OSPAR COMMISSION

Background Document on short chain chlorinated paraffins

Hazardous Substances Series

2009

OSPAR Convention

The Convention for the Protection of the Marine Environment of the North-East Atlantic (the “OSPAR Convention”) was opened for signature at the Ministerial Meeting of the former Oslo and Paris Commissions in Paris on 22 September 1992. The Convention entered into force on 25 March 1998. It has been ratified by Belgium, Denmark, Finland, France, Germany, Iceland, Ireland, Luxembourg, Netherlands, Norway, Portugal, Sweden, Switzerland and the United Kingdom and approved by the European Community and Spain.

Convention OSPAR

La Convention pour la protection du milieu marin de l'Atlantique du Nord-Est, dite Convention OSPAR, a été ouverte à la signature à la réunion ministérielle des anciennes Commissions d'Oslo et de Paris, à Paris le 22 septembre 1992. La Convention est entrée en vigueur le 25 mars 1998.
La Convention a été ratifiée par l'Allemagne, la Belgique, le Danemark, la Finlande, la France, l’Irlande, l’Islande, le Luxembourg, la Norvège, les Pays-Bas, le Portugal, le Royaume-Uni de Grande Bretagne et d’Irlande du Nord, la Suède et la Suisse et approuvée par la Communauté européenne et l’Espagne.

Acknowledgement

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Secretariat note: This Background Document was prepared by Sweden as lead country and first adopted in 2001. A monitoring strategy for lead was added in 2004 (annex 1). The document was updated in 2009.

Executive summary

Short-chain chlorinated paraffins (SCCPs) are n-paraffins that have a carbon chain length of between (and including) 10 and 13 carbon atoms and a degree of chlorination of more than 48% by weight. They are very persistent and not biodegradable. They adsorb strongly to sludge and sediments. They are therefore very likely to bioaccumulate. They are carcinogenic. The OSPAR Action Plan in 1992 gave priority to action on them, and they were therefore included in the List of Chemicals for Priority Action in 1998.

SCCPs are mainly used as metal-working fluids, with other major uses being in paints, coatings and sealants and as flame-retardants in rubber and textiles. The main sources of inputs to the sea are therefore production sites for SCCPs and products containing them and metal-, leather- and rubber-working-sites where they are used.

Releases of EU-produced SCCPs from EU sites to water in 1994 were estimated at 1784 tonnes a year, 95% of which was from metal-working sites. Substantial reductions in use have since been made. There are, however, no figures for releases from products or from imported SCCPs. Concentrations of SCCPs of 426 – 526 µg/kg have been found in Arctic marine mammals.

The existing OSPAR measure is PARCOM Decision 95/1, which required the phasing-out by the end of 1999 of the use of SCCPs as plasticisers in paints and coatings, as plasticisers in sealants, in metal-working fluids and as flame retardants in rubber, plastics and textiles, except for some uses in dams and mining where the end-date was the end of 2004. EC Directive 2002/45/EC bans the use in metal-working fluids, and leather finishing. SCCPs are identified as priority hazardous substances under the EC Water Framework Directive.

The action proposed is: greater efforts to implement PARCOM Decision 95/1, including identifying uses not previously recognised, identification of acceptable alternatives, and avoidance of the use of unacceptable substitutes; to review by OSPAR of the need for further OSPAR measures to supplement the EC measures; and to ask other relevant international forums to take account of the Background Document.

Récapitulatif

Les paraffines chlorées à chaîne moléculaire courte (SCCP) sont des paraffines « n » dont la chaîne de carbone comporte entre 10 et 13 atomes de carbone (inclus) et possédant un degré de chloration de plus de 48% de leur poids. Elles sont très persistantes et ne sont pas biodégradables. Elles sont fortement adsorbées sur la boue et les sédiments. Elles ont donc de fortes chances de s'accumuler biologiquement. Elles sont cancérigènes. Une action prioritaire à leur égard est prévue dans le Plan d'action OSPAR 1992, d'où le fait qu'en 1998, elles aient été inscrites sur la Liste des produits chimiques devant faire l'objet de mesures prioritaires.

Les SCCP sont pour l'essentiel utilisées comme fluides de travail des métaux, leurs principales autres applications étant dans les peintures, les revêtements et les produits d'étanchéité, ainsi que comme agents ignifuges dans le caoutchouc et les textiles. Les principales sources d'apport à la mer sont donc constituées par les sites de fabrication des SCCP ainsi que par les produits qui en contiennent, de même que par les sites de transformation des métaux, du cuir et du caoutchouc où elles sont utilisées.

Les émissions dans l'eau de SCCP fabriquées dans l'Union européenne et provenant de sites se trouvant dans l'Union européenne ont été estimées en 1994 à 1784 tonnes par an, dont 95%

provenaient de sites de travail des métaux. Depuis lors, d'importantes réductions ont été obtenues dans leur consommation. Il n'existe cependant aucune statistique des émissions dues aux produits ni des importations de SCCP. Des teneurs en SCCP se situant entre 426 et 526 µg/kg ont été constatées chez des mammifères marins de l'Arctique.

La mesure OSPAR en vigueur est la décision PARCOM 95 /1, qui exige l'abandon, d'ici la fin de 1999, de l'utilisation des SCCP comme plastifiants dans les peintures et les revêtements, comme plastifiants dans les produits d'étanchéité, dans les fluides de travail des métaux et comme agent ignifuge dans le caoutchouc, les matières plastiques et les textiles, excepté dans le cas de certaines applications dans les barrages et les mines, où la date limite d'abandon a été fixée à fin 2004. La Directive communautaire européenne 2002/45/EC interdit son utilisation dans les fluides de travail de métaux et dans la finition des cuirs. Les SCCP sont définies comme des substances dangereuses prioritaires dans le cadre de la Directive communautaire européenne cadre relative aux eaux.

L'action proposée est la suivante : intensification des efforts de mise en œuvre de la Décision PARCOM 95/1, dont l'identification des applications qui n'ont pas encore été décelées, la détermination d'alternatives acceptables, et la non-utilisation de succédanés inacceptables ; examen par OSPAR de la question de savoir si de nouvelles mesures OSPAR venant compléter les mesures communautaires européennes éventuelles s'imposent ; et enfin, demande adressée aux autres instances internationales compétentes de prendre en considération le document de fond correspondant.

1. Introduction

In PARCOM Decision 95/1 on the Phasing Out of Short Chained Chlorinated Paraffins, Contracting Parties agreed (with reservations from Portugal[1] and the United Kingdom[1]) on the phasing out of short chained, highly chlorinated paraffins. "Chlorinated paraffins" are here defined as mixtures of compounds that are manufactured by the chlorination of n-paraffins with carbon chain length between and including 10 and 36 and with a chlorination degree between 10 and 72% by weight. Short chain chlorinated paraffins (SCCPs) are defined as chlorinated paraffins with carbon chain length between and including 10 and 13 and with a chlorination degree of more than 48% by weight.

Occurrences of SCCPs, in particular those with carbon chain length C_{10}-C_{13} and a chlorination of >50% were found in the aquatic environment of industrial and non-industrial areas as well as in aquatic and terrestrial organisms, were reasons for concern. Further justifications for PARCOM Decision 95/1 were the persistent and bioaccumulative properties of these substances, together with their toxicity to aquatic organisms and carcinogenicity to rats and mice. It was considered that less environmentally hazardous substitutes were available for most major applications.

SCCPs are also on the OSPAR List of Chemicals for Priority Action (Agreement 2004-12).

The following substance information is given in the risk assessment within the framework of the European Union (EU) Existing Substances Regulation (EEC) 793/93/EEC, for 'typical' C_{10-13} chloroalkanes (short chain length chlorinated paraffins) (EU, 2008):

CAS No	85535-84-8
Molecular formula	$C_xH_{(2x-y+2)}Cl_y$, where x = 10 to 13 and y = 1 to x
Synonyms	Alkanes, chlorinated; alkanes (C_{10-13}), chloro-(50 - 70%); alkanes (C_{10-12}), chloro-(60%); chlorinated alkanes; chlorinated paraffins; chloroalkanes; chlorocarbons; polychlorinated alkanes; paraffins-chlorinated.

SCCPs occur in industrial formulations as highly complex mixtures, which make the chemical analysis complicated. The calibration is a major problem, yielding hugely variable results, and there are no certified reference materials (CRMs) available. In order to get comparable results in a one-off survey it is therefore essential that all analyses will be undertaken at one laboratory. In addition, SCCPs is a priority group within the EU Water Framework Directive, so further method development is likely to occur (ICES, 2004).

The EU risk assessment for SCCPs was first published in October 1999 and updated in 2008. Environmental risks of SCCP were identified for the aquatic environment where *e.g.* metalworking and fat liquoring for leather takes place. An EC Directive restricting the use of SCCPs was published in 2002 (Directive 2002/45/EC). SCCPs are classified as dangerous for the environment (very toxic to aquatic organisms) (Technical channels, 2004). In March 2003 an updated environmental risk assessment report was published, which included new data. This report identified a number of potential risks of SCCPs in several environmental compartments, and it was recommended that further exposure information should be gathered (Technical channels, 2004).

[1] Portugal lifted its reservations at OSPAR/MMC 1998. The UK entered its reservation to this Decision because it considered that the competence to enforce it rests with the European Community. The UK urges the European Commission to bring forward early proposals on that subject.

2. Sources of Short Chain Chlorinated Paraffins and their pathways to the marine environment

2.1 Production and use in the European Community

According to the EU risk assessment, C_{10-13} chloroalkanes were manufactured by two producers within the European Union (EU), and with a total production of $\leq$ 15 000 tonnes/year (1994). The main uses were in metal working fluids, as plasticiser in paints, coatings and sealants, as flame retardant in rubbers and textiles, and in leather processing (fat liquoring).

Recent data shows that the corresponding use of SCCPs has been reduced from 13 000 tonnes in 1994 to 4000 tonnes in 1998 (Chlorinated Paraffins Sector Group of CEFIC, 1999; Table 1 below). The main use in 1998 was still in metal working fluids, in spite of a considerable reduction of 7362 tonnes. The different uses in products mentioned in PARCOM Decision 95/1 have also declined considerably. Overall there has been a reduction of nearly 70% over the period 1994 to 1998, largely due to voluntarily agreements by industry.

The unspecified group "other" increased considerably from 100 tonnes in 1994 to 648 tonnes in 1998. However, this category may have been used to categorise tonnage where manufacturers are not sure of the exact uses further down the supply chain, and/or to render an account for some earlier not known uses. Therefore, an increase in other uses does not necessarily mean that these are different from those already identified. It could also be a difference in the basis for reporting between 1994 and 1998. On the other hand, it is not possible to rule out new product developments using SCCPs**.**

In 1998, about 50% of European sales and about 10% each of Medium Chain Chlorinated Paraffins (MCCPs) and Long Chain Chlorinated Paraffins (LCCPs) sales have been used for formulation of metal working fluids.

Table 1: Use of SCCPs in Europe, tonnes per year and per cent of total

Application	**tonnes/year in 1994**	**tonnes/year in 1998**
Metal working fluids	9380(71.02%)	2018(49.5%)
Paints, coatings and sealants	1150(8.71%) +	726(17.8%) +++
	695(5.26%) ++	
Rubber/flame retardants/	1310(9.91%)	638(15.7%)
Leather fat liquors	390(2.95%)	45(1.1%)
Textile/polymers (other than PVC)	183(1.4%)	
PVC plasticisers	-	-
Other	100(0.75%)	648(15.9%)
Total	**13208**	**4075**

There is no specific information on the use category "Other".

+ figures for paints; ++ figures for coatings and sealants; +++ figures for paints, coatings and sealants

It has not, within the scope of this document, been possible to obtain information on the amount of SCCPs imported into the European Community. Hence, it has not been possible to estimate use categories for imported SCCPs. Neither has it been possible to get any figures on the amounts of SCCPs entering the EU through imported goods. According to a recent report (1999), the total production of SCCPs, MCCPs and LCCPs in China in 1997 was about 100 000 tonnes. Even if only a very small fraction reaches the EU, *e.g.* through imported goods, it can still represent significant amounts.

The EU's ban of SCCPs for metal and leather working was applied in January 2004. The usage of SCCPs in 1994 in products was in Sweden reported to be 233 tonnes in about 50 products. In 2005 the usage had decreased to 14 tonnes in 18 products (Kemi-Stat, 2008). In France, several thousands of tonnes were used in the beginning of the 1990s but only 222 tons in 2002. At the time 147 tonnes were still used for metal working fluid, which was expected to end in 2004 (INERIS, 2005).

2.2 Emissions and discharges

The main sources, identified in the EU risk assessment as having the potential for releases to water, sediment and sewage sludge are production sites for SCCPs, production sites for the formulation of metal working fluids and leather finishing agents, as well as metal working and leather finishing plants. Metal working plants are also sources for releases to landfills, like leather finishing plants are to air. Rubber working plants are emitting to water, air and soil. Of these, the use of metal working fluids is still by far the largest source of releases into the environment.

As considered in PARCOM Decision 95/1, different products, *e.g.* articles, containing SCCPs are also potential sources of emissions. This can be the case during production and use, and when the articles become waste and are sent to landfill. SCCPs could be a possible source of PCBs (polychlorinated biphenyls) and PCNs (polychlorinated naphthalenes) formation via incineration of wastes.

In the EU risk assessment, emissions from articles are discussed very briefly. Elaborated methods to estimate this are lacking in the EC Technical Guidance Document (TGD) on Risk Assessment of New and Existing Substances (1996). However, reported data on emissions from surfaces with a paint containing SCCPs could indicate that such emissions can be significant.

The emissions of SCCPs in Europe 2001 reported to the European Pollutant Emission Register (EPER) are given in Table 2. The emissions of SCCPs mainly take place indirect to water, via transfer to an off site water treatment plant.

Table 2. Total emissions in Europe of SCCPs reported to EPER 2001 in tonnes (EPER 2006)

Activity	To air (per year)	Direct to water (per year)	Indirect to water (transfer to off-site waste water treatment)
Combustion installations > 50 MW	-	-	0.0022
Basic organic chemicals	-	-	0.01584
Basic inorganic chemicals or fertilisers	-	0.01	-
Total	**-**	**0.01**	**0.01804**

2.3 Pathways to the marine environment

If SCCPs reach the marine environment, they will generally do so via rivers and via the atmosphere, from the main compartments to which releases occur. The latter are sediment and surface waters in rivers, lakes and seas, air, and soil spread with sewage sludge. Furthermore, recent reports of high levels of SCCPs in biological samples from the Arctic could indicate that these chemicals are effectively transported over long distances.

3. Monitoring data, quantification of sources and assessment of the extent of problems

3.1 Monitoring data

Concentrations of SCCPs in surface water, sediment, sewage sludge up to 2001

Monitoring data from the EU Risk Assessment Report (1999) and from Organohalogen Compounds, Volume 47 (2000) are summarised here:

Levels of 0.12 - 1.45 µg/l have been measured in surface water in rivers from industrial areas in the United Kingdom in the year 1986;

- Levels of 0.50 - 1.2 µg/l and 0.05 - 0.12 µg/l have been measured in two rivers in Germany in the years 1987 and 1994, respectively. These values include sites downstream from a chlorinated paraffins production plant;
- Levels of 17 - 83 µg/kg dry weight in sediments have been measured in rivers in Germany in 1994. These values also includes sites downstream from a chlorinated paraffins production plant;
- Levels of 47 - 65 µg/g in sewage sludge have been measured near a metal working plant in Germany. Further levels around 0.12 µg/l in the run-off water from the sewage plant into a nearby river, and of 0.08 and 0.07 µg/l in the river water, up and downstream from the metal working plant have been measured in the years 1991 to 1993;
- Levels of 18 - 275 µg/kg dry weight in surface sediments have been measured in three lakes in Canada;
- Levels of 0.0073 - 0.29 µg/g in surface sediment have been measured in harbour areas along Lake Ontario;
- Average levels around 1.8 µg/g have been measured in sediment of the Detroit River at Lake Eire in Canada;
- Levels of 0.06 - 0.448 µg/l have been measured in final effluent from sewage treatment plants in southern Ontario in Canada in 1998;
- Levels of around 0.0045 µg/g dry weight have been measured in sediment in Lake Hazen on Ellesmere Island in the Arctic;
- Estimates of SCCPs in waters in non-industrial areas compared to marine waters and industrial areas in the United Kingdom were 0.1 - 0.3, 0.1 - 1 and 0.1 - 2 µg/l, respectively. These data were estimated from analytical values for all chlorinated paraffins in the range C_{10}-C_{20} (data published in 1980).

Monitoring data of SCCPs in sediments, water, digested sludge and soil published after 2001

- In general, Baltic Sea sediments were more contaminated with Chloroparaffins (CPs) than North Sea sediments. The concentrations of SCCPs in sediments from the North Sea varied between 5 to 112 ng/g dw and in sediments from the Baltic Sea between 116 to 377 ng/g dw. The samples were collected between August 2001 and May 2003 (Huttig and Oehme, 2005);
- The concentrations of SCCPs in surface sediments collected during 1998 in Lake Ontario in North America were on average 49 ng/g dw with the highest concentrations ranging from

147 to 410 ng/g dw (Marvin *et al.* 2003). The highest concentrations were found in the most industrialised areas. Core samples from a polluted site in the Niagara Basin showed a decreasing trend of accumulation of SCCPs with the highest peak during the 1970s of about 700 - 800 ng/g dw. However at a background site in Lake Ontario there was still a slight increase in accumulation of SCCPs (Marvin *et al.* 2003);

- SCCP and MCCP (medium chain chlorinated paraffins) in samples from the UNITED KINGDOM collected 1983 to 1988 showed concentration levels in sediment of <0.2 - 65.1 mg/kg dw, in water <0.1 - 1.7 µg/l, in digested sewage 1.8 - 93.1 mg/kg dw and in soil <0.1 mg/kg dw (Nicholls *et al.* 2001). These sampling sites were chosen on the basis of target specific industries;
- Sediments in 11 Czech rivers were collected during 2003 and 2004, were analysed for SCCPs. Concentrations of SCCPs were between 6 to 397 ng/g dw. The highest concentration occurred close to a chemical and electro engineering industry (Pribylová *et al.,* 2006);
- The concentrations of SCCPs in sediments from the Czech Republic varied in the Kosetice area between 24 to 46 ng/g dw, in the Zlin area 16 to 181 ng/g dw and in the Beroun area from 5 to 22 ng/g dw (Stejnarova *et al.* 2005). The Kosetice area is considered to be a background area, the Zlin area is a typical industrial region with rubber, tanning and textile industries and the Beroun area represents the cement and machinery industries;
- Sediments from Lake Mälaren in Sweden were collected close to an urban area, Stockholm. The concentrations of SCCPs in the sediments varied between 170 to 3300 ng/g dw in samples collected at sites close to the city and between 8 - 63 ng/g dw at urban background sites (Sternbeck *et al.,* 2003);
- Sediment samples were collected in Norway and analysed for SCCPs and the results varies between 5.8 to 1300 ng/g dw. High concentrations were found in *e.g.* Trondheim harbour, while Tromsö harbour showed as low concentrations as 5.8 ng/g dw (Fjeld *et al.* 2004).

Concentrations of SCCPs in Biota up to 2001

- Mussels were collected up and downstream from a chlorinated paraffin manufacturing site in the United States. Measured levels of SCCPs ranged between 7 - 280 µg/kg;
- High levels of SCCPs have been measured in different marine mammals in the Arctic, such as seal from Iceland and walrus from Western Greenland. The measured concentrations of SCCPs were 526 and 426 µg/kg in blubber, respectively;
- On a lipid basis, average levels of 13 µg/kg of SCCPs have been measured in breast milk from Inuit women living in communities on the Hudson Strait in Northern Quebec;
- Levels of SCCPs of 370 - 1400 µg/kg have been measured in beluga blubber from the St. Lawrence River in Canada;
- Average levels of SCCPs of 630 µg/kg, 200 µg/kg, 320 µg/kg and 460 g/kg have been measured in blubber from male beluga collected in different Arctic places; Hendrickson Island, Arivat (Western Hudson Bay), Sanikiluaq (Belcher Island area in southern Hudson Bay) and in Pangnirtung (south eastern Baffin Island), respectively.

Concentrations of chlorinated paraffins (C_6-C_{16}, C_{10}-C_{20} and C_{15}-C_{17} respectively) in biota up to 2001

- On a lipid basis, levels of around 1500 µg/kg chlorinated paraffins (C_6-C_{16}) have been measured in herring (muscle), in the Bothnian Sea, in the Baltic Sea and in Skagerrak in Sweden in the years 1986 and 1987;
- High concentrations of chlorinated paraffins (C_6-C_{16}) have also been measured in rabbit and moose (2900 and 4400 µg/kg, respectively on a lipid basis) in Sweden in 1986;
- On a lipid basis, levels of around 130 and 280 µg/kg chlorinated paraffins (C_6-C_{16}), respectively, have been measured in ringed seal blubber from Kongsfjorden, Svalbard in 1981 and in grey seal blubber from the Baltic Sea during 1979 - 85;
- On a lipid basis, levels of chlorinated paraffins (C_6-C_{16}) of around 1000 µg/kg and 570 µg/kg, respectively, have been measured in whitefish muscle in Lake Storvindeln, Lapland, in Sweden and in Arctic char muscle in Lake Vättern, central Sweden in 1986 and 1987;
- On a lipid basis, levels of chlorinated paraffins (C_6-C_{16}) of around 140 µg/kg and 530 µg/kg, respectively, have been measured in reindeer suet and in osprey muscle in Sweden in 1986;
- Levels of chlorinated paraffins (C_{10}-C_{20}) up to 200 µg/kg in fish, 100 - 12 000 µg/kg in mussels, levels in mussels above 200 µg/kg have been measured in the Wyre Estuary close to a paraffinic production site, 50 - 2000 µg/kg have been found in seabirds (eggs), 100 - 1200 µg/kg in heron and guillemot, 200 - 900 µg/kg in herring gull, 50 - 200 µg/kg in sheep close to a chlorinated paraffin production plant and 40 - 100 µg/kg in grey seal have been found in the United Kingdom (data published in year 1980). All these values were estimated from analytical values for all chlorinated paraffins in the range C_{10} to C_{20};
- Stern *et al.* (1998) noted that the Arctic formula group profiles showed higher proportions of the lower chlorinated congeners (C_{l5}-C_{l7}), suggesting that the major source of contamination to the Arctic is via long range atmospheric transport.

Monitoring data of SCCPs in Biota published after 2001

- In liver samples of little aUnited Kingdoms collected in the European Arctic SCCP levels of 5 - 88 ng/g ww were found (Reth *et al.* 2006). The range for SCCPs in cod varied from 11 to 70 ng/g ww, and in Arctic char from 7 to 27 ng/g ww;
- Fish from the North Sea and the Baltic Sea were collected during 2002; cod, flounder and North Sea dab. In the Baltic Sea the concentration levels of SCCPs varied between 19 and 221 ng/g ww, and in the North Sea the levels varied between 26 and 286 ng/g ww. The congener patterns in the samples from the Baltic Sea were similar to commercial SCCP mixtures and C13 were the most abundant, while the North Sea samples had a higher abundance of C_{10} (Reth *et al*. 2005);
- In ringed seals from Pangnirtung and Eureka in the Canadian Arctic, levels of SCCP of 95 and 527 ng/g ww were found, respectively (Braune *et al.* 2005);
- The concentrations of SCCP and MCCP in biota samples collected during 1983 to 1988 in UNITED KINGDOM were in fish <0.1 - 5.2 mg/kg ww, in benthos <0.05 - 0.8 mg/kg ww and in earthworms <0.1 - 1.7 mg/kg ww (Nicholls *et al.* 2001);

- Moose liver and muscle samples from Sweden, Norway and Finland collected in the late 1990s showed levels below the detection limit, < 20 ng/g fresh muscle tissue (Fridén *et al.* 2004);
- SCCPs have recently been found in Arctic biota but there is still insufficient information to assess species differences, spatial patterns or food web patterns (Braune *et al.* 2005). The SCCPs are found in fish samples from the North Sea and the Baltic Sea, at concentrations up to 300 ng/g wet weight in dab liver (North Sea), and in cod liver at up to 100 ng/g (North Sea) and 150 ng/g (Baltic) (ICES 2004);
- Blue mussel from Norway showed a concentration range from 0.9 to 4.8 ng/g ww. Samples from Bölmo/Sotra had a concentration of 4.8 ng/g ww and samples from Ulleröy/Lista had a concentration of 0.9 ng/g ww (Fjeld *et al.* 2004);
- Cod liver from Norway had concentrations of SCCPs between 30 ng/g ww in Drammensfjorden to 110 ng/g ww in Ulleröy/Lista area (Fjeld *et al.* 2004);
- Concentrations of chlorinated paraffins (C_{10}-C_{30}) in household waste;
- Levels of 0.5 - 48 µg/g dry matter of chlorinated paraffins (C_{10}-C_{30}) have been measured in household waste collected from the Uppsala municipality in Sweden in 1995.

3.1.1 Conclusion of comparison of the monitoring data found before and after 2001

No general decrease in the concentration levels of SCCPs in sediments and biota in the samples collected and reported lately were found when compared to data published before 2001.

3.2 Quantification of sources

3.2.1 Releases to the environment

The EU Existing Substances Regulation risk assessment (EU, 2008) concluded that risk reduction in metal working would eliminate 98% of the total environmental burden. This risk assessment, carried out by the United Kingdom, contains a number of release estimates, made by using various models and assumptions. In summary they indicate the following releases of SCCPs in the EU:

- 0.4 tonnes/year to air, apportioned to rubber formulations <0.012 tonnes/year (including releases to soil and water), leather formulations 0.0039 tonnes/year and leather use 0.390 tonnes/year;
- 1784 tonnes/year to water, apportioned to metal working use 1688 tonnes/year, metal working formulation 23.4 tonnes/year, production sites <0.037 tonnes/year, rubber formulations <0.012 tonnes/year (including releases to air and soil), leather formulations 7.8 tonnes/year and leather use 19.5 tonnes/year.

It should be noted that the estimates of releases referred to are made on the basis of uses in Europe of SCCPs produced in 1994 in Europe. Bearing in mind the heavy reductions in corresponding uses up to 1998, those releases should be much lower today. On the other hand, there are no figures on amounts of imported SCCPs and hence, no estimates of releases from such uses.

There are no general figures on releases from products. These could, however, contribute considerably to emissions to the environment. An example is given by CSTEE (1998) on estimated emissions of nine tonnes on a yearly European scale from surfaces with paint containing SCCPs. Other sources, which could contribute to emissions mentioned, are products like rubber, textiles, sealants and polymers.

3.2.2 Human exposure

In the EU risk assessment, concerns for exposure of workers in metalworking and leather finishing plants are expressed. It is further concluded that measures identified to protect the environment will also reduce human exposure.

To date there are no reliable scientific data on exposure to humans/consumers from different products containing SCCPs. The possibility of emissions from products has, among others, been expressed by the CSTEE.

A median level of SCCPs in human milk fat was 180 ng/g fat with a range of 49 to 820 ng/g fat in the UNITED KINGDOM, London and Lancaster (Thomas *et al.* 2006).

3.3 Assessment of the extent of problems

In the EU risk assessment, it was found that some major characteristics of C_{10-13} chloroalkanes are relevant for the assessment of exposure to the environment: the C_{10-13} chloroalkanes are not hydrolysed in water; are not readily or inherently biodegradable; have a high log K_{ow} value (4.4 - 8) and have an estimated atmospheric half-life of 1.9 - 7.2 days. The high log K_{ow} values indicate a high potential for bioaccumulation, strong adsorption to sludge and sediments and very low mobility in soil. High bioconcentration factors have been reported with a variety of freshwater and marine organisms (ranging from 1000 to 50 000 for the whole organism, with high values for individual tissues).

SCCPs have been raised as a concern with regard to long range transport. This is currently being discussed within the appropriate international forums. High levels of SCCPs in biological samples from the Arctic indicate that these chemicals are effectively transported over long distances (CSTEE 1998) and a draft risk profile made for the Stockholm Convention in October 2008 mentions that:

"*SCCPs are not expected to degrade significantly by hydrolysis in water, and dated sediment cores indicate that they persist in sediment longer than 1 year. SCCPs have atmospheric half-lives ranging from 0.81 to 10.5 days, indicating that they are relatively persistent in air. SCCPs have been detected in diverse environmental samples (air, sediment, water, wastewater, fish and marine mammals), and in remote areas such as the Arctic, providing evidence of long-range transport*."

Tumours of the liver, thyroid and kidney (male rats only) were observed in a lifetime carcinogenic study in rats carried out in the US (Organohalogen Compounds, Volume 47, 2000).

It can be concluded that all environmental contamination of SCCPs is likely to represent a widespread problem. This is due to the persistent, bioaccumulative and toxic (PBT), as well as the carcinogenic properties of SCCPs. It can further be concluded that emissions from different, also diffuse sources, have the potential to reach the maritime area. On the basis of the accessibility of data on the amount of discharges, emissions and losses from several sources, it is not always possible to fully estimate the degree of risk to the marine environment. However, the absence of data to quantify emissions from each source should not be an obstacle to observing potential risks. Hence, the absence of quantifiable data does not eliminate a risk as such.

4. Desired reduction

The adopted targets for year 2000 and 2004 are outlined in PARCOM Decision 95/1. According to this, SCCPs should be phased out by 31 December 1999 in metalworking fluids and in major uses as plasticisers in paints, as coatings and sealants and as flame retardant in rubber, plastics and textiles. The use as plasticers in sealants in dams, and as flame retardant in rubber in conveyor belts for the exclusive use in underground mining, should be phased out by 31 December 2004.

The objective for SCCPs, in the framework of the OSPAR Strategy on Hazardous Substances, is to make every endeavour to move towards the target of the cessation of discharges, emissions and losses of hazardous substances by the year 2020 with the ultimate aim of achieving concentrations in the marine environment close to zero.

5. Identification of measures

5.1 Measures within the European Community

The C_{10-13} chloroalkanes are (decision in the 25th Adaptation to Technical Progress of EU Directive 67/548/EEC on the classification, packaging and labelling of dangerous substances) classified as dangerous for the environment, with the symbol N and the risk phrases R50/53 (very toxic to aquatic organisms/may cause long-term adverse effects in the aquatic environment) and harmful, carcinogen, cat. 3 with the symbol Xn and risk phrase R40 (possible risk of irreversible effects).

The agreed conclusions of a final risk assessment and a risk reduction strategy within the framework of the EU Existing Substances Regulation (EEC) 793/93 were unanimously adopted by Member States and the Commission in July 1999.

The Recommendation of the European Commission on a risk reduction strategy for SCCPs was that limitations on marketing and use within the framework of Council Directive 76/769/EEC for the use and formulation of products, in particular for metal working and leather finishing, should be considered to protect the environment. It was further concluded that these measures would reduce concern for human exposure.

In July 1999 the Directorate General Enterprise of the European Commission presented a draft proposal on limitations on marketing and use of metalworking fluids and leather finishing uses of SCCPs. Member States were divided on this proposal in the light of PARCOM Decision 95/1. The Directive 2002/45/EC later prohibited the use of SCCPs in substances and preparations for metalworking fluids and for fat liquoring of leather in concentrations higher than 1%. In the Directive it was stated that a review should be made before 1 January 2003 of new relevant scientific data, especially on emissions. In a recital introducing the articles, references are made to those products included in PARCOM Decision 95/1. This review was made, but no further measures have been proposed. SCCPs have however been selected as a Substance of Very High Concern (SVHC) based on its PBT properties and further use in the EU will require authorisation.

In the framework of Directive 2000/60/EC of the European Parliament and of the Council of establishing a framework for Community action in the field of water policy (Water Framework Directive) the Council has reached on 7 June 2001 a common position on the establishment of a list of priority substances, including substances identified as priority hazardous substances. C_{10-13} chloroalkanes are included in this list with an indication that they are identified as priority hazardous substances. With respect to the priority substances, the European Commission shall submit proposals of controls for the progressive reduction of discharges, emissions and losses of substances concerned, and, in particular the cessation or phasing out of discharges, emissions and losses of priority hazardous substances. Hazardous substances are defined in the Water Framework Directive as “substances or groups of substances that are toxic, persistent and liable to bio-accumulate, and other substances or groups of substances which give rise to an equivalent level of concern”. In drawing up the above list, the European Commission has taken into account OSPAR work on the prioritisation of hazardous substances.

The European Union has also notified SCCPs to the Stockholm POPs convention and a draft risk profile has been prepared (UNEP, 2008).

5.2 Implementation of PARCOM Decision 95/1 by Contracting Parties

Sweden made a review of the status of implementation by Contracting Parties of PARCOM Decision 95/1 in 2006 (Insert publication number). The review notes the coming into force of the EU directive 2002/45/EC. In the conclusion it is also stated that:

“*OSPAR should cooperate with the Commission to perform the envisaged overview of the remaining uses of SCCPs that might give reasons for concern for the marine environment and future EC risk reduction measures for the use of MCCPs may also be of relevance for the 95/1 Decision. Any further risk reduction measures regarding the use of MCCPs should also be noted by OSPAR*”.

In Finland and the Netherlands, national restrictions equivalent to PARCOM Decision 95/1 have been notified to the European Commission. Norway has implemented the restrictions as set out in PARCOM Decision 95/1. In Sweden, a complete phase out of uses of SCCPs has taken place by voluntary means. Furthermore, 90% of the use of medium- and long chain chlorinated paraffins (MCCPs and LCCPs) have been phased out. An almost complete phase out of SCCPs used for formulation of metalworking fluids seems to have taken place in Germany and Norway. Corresponding phasing out activities are also reported by Belgium and the United Kingdom. There is no information on phasing out activities in remaining Contracting Parties.

5.3 Alternatives to short chain chlorinated paraffins

MCCPs, the medium-chain chlorinated paraffins (C_{14-17}) may have similar uses to SCCPs and are used as replacements for SCCPs as extreme pressure additives in metalworking fluids, as plasticisers in paint, and as additives in sealants.

The UNITED KINGDOM risk assessment on MCCPs, in the framework of the Existing Substances Regulation, states that some risk reduction measures are required for uses in the production of PVC, in some process formulations of metal cutting fluids, in emulsifiable metal cutting/working fluids where the spent fluid is discharged to waste water, in leather fat liquors and in carbonless copy paper during recycling. The risk from use in oil-based metal cutting fluids may also be of concern.

LCCPs, the long chained chlorinated paraffins have been used in some demanding applications in metalworking fluids instead of SCCPs in Sweden. LCCPs are also suggested as a replacement to SCCPs in the leather industry as well as in paint and coatings, in sealants and rubber.

Alkyl phosphate esters and sulfonated fatty acid esters may function as replacements for SCCPs as extreme pressure additives in metalworking fluids. Natural animal and vegetable oils are also alternatives in the leather industry. In paint and coatings, phthalate esters, polyacrylic esters, diisobutyrate as well as phosphate and boron-containing compounds are suggested as replacements. Phthalates esters are alternatives for use in sealants. Alternatives as flame retardant in rubber, textiles and PVC are antimony trioxide, aluminium hydroxide, acrylic polymers and phosphate containing compounds. Sweden considers these substances as being less harmful than chlorinated paraffins. However, there might still be uses for which these alternatives do not fulfil all technical and security demands. In addition, the cost of substitution may not be proportional to health and environmental advantages for all types of applications. Risk reduction measures like closed production and/or further regulation of emission limits, are amongst several measures that could be taken into account.

It was agreed at the OECD Expert Meeting on SCCPs and NP/NPEs, hosted by Switzerland on 8 - 10 November 1999, that some form of exchange of information on substitute chemicals and processes is desirable. A password protected web site has been established by the OECD Secretariat.

5.4 Identification of possible OSPAR measures

Most OSPAR Contracting Parties are bound to harmonised EU-restrictions on the marketing and use (Council Directive 76/769/EEC) of SCCPs, and remaining Contracting Parties have introduced similar or more stringent measures. It is to be noted that the phasing out of the most severe uses which are included in Directive 2002/45/EC on a regulation on SCCPs, has been partly achieved by voluntary means. The regulation however does not so far include articles containing SCCPs.

OSPAR should therefore continue to follow the outcome of EU measures, and continue to strive for decisions that will aim at the 2020 target. The phasing out of additional uses identified in the EU risk assessment and for which alternatives seem to be available, *e.g.* as additives to paint and plastics, should be promoted by OSPAR, especially considering the notification of SCCPs to the Stockholm Convention and the draft conclusion on the POPs properties of SCCPs. Measures will also eventually be taken according the REACH regulation and the need to apply for authorisation for remaining use of SCCPs.

6. Choice for action

The EU Risk Assessment identified that the uses in metalworking fluids and leather finishing gave rise to considerable emissions that could reach the marine environment. This situation should have improved since the introduction of the Directive 2002/45/EC. The Directive however also included a review clause which gave the possibility within three years of the further inclusion of other uses, *e.g.* in products such as plasticisers in paints, coatings and sealant and as flame-retardant in rubber, plastics and textiles, since these uses also gave rise to concern in the Risk Assessment. As reflected in Chapter 4 (first paragraph), the review is to be conducted in co-operation with OSPAR.

Bearing this in mind, OSPAR Contracting Parties that are also EU Member States should, in coming years, take actions aiming at ensuring that PARCOM Decision 95/1 will be fully covered by EC legislation. The updated monitoring data in this document should also be taken into account. Recent monitoring data show no clear reduction of environmental concentrations. The inclusion of SCCPs as a priority hazardous substance in the water framework directive and the nomination to the Stockholm Convention also underlines the need for further measures and the elimination of remaining uses.

According to the measures that have been reported, PARCOM Decision 95/1, which should have been acted upon by the year 2000, seems to have been implemented by only a few of the Contracting Parties that are bound by it. Therefore,

- all Contracting Parties that are bound by PARCOM Decision 95/1 should increase their efforts to implement it by national measures. Measures for such implementation can be taken by means of voluntary agreements;

- while carrying out this implementation, these Contracting Parties should pay attention to identifying uses of SCCPs that have not previously been recognised;
- all Contracting Parties should put efforts into collecting information on the availability of, and experiences on the use of, technically and economically acceptable alternatives to SCCPs. This information should preferably, with the agreement of the OECD Secretariat, be included on the OECD web site.

In order to avoid substitution of SCCPs by alternatives which are later shown to be unacceptable:

- States that are OSPAR Contracting Parties should take action to ensure that any decisions on substitution take account of the fact that the work in the EU risk assessment of MCCPs has demonstrated a need for risk reduction measures for some of the uses of MCCPs;

In the light of the information collected on MCCPs and LCCPs by the UNITED KINGDOM (in its EU risk assessment of MCCPs) further consideration by OSPAR on the whole range of chlorinated paraffins is likely to be needed.

The EU decisions to notify SCCPs to the Stockholm Convention and the inclusion into the water framework directive as a priority hazardous substance highlight the need for further measures to be taken. OSPAR is therefore recommended:

- to review the outcome so far of:
  - (i) legislative actions on SCCPs within the framework of Council Directive 76/769/EEC;
  - (ii) the implications of the inclusion of SCCPs in the Water Framework Directive list on priority hazardous substances;
  - (iii) the EU Risk Assessment and the Risk Reduction Strategy for MCCPs;
- consider the need for the full implementation of PARCOM Decision 95/1 and hence the need for further actions in order to achieve the OSPAR 2020 target.

The inclusion of SCCPs in the Water Framework Directive as a priority hazardous substance and other risk reduction measures increase the probability that the OSPAR 2020 will be reached, but Contracting Parties will have to continue to assess the potential to substitute SCCPs and MCCPs wherever possible.

To ensure that the information in this Background Document and the conclusions reached by OSPAR are formally communicated to the European Commission.

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Annex 1: Monitoring strategy for short chained chlorinted paraffins

As part of the Joint Assessment and Monitoring Programme (reference number 2003-22), OSPAR 2004 adopted an Agreement on monitoring strategies for OSPAR Chemicals for Priority Chemicals (reference number 2004-15) to implement the following monitoring for tracking progress towards the objectives of the OSPAR Hazardous Substances Strategy (reference number 2003-21) with regard to short chained chlorinated paraffins. The Monitoring Strategy for short chained chlorinated paraffins will be updated as and when necessary, and redirected in the light of subsequent experience.

In general, the sources of SCCPs are well characterised and have been set out in the OSPAR Background Document on SCCPs and the HARP-HAZ Guidance document on SCCPs. Methodologies for monitoring SCCPs are available and monitoring that has been carried out in the marine environment shows concentrations above the detection limit in the individual environmental compartments water, biota and sediment. There are currently no monitoring programmes for SCCPs in the OSPAR framework.

There are a number of relevant controls (e.g. regulations, directives, recommendations and decisions) on a) marketing and/or use, b) emissions and/or discharges of SCCPs which have been agreed by Contracting Parties both in OSPAR and in other international forums and have been highlighted as important measures for achieving the OSPAR Hazardous Substances objective with respect to SCCPs in the “choice for actions” chapter of the Background Document. Evidence from reports on the implementation of such measures will be used to make an initial judgement of the extent to which the amounts of the substance emitted or discharged are likely to have been reduced.

On the evidence available, it would not appear to be sensible to include SCCPs in the RID or CAMP programmes. If any monitoring is to take place, it could be in the form of periodic surveys on sediments in specific locations known to be at risk, and identified through the WFD catchment assessments. The PEC/PNEC ratios from the EU Technical Guidance Document (TGD) indicate a significant risk to aquatic organisms local to release sources, and biological effects monitoring may also need to be considered. The need for developing an EAC may be questionable in the light of the development of Environmental Quality Standard (EQS) under the WFD.

OSPAR will examine and assess trends in data on discharges from large installations reported annually by Contracting Parties to the EPER database.

SCCPs, as C_{10-13} chloroalkanes, are priority hazardous substances under the WFD. OSPAR will therefore seek to make use of monitoring with respect to the environmental quality standard.

In order to establish a base-line against which to measure progress towards the objectives of the Hazardous Substances Strategy with respect to SCCPs, OSPAR will carry out a one-off baseline survey of concentrations of SCCPs in sediments.

As an additional tool, OSPAR will seek to evaluate progress on the implementation of EC directives or regulations and OSPAR measures addressing the regulation of marketing and use, and the reduction of discharges of, SCCPs.

Short chained chlorinated paraffins Monitoring Strategy	
Implementation of actions and measures	• Examination of progress in the implementation of regulations on marketing and/or use or emission and/or discharge which have been agreed, or are endorsed, by the Background Document
Discharges and losses to water	• Examination and assessment of trends in data on discharges from large installations reported annually by Contracting Parties to EPER
Maritime area:	
Concentrations in sediments	• A base-line one-off survey will be carried out • The need for EACs and BRCs will be considered
Concentrations in water	• Where available, data will be periodically compiled from EC WFD monitoring

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OSPAR's vision is of a healthy and diverse North-East Atlantic ecosystem, used sustainably

ISBN 978-1-906840-37-2
Publication Number: 397/2009