCP containing waste.

SCCP has been detected in environmental matrices in the industrialized parts of the world, as well as in the Arctic (23). As an example SCCP were measured in human breast milk from Inuit women living in communities on Hudson Strait in Northern Quebec. (22)

Also in a Ph.D. thesis (23) from 2010 from the University of Stockholm the occurence of chloroparaffins are studied in the indoor air and dust as well as outdoor in Stockholm and a rural area. The study showed that the content of chloroparaffins was higher indoor than outdoor, an indication of emission of chloroparaffins from indoor sources. An analysis of the substance flow showed that the main sources were painted surfaces and sealants. Comparison of the estimates of

the resulted exposure to the estimates of dietary intake indicates that the indoor exposure pathways are not negligible.

Furthermore the outdoor concentration in Stockholm was higher than in rural areas, indicating more sources of chloroparaffins in urban areas. The thesis supports the picture of chloroparaffins being a pollutant in very high concentrations compared to other persistent organic pollutants (23).

The major occupational exposure as described in the Haz-Map database (21) is the work with extreme paints (f.x. water repellent, fire retardant), manufacturing of composites, fiber and fabric manufacturing and working with glues and adhesives.

2.4 Conclusion

In view of the above described main uses of and possible exposure to SCCP, this SUBSPORT review of alternatives will focus on alternatives to SCCP as flame retandants in rubber and plastic products (apart from PVC) and in sealants.

3. Preliminary identification of alternatives

ECHA concludes in (1) that there appears to be information available on alternative substances to SCCPs for many uses. Furthermore the available information indicates substitution of SCCPs is already ongoing for some of these uses.

Table 5: Alternatives identified for all main uses of SCCP

Use	Identified Alternatives
Flame retardant in the manufacturing of rubber and articles from rubber	Medium chained chlorinated paraffines (3) Longchained chlorinated paraffines (3)(22) Antimony trioxide (22) Aluminium hydroxide (22) Acrylic polymers (22) (Phosphate containing compounds – maybe only PVC (3)) (22): Cresyl diphenyl phosphate (CDP)(3) Tertbutylphenyl diphenyl phosphate (TBPDPP)(3) Isopropylphenyl diphenyl phosphate (IPPDPP)(3)
PVC flame retardant	Medium chained chlorinated paraffines (3) Long-chain chlorinated paraffines (3)(22) Antimony trioxide (22) Aluminium hydroxide (22) Acrylic polymers (22) Phosphate containing compounds (22) Cresyl diphenyl phosphate (CDP)(3) Tertbutylphenyl diphenyl phosphate (TBPDPP)(3) Isopropylphenyl diphenyl phosphate (IPPDPP)(3)
Sealants flame retardants	Medium chain chlorinated paraffins (3)(22) Long-chain chlorinated paraffins (3)(22)
Sealants - plasticizers	Phthalate esters (3): (bis(2-ethylhexyl) phthalate (DEHP) (diisononyl phthalate), DINP (diisodecyl phthalate) DIDP)
Dam sealants	Hard to find alternatives, but maybe medium-chained and long-chained. Use has been reduced indicating that alternatives exists (3)

Use	Identified Alternatives
Paints plasticisers	Medium chained chlorinated paraffins (22)(3), Long chained chlorinated paraffins (22) (3), phthalate esters (22) polyacrylate esters (22) diisobutyrate (22) phosphate and boron-containing compounds (22) (the latter presumably where flame-retardancy of the final paint is important). The technical and economic feasibility of some of these suggested alternatives is unclear (3) Epoxy-based paints
Textiles Flame retardant, water proofing	Medium chained chlorinated paraffins (3) Long-chain chlorinated paraffins (3) Hexachlorocyclodecane (3) Decabromodiphenyl ether (3) Ethane, 1,2-bis(pentabromophenyl) (EBP) (3) Hexabromocyclododecane (HBCDD) (3) Ethylenebistetrabromophthalimide (3) Tetrabromophthalate ester (3) Bis (tribromophenoxy) ethane (3) Tribromophenyl allyl ether (3) Dibromostyrene (3) Tetrabromophthalate diol (3) Tetrabromophthalic anhydride (3) Phosphat containing compounds(3)(22) Antimon trioxide (3)(22) Aluminium hydroxide (22) Acrylic polymers (22)

4. Screening out regrettable substitutes

The purpose of this chapter is to eliminate any alternatives that would pose a high risk to the environment or human health. SUBSPORT developed a database (SDSC) containing substances that are not acceptable as alternative due to their hazards. The alternatives are all screened against this database. It can be found as part of the SUBSPORTdatabase by following this link: http://www.subsport.eu/case-stories-database. If a substance meets any of the SUBSPORT screening criteria, it is removed from further consideration as an appropriate alternative, unless the author (SUBSPORT) regards the alternative safer than the original substance. In the following table the column "SDSC" states if the substance is on the SDSC. Yes in this column means that the substance is not considered as a possible alternative. In the column "Hazardous properties" the effects are mentioned with the same way, as in the source.

4.1 Screening of alternatives

Table 6: Screening of alternatives to SCCPs. Overview of primary hazards and information sources

Chemical alternative	CAS	SDSC	Hazardous properties	source
MCCPs	85535-84-9	no	Reproductive effects Liver and Kidney effects Environmental persistence	BRE 2008 (3)

Chemical alternative	CAS	SDSC	Hazardous properties	source
LCCPs, Cn≥18	85535-86-0	no	Possible reproductive effects Possible carcinogenic effects Environmental persistence	BRE 2008 (3)
LCCPs, C18-32	63449-39-8	yes	PBT Endocrine disruptor Possible reproductive effects Possible carcinogenic effects Environmental persistence	OSPAR Sin List BRE 2008 (3)
Cresyl diphenyl phosphate / CDP	26444-49-5	no	Reproductive effects Liver toxicity Kidney toxicity Blood toxicity Possible aquatic effects Acute toxicity, Category 4, oral; H302 Acute toxicity, Category 4, inhalation; H332 Possible neurological effect	BRE 2008 (3) GESTIS (29) TOXNET (28)
Isopropylphenyl diphenyl phosphate / IPPDPP	28108-99-8	no	General low toxicity in all categories	BRE 2008 (3) TOXNET (28)
tert-Bytulphenyl diphenyl phosphate / TBPDPP	56803-37-3 68937-40-6	no no	Possible liver toxicity Possible kidney toxicity Possible adrenal toxicity General low toxicity	BRE 2008 (3)
DEHP (bis(2-ethylhexyl) phthalate)	117-81-7	yes	Repr 1B Carcinogen 2B Category 1B; H360FD	CLP IARC ECHA
DINP (diisononyl phthalate)	68515-48-0 28553-12-0	yes yes	Endocrine disruptor Reproductive effects Carcinogenic effects	Sin List BRE 2008 (3) ESIS TOXNET (28)
DIDP (diisodecyl phthalate)	68515-49-1 26761-40-0	no yes	Possible reproductive effects Possible carcinogenic effects Endocrine disruptor cat 2	BRE 2008 (3) ESIS TOXNET (28) Endocrine disruptor Database
Antimony trioxide	1309-64-4	yes	Carcinogen group 2B Carcinogenicity, Category 2; H351 Toxic and reproductive effects	IARC ECHA TOXNET (28)
Aluminium hydroxide	21645-51-2	no	Non toxic	TOXNET (28) GESTIS (29)

Chemical alternative	CAS	SDSC	Hazardous properties	source
Acrylic polymers	Substance group	only specific substance can be evaluated-	Diverse group; only specific substance can be evaluated	-
Polyacrylate esters	Substance group	- only specific substance can be evaluated	Diverse group; only specific substance can be evaluated	-
Diisobutyrate compounds	Substance group	- only specific substance can be evaluated	Diverse group; only specific substance can be evaluated	

Using the above information(Table 6), the following alternatives to SCCPas a flameretardant in rubber and plastics are screened out as regrettable substitutes:

- LCCPs, C_{18-32}
- DEHP (bis(2-ethylhexyl) phthalate**)**
- DINP (diisononyl phthalate)
- DIDP (diisodecyl phthalate) with CAS 26761-40-0
- Antimony trioxide

5. Characterizing alternatives

Organophosphates: CDP, IPPDPP and TBPDPP**.**

Organophosphates are a diverse group with various toxicological profiles. In their pure form they are considered hazardous, but depending on the formula of the end products, the toxicological profile might be diverging significantly. Of the three presented alternatives, IPPDPP shows the lowest toxicological effect in trials according to (3) (28) and hence is regarded as a feasible alternative.

Inorganic salts

A number of inorganic salts have been evaluated for flame retardant properties. Antimony trioxide is classified as a carcinogen and listed in the substance database according to SUBSPORT screening criteria (SDSC) and is thus not an alternative for further consideration. Aluminium hydroxide is not assessed as being toxic, and can thus be considered an alternative to SCCPs as a flame retardant.

Polyacrylate esters, acrylate polymers and iisobutyrates

Diverse groups of compounds that cannot be readily evaluated without access to more specific product information.

For further characterization of alternatives isopropylphenyl diphenyl phosphate / IPPDPP and aluminium hydroxide is chosen on background of the information in the above table 6.

5.1 Hazard characteristics of alternatives

Table 7. Hazards of isopropylphenyl diphenyl phosphate IPPDPP

Isopropyl diphenyl phosphate	Properties	Source of information
Physical Hazards		
Explosivity	no data avaliable	-
Flammability	no data avaliable	-
Oxidizing	no data avaliable	-

Isopropyl diphenyl phosphate	Properties	Source of information
Other properties of reactivity	might be combustible	Chemical Book
Human Health Hazards		
Acute toxicity		
Highly toxic	no	TOXNET (28) BRE 2008 (3)
Skin or eye corrosion / irritation	Indication of non-irritation	BRE 2008 (3)
Carcinogenicity	No information	BRE 2008 (3)
Mutagenicity	no	BRE 2008 (3)
Reproductive toxicity (including developmental toxicity)	No information	BRE2008 (3)
Endocrine disruption	-	-
Respiratory or skin sensitization	Indication of non-sensitising	BRE2008 (3)
Neurotoxicity	no	TOXNET (28)
Immune system toxicity	no data avaliable	-
Systemic Toxicity	no data avaliable	-
Toxic metabolites	no data avaliable	-
Environmental aspects		
Acute/chronic aquatic toxicity	yes	BRE 2008 (3)
Bioaccumulation	Readily biodegradable	BRE 2008 (3)
Persistence	no	TOXNET (28)
Greenhouse gas formation potential	no data avaliable	-
Ozone-depletion potential	no data avaliable	-
Monitoring – has the substance been found in human or environmental samples?	no data avaliable	-

Table 8. Hazards of aluminium hydroxide

Aluminium hydroxide	Properties	Source of information
Physical Hazards		
Explosivity	no	GESTIS (29)
Flammability	no	GESTIS (29)
Oxidizing	no	GESTIS (29)
Other properties of reactivity	no	GESTIS (29)
Human Health Hazards		
Acute toxicity		
Highly toxic	no	GESTIS (29)
Skin or eye corrosion / irritation	yes – on direct contact	GESTIS (29)
Carcinogenicity	no	GESTIS (29)
Mutagenicity	no	GESTIS (29)
Reproductive toxicity (including developmental toxicity)	no	GESTIS (29)
Endocrine disruption	no	GESTIS (29)
Respiratory or skin sensitization	no	GESTIS (29)
Neurotoxicity	no	GESTIS (29)
Immune system toxicity	no	GESTIS (29)
Systemic Toxicity	no	GESTIS (29)

Aluminium hydroxide	Properties	Source of information
Toxic metabolites	no	GESTIS (29)
Environmental aspects		
Acute/chronic aquatic toxicity	no – practically insoluble	GESTIS (29)
Bioaccumulation	Readily biodegradable	BRE 2008 (3)
Persistence	No	BRE 2008 (3)
Greenhouse gas formation potential	-	not relevant
Ozone-depletion potential	-	not relevant
Monitoring – has the substance been found in human or environmental samples?	-	

6. Comparing alternatives

Table 9. Comparing IPPDPP and aluminium hydroxide

	Isopropylphenyl diphenyl phosphate IPPDPP	Aluminium hydroxide
Health aspects	PROS: Well-investigated and tested. CONS: Harmful if swallowed, Can cause eye irritation	PROS: Well-investigated and tested. CONS: Can be a skin irritant at dirct contact because of alkaline properties
Environmental aspect	PROS: Not identified as a PBT substance. Acute aquatic toxicity, but readily biodegradable	PROS: Practically insoluble in water Occurs naturally and are relatively easily degraded to carbon dioxide and water
Performance aspects	PROS: Technically viable alternative. Commercially avaliable CONS: Probably mostly used in PVC.	PROS: Technically viable alternative in electrical equipment Commercially avaliable CONS: Only comparable to SCCP in specific cases. Can be used as flame retardant in rubber, as long as high plasticity of the product is not vital
Cost aspects	PROS: - CONS: Significantly higher substance cost than SCCP	PROS: Aluminium hydroxide is a low cost substance

7. Summary and conclusion

The use of short chained chloro paraffins SCCP has been reduced markedly during the last 2 decades. The main use now is as a flame retardant in rubber and plastics except PVC. This reports researches possible alternatives to SCCP for this use. Some of the possible alternatives have regrettable effects

concerning health aspects and environmental risc. 2 alternatives namely isopropylphenyl diphenyl phosphate IPPDPP and aluminium hydroxide have been further assessed in this report.

Isopropylphenyl diphenyl phosphate IPPDPP
The substance is an available alternative. It has a significant higher cost, but do not represent the same concern for occupational health and environment as SCCP.

Aluminium hydroxide
This substance can primarily be used as an alternative for SCCP in electrical equipment. It is practically insoluble in water and therefore it does not present a concern for the environment. It is not suspected to have any effects concerning occupational health except for irritation of eyes and skin because of the alkaline reaction. It is not suspected to have any long term effects on health. Aluminium is commercial available and is a low cost alternative to SCCP for this specific application.

8. References

1 European Chemicals Agency. Prioritisation and annex XIV background information. January 2009. Available at http://echa.europa.eu/documents/10162/13640/prioritisation_alkanes_chloro_en.pdf

2 Persistant Organic Pollutants review Committee, Updated supporting document for the risk profile on short-chained chlorinated paraffins, September 2008.

3 Data on Manufacture, Import, Export, Uses and Releases of Alkanes, C10-13, Chloro (SCCPS) as well as Information on Potential Alternatives to its Use. BRE 2008, Prepared for ECHA. Available at http://echa.europa.eu/documents/10162/13640/tech_rep_alkanes_chloro_en.pdf

4 Directive 2002/45/EC relating to restrictions on the marketing and use of certain dangerous substances and preparations (short-chained chlorinated paraffins). June 2002

5 Data from SPIN – Substances in Preparations in Nordic Countries. Accessible from http://90.184.2.100/DotNetNuke/default.aspx

6 Restriction of the use of certain hazardous substances in electrical and electronic equipment RoHS – Directive 2002/95/EC of the European Parliament and of the Council 27 January 2003. Available at http://ec.europa.eu/environment/waste/rohs_eee/legis_en.htm

7 Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy. Available at http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2000:327:0001:0072:EN:PDF

8 Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), ANNEX XIV , List of Substances subject to Authorisation.

9 Back, J., Olsen, S.I., Andersen, S.H. Klorparaffiner i Danmark. Miljøprojekt nr. 248,Miljøministeriet, Miljøstyrelsen, 1994.

10 Skak, C., Rasmussen, J.O., Nilsson, M., Pedersen, M.M., Mathiesen, T. Mapping and development of alternatives to chlorinated lubricants in the metal industry (KLORPARAFRI). Environmental Project No. 1039, Danish Ministry of environment, Environmental Protection Agency, 2005. Available at http://www2.mst.dk/common/Udgivramme/Frame.asp?http://www2.mst.dk/Udgiv/publications/2005/87-7614-807-6/html/kap01_eng.htm

11 Gustafsson, L. Lägesbeskrivning för avveckling av bly, bromerade flamskyddsmedel, kvicksilver, nonylfenoletoxilater, klorparaffiner. Kemikalieinspektionen, 2001. Available at https://www.kemi.se/Documents/Publikationer/Trycksaker/PM/PM1_01.pdf

12 European Chemicals Agency. Member State Committee. Support document for identification of alkanes C10-13, chloro as a substance of very high concern. Adopted on 8 October 2008. Available at http://echa.europa.eu/doc/candidate_list/svhc_supdoc_alkanes_c10_13_chloro_publication.pdf

15 UK REACH Competent Authority, Annex XV, Proposal for identification of a substance as a CMR, PBT, vPvB or a substance of an equivalent level of concern. June 2008. Available at http://echa.europa.eu/documents/10162/13640/svhc_axvrep_uk_pbt_sccp_20083006_en.pdf

16 European Chemicals Agency, Background document for alkanes C10-13, chloro (SCCPs), June 2009. Available at http://echa.europa.eu/documents/10162/919d4d52-e565-4c83-9b3d-7615076967fa

17 European Chemicals Agency Data Dossier for alkanes C10-13, chloro. Available at http://apps.echa.europa.eu/registered/data/dossiers/DISS-9d970c25-ddc8-22ff-e044-00144f67d249/AGGR-49e8f998-88ae-4d20-bf44-4381d15cb415_DISS-9d970c25-ddc8-22ff-e044-00144f67d249.html#AGGR-49e8f998-88ae-4d20-bf44-4381d15cb415

18 Subsport screening criteria (SDSC). Available at http://www.subsport.eu/case-stories-database

19 *The Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC), Annex A. Available at http://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch2s2-3-4.html*

20 Montreal Protocol on Substances that Deplete the Ozone Layer. Available at http://scorecard.goodguide.com/chemical-groups/one-list.tcl?short_list_name=ods

21 Haz-Map®: Information on Hazardous Chemicals and Occupational Diseases. National Institute of Health, Specialized Information Services U.S.National Library of Medicine, December 2012. Available at www.hazmap.nlm.nih.gov

22 Implementing the HELCOM Objective with regard to Hazardous Substances. Guidance Document on Short Chained Chlorinated Paraffins (SCCP). Helsinki Comission, Baltic Marine Environment Protection Comission, June 2002. Available at http://www.helcom.fi/stc/files/environment/haz_subs/sccps.pdf

23 Fridén, U.E. Sources, emissions, and occurrence of chlorinated paraffins in Stockholm, Sweden. Doctoral Thesis in Applied Environmental Science, Stockholm University 2010. Available at http://www.itm.su.se/documents/publications/Ulrika_Friden_PhDthesis.pdf

24 Decisions POPRC-2/8: Short-chained chlorinated paraffins

25 (Ospar Commission, 2001) OSPAR, www.ospar.org,

26 The ad hoc working group on short-chained chlorinated paraffins. Stockholm Convention on Persistent Organic Pollutants Persistent Organic Pollutants Review Committee (POPRC). Draft Risk Profile For Short-Chained Chlorinated Paraffins. Draft prepared by:
May, 2007. Available at http://www.pops.int/documents/meetings/poprc/drprofile/drp/DraftRiskProfile_SCCP.pdf

27 Fiedler, H. Short-Chain Chlorinated Paraffins: Production,
Use and International Regulations in Handbook of Environmental Chemistry, Chlorinated Paraffins, Springer Berlin Heidelberg, 2010, pp 1-40.

http://www.zenobi.ethz.ch/Analytik_2012/Fiedler_CPs_HandbookEnvChem2010.pdf

28 TOXNET, www.toxnet.nlm.nih.gov, NLM (National Library of Medicine).

29 GESTIS – Stoffdatenbank. www.gestis-en.itrust.de, IFA (Institut fur Arbeitsschutz).

30 Evaluation of new scientific evidence concerning DINP and DIDP in relation to entry 52 of Annex XVII to Regulation (EC)No 1907/2006 (REACH). Draft review report, May 2012.

31 Chemical Book, www.chemicalbook.com

32 WHO(World Health Organization, International Programme on Chemical Safatey, Environmental Health Criteria 181, Chlorinated Paraffins. http://www.inchem.org/documents/ehc/ehc/ehc181.htm#SubSectionNumber:10.1.2

33 IARC, www.iarc.fr, Evaluation of human carcinogens.

34 Endocrine Active Substances Database, www.ihcp.jrc.ec.europa.eu/glossary/endocrine-disruptors , EC Institute for Health and Consumer Protection.

35 SIN LIST 2.0, www.chemsec.org.

36 Environment Agency UK, www.environment-agency.gov.uk .