Format for submitting pursuant to Article 8 of the Stockholm Convention the information specified in Annex E of the Convention

Introductory Information

Name of the Submitting Party/Observer

NGO Observer**: National Toxics Network Inc.** on behalf of the International POPs Elimination Network (IPEN)

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Chemical Name

Short-chained chlorinated paraffins (SCCPs)
CAS Number: 85535-84-8

Common Trade Names and Synonyms

- A 70
- A 70 (wax)
- Adekacizer E
- Alkanes, chlorinated
- Arubren
- Cereclor
- Chlorcosane
- Chlorez
- Chlorinated alkanes
- Chlorinated hydrocarbon waxes
- Chlorinated paraffin waxes
- Chlorinated waxes
- Chloroalkanes
- Chlorocarbons
- Chlorofin
- Chloroflo
- Chloroparaffin waxes
- Chlorowax
- Chlorparaffin
- Cloparin
- Cloparol
- Clorafin CW
- Derminolfett
- Derminolöl
- EDC-tar

- Electrofine
- Enpara
- Hordaflam
- Hordaflex
- Hordalub
- Hulz
- KhP
- Meflex
- Monocizer
- Paraffin waxes chlorinated
- Paraffin, chlorinated
- Paraffins, chloro
- Paroils, chlorinated
- Poliks
- Polychlorinated alkanes
- Polychloro alkanes
- Tenekil
- Toyoparax
- Unichlor

Date of submission
9th February 2007

(a) Sources, including as appropriate (provide summary information and relevant references)

Chlorinated paraffins are not known to occur naturally. They are produced by reacting liquid paraffin fractions with pure chlorine gas. The reaction may require the use of a solvent, and often ultraviolet light is used as a catalyst.[1] Carbon-chain lengths of commercial products are generally between C_{10} and C_{30}, and the chlorine content is typically between 40 and 70%. They were first produced around 1930.[2]

(i) Production data:

In 1985, the estimated world production of chlorinated paraffins was approximately 300,000 tonnes with about 4 % of the European consumption of chlorinated paraffins estimated to be C10-13, 84% C14-17 and 12% C20-30 . The 1999 EU Risk Assessment Report on C10-13 chloroalkanes reported that as of 1996 SCCPs were being manufactured, under a variety of trade names, by two companies in the EU. Total annual production, based on 1994 Euro-Chlor figures, was estimated at less than

[1] Wisconsin Department of Natural Resources, 01 S. Webster Street . PO Box 7921 . Madison, Wisconsin 53707-7921 . 608.266.2621 Available at http://dnr.wi.gov/environmentprotect/pbt/chemicals/shortchain.htm

[2] United Nations Environment Program Regionally Based Assessment of Persistent Toxic Substances, EUROPE REGIONAL REPORT, December 2002, Global Environment Facility Available at http://www.chem.unep.ch/Pts/

or equal to 15,000 tonnes per year. This figure dropped to less than 3,000 tonnes in 2001.

It is believed that 50% of the chlorinated paraffins produced in the world have carbon chain lengths of between 14 and 17 and a chlorine content of between 45 and 52%.[3]

Quantity

According to a 2003 Australian government report use of SCCPs in Australia decreased by 80% between 2001 to 2003 to approximately 25 tonnes per annum of SCCPs in the metal working industry. This indicated that their use for metal working fluid application was declining rapidly due to their replacement by longer chain chlorinated paraffins or the introduction of new technology in formulations, which do not use chlorinated paraffins.

The report also states that the use of SCCPs in EU has reduced from 13,000 tonnes in 1994 to 4000 tonnes in 1998; a reduction of nearly 70%, mainly due to voluntary agreements by industry, although the main use in 1998 was still in metal working fluids.[4]

Location

(ii) Uses

The use of SCCPs in metal working fluids is as an extreme pressure additive. SCCPs are used in a variety of engineering and metal working operations such as drilling, machining/cutting, drawing and stamping. Chlorinated paraffins improve the pressure-accepting capacity of cutting fluids. They are believed to work by liberating hydrogen chloride as the metal surface heats up. This leads to the formation of metal chlorides, which have a good lubricating and parting effect, thereby helping to prevent the welding together of metal parts under the high pressure and temperature involved. Generally, the efficiency of the metal working fluid increases as the chlorine content of the chlorinated paraffin increases. [5]

A secondary function of cutting fluid is to flush away chips and metal fines from the tool/workpiece interface to prevent a finished surface from becoming marred and also to reduce the occurrence of built-up edge. Monitoring and maintenance of cutting fluid is required due to contamination and degradation. Eventually, fluids require disposal once their efficiency is lost. Waste management and disposal as well as issues of environmental liability have become a major problem.[6]

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[3] United Nations Environment Program Regionally Based Assessment of Persistent Toxic Substances, EUROPE REGIONAL REPORT, December 2002, Global Environment Facility

[4] Environmental Exposure Assessment of Short Chain Chlorinated Paraffins (SCCPs) in Australia, July 2004 A follow up report to the National Industrial Chemicals Notification and Assessment Scheme (NICNAS) Short Chain Chlorinated Paraffins (SCCPs) Priority Existing Chemical Assessment Report No. 16. Available at http://www.**nicnas**.gov.au/publications/car/other/sccp_environ_exposure_**assessment**_pdf.pdf

[5] NICNAS SCCP 2004

[6] NICNAS SCCP 2004

While, SCCPs are used in metal working fluids, they are also used in paints and sealants, as flame-retardants in rubber and textiles, and in fat liquors in the leather working industry. [7]

Applications for SCCPs in 1994

Application	Quantity used [tonnes.year-1]	Percentage of total use
Metal working	9,380	71.02%
Rubber	1,310	9.91%
Paints	1,150	8.71%
Sealants	695	5.26%
Leather	390	2.95%
Textiles	183	1.40%
Others	100	0.75%
Total	13,208	100%

Applications for SCCPs in 2001

Application	Quantity used [tonnes.year-1]	Percentage of total use
Metal working	457	16.87%
Textiles & Rubber	975	35.97%
Paints	358	13.22%
Sealants	324	11.95%
Leather	0	0.00%
Others	594	21.91%
Total	2709	100.00%

(iii) Releases

The widespread, numerous contemporary uses of chlorinated paraffins are major sources of environmental contamination, particularly to the aquatic environment. They may be released into the environment from improperly disposed metal-working fluids containing chlorinated paraffins or from polymers containing chlorinated paraffins. Loss of chlorinated paraffins by leaching from paints and coatings may also contribute to environmental contamination. The potential for loss during production and transport is expected to be less than that during product use and disposal. [8]

Sources with the potential for releases of SCCPs to water, air and soil include production sites for SCCP, production sites for the formulation of metal working fluids and leather finishing agents, rubber working and leather finishing plants as well as their use in metal working, rubber formulations, paints and sealants, and leather and textile applications. Preliminary summary data estimates total release from both production and use to air in the EU is 393.9 kg.year-1; and to water 1,784 tons.year-1.

In the EU risk assessment, emissions from articles are also discussed and products that may contain and emit SCCPs are described as including:

[7] UNEP RBAPTS EUROPE REPORT 2002

[8] UNEP RBAPTS EUROPE REPORT 2002

• Flame retardants in rubber (proportion 1-10%), with applications mostly in high density conveyor belts. Belts may also be recycled into other products at the end of their life.

• Plasticisers in paints and other coatings; also to improve water resistance, chemical resistance and nonflammability. Mostly industrial/specialist applications; used in proportions of 1-10% in paints.

• Additives in sealing compounds in building, automotive and industrial applications. The leachability and volatility of short chain length chlorinated paraffins over the lifetime of the sealant (typically 20 years) was reported to be low.

• Leather - as a fat liquoring agent, usually applied to moist dressed leather in the form of an emulsion – this application has ceased in 2001.

• Textiles - SCCPs used mostly in backcoating operations for sail cloths, industrial protective clothing, lorry tarpaulins, etc. [9]

Discharges

Losses

Breakdown of the total losses for a large and small machine shop using oil-based cutting fluids.

		Large Facility with swarf reprocessing		**Small Facility - no swarf reprocessing**
Misting/evaporation	2%	to air	2%	to air
Overalls	1%	to water	2%	to water
Leaks	1%	to water	3%	to water
Dragout/swarf	27%	incinerated	81%	incinerated
	3%	to landfill	9%	to landfill
Dragout/workpiece	1%	to water	1%	to water
	2%	chemical waste	2%	chemical waste
Internal processing	1%	to water		
External processing	10%	Reuse/discard as waste oil		
	2%			
Total Losses	48%		100%	

Emissions

An estimate was given of annual emissions of 9 tons a year in Europe from surfaces with paint containing SCCP. Other products that are potential sources of SCCP emissions include: rubber, textiles, sealants and polymers. Within the Region, no data has been reported for emissions to air and soil. Estimated inputs of short chain paraffins to water have been reported for Germany at 74t. SCCPs were also identified

[9] UNEP RBAPTS EUROPE REPORT 2002

as a possible source of polychlorinated biphenyls (PCBs) and polychlorinated naphthalenes (PCNs) formation via incineration of wastes. [10]

(b) Hazard assessment for endpoints of concern, including consideration of toxicological interactions involving multiple chemicals (provide summary information and relevant references)

"The main concerns involve toxicity to aquatic invertebrates and the ability to cause cancer in rodents. In animal experiments, the principal signs of toxicity were effects on the liver and thyroid. SCCPs also feature on Sweden's list of suspected endocrine disruptors." - BKH Report 2000 [11]

Short-chain and mid-chain CPs have been shown, in laboratory tests, to have toxic effects on fish and other forms of aquatic life after long-term exposure.[12] SCCP have shown to have long-term toxicity to algae, aquatic invertebrates and fish at concentrations as low as 19.6, 8.9 and 3.1 µg/litre, respectively; no-observed-effect concentrations appear to be in the range of 2 to 5 µg/litre for the most sensitive species tested.[13]

In repeated dose toxicity studies by the oral route, the liver, kidney and thyroid were shown to be the primary target organs for the toxicity of the chlorinated paraffins.[14]

Carcinogenicity
Three commercial chlorinated paraffin products of average carbon-chain length C_{12} and average degree of chlorination 60% were tested for carcinogenicity by oral administration in one strain of mice and in one strain of rats. In mice, it increased the incidence of hepatocellular tumours in animals of each sex and of alveolar /bronchiolar carcinomas in males and of follicular-cell tumours of the thyroid gland in females. In rats, it increased the incidences of hepatocellular tumours in animals of each sex, of follicular-cell tumours of the thyroid in females and of mononuclear- cell leukaemia in males.

[10] UNEP RBAPTS EUROPE REPORT 2002

[11] BKH Report (2000), Towards the establishment of a priority list of substances for further evaluation of their role in endocrine disruption. Commissioned by European Commission DG Env M0355008/1786Q. BKH and TNO: Delft.
Available at http://ec.europa.eu/environment/docum/pdf/bkh_main.pdf

[12] UNEP RBAPTS EUROPE REPORT 2002

[13] United Nations Environment Programme, International Labour Organisation & World Health Organization International Programme on Chemical Safety, Environmental Health Criteria 181, Chlorinated Paraffins Available at http://www.inchem.org

[14] Wisconsin Department of Natural Resources, 01 S. Webster Street . PO Box 7921 . Madison, Wisconsin 53707-7921 . 608.266.2621

Hence the International Agency for Research on Cancer considers there is *sufficient evidence* for the carcinogenicity of a commercial chlorinated paraffin product of average carbon-chain length C_{12} and average degree of chlorination 60% in experimental animals.

Chlorinated paraffins of average carbon-chain length C12 and average degree of chlorination approximately 60% are possibly carcinogenic to humans (Group 2B)[15].

IARC also found that the administration of some chlorinated paraffins to rodents also resulted in nephrotoxicity and proliferation of smooth endoplasmic reticulum and peroxisomes in hepatocytes.

Effects of Chlorinated Paraffins on Rat Liver Microsomal Activities
In this study, the short term effects of chlorinated paraffins with different length of the carbon chain and different degree of chlorination were investigated with respect to rat liver cytochrome P-450 mediated metabolism and liver cell morphology. When paraffins were administered by i.p. injection, liver weights increased inversely with the length of the carbon chain. The short carbon chain paraffins with a high degree of chlorination increased the concentration of liver microsomal cytochrome P-450, inhibited the metabolism of 7-ethoxyresorufin but increased the metabolism of benzo(a)pyrene, especially the formation of the 4,5-diol metabolite. Short carbon chain paraffins gave rise to a proliferation of the smooth ER, increased the number of cytoplasmic fat droplets as well as the number and size of mitochondria and peroxisomes and finally induced the occurrence of autophagosomes and lysosomes. The fat droplets were preferentially degraded in lysosomes. In all respects the long carbon chain paraffins were less biologically active. [16]

(c) Environmental fate (provide summary information and relevant references)

When released to the environment, SCCPs are expected to be stable and degrade only slowly. They will bind strongly to soils and sediments and there is a high potential for bioaccumulation, supported by the limited available data. Long range transport through the air also appears to occur.[17]

Ecological Effects:
SCCPs may be considered highly toxic to aquatic invertebrates and algae, although in instances the EC50 values exceeded the highest mean measured concentrations of the test substance employed in the study. Some results exceeded the limit of solubility.[18]

[15] International Agency for Research on Cancer (IARC) - Summaries & Evaluations CHLORINATED PARAFFINS (Group 2B) VOL.: 48 (1990) p. 55
Available at http://www.inchem.org

[16] Odd G. Nilsen , Rune Toftgård & Hans Glaumann, Effects of chlorinated paraffins on rat liver microsomal activities and morphology, *Journal of Toxicology* Vol. 49: 1: 1-13
Available at http:// http://www.springerlink.com

[17] NICNAS SCCP 2004

[18] NICNAS SCCP 2004

Toxic Effects of SCCP in Xenopus laevis Frog
The study results indicated significant developmental toxicity of SCCPs to aquatic organisms along with inductions of specific biochemical toxiciy mechanisms. The growth inhibitors and malformations observed in the study may indicate possible effects of SCCP on thyroid regulation which in turn affected embryonic development. The embryotoxicity and teratogenicity potential for SCCPs was demonstrated. [19]

Chemical/physical properties

SCCPs and MCCPs are viscous liquids of very low volatility which are not hydrolysed in water and are not readily or inherently biodegradable. They have a high log Kow value (4.39 to 8.69 and 5.47 to 8.21), indicating a high potential for bioaccumulation. High bioconcentration factors for SCCPs, ranging from 1,000 to 50,000 for whole body, with high values for individual tissues, have been reported with a variety of freshwater and marine organisms. SCCP exhibit PBT characteristics, including the estimated atmospheric half-life of 1.9-7.2 days for SCCP, raising concerns with regard to long-range transport. [20]

NICNAS 2004 report that the LogKow values increase with the number of heavy atoms (carbon plus chlorine). The lowest LogKow value reported in the NICNAS 2004 report is 4.39 for C10-13 with 49% chlorine, increasing to a LogKow value of 8 with 71% chlorine.[21]

Properties are largely depending on the chlorine content. Based on the EU risk assessment, the values for SCCPs are water solubility: 150 to 470 ug.l-1 at 20°C; vapour pressure: 1.6 x 10-4 mm Hg (0.021 Pa) at 40°C (with predicted range for C10-30% chlorine to C13-70% chlorine of 3.3 x 10-4 to 6.0 x 10-8 mm Hg at 20°C). [22]

Persistence

SCCPs are persistent in water. The available screening studies indicate that the half-life for mineralization is likely to be greater than 60 days in marine water and greater than 180 days in marine sediment. [23]

[19] Sublethal Toxic Effects and Induction of Gutathione S-transferase by Short chain Chlorinated Paraffins (SCCPs) and C-12alkane (dodecane) in Xenopus laevis Frog Embryos. *Acta Vet. Brno* 2006:75:115-122

[20] WWF Detox Campaign Clean Baltic within REACH, How can a new chemical policy contribute to the protection of the Baltic Sea? January 2005 Available at http://www.panda.org/detox

[21] NICNAS SCCP 2004

[22] UNEP RBAPTS EUROPE REPORT 2002

[23] EU. RAR (European Union Risk Assessment Report). Office for Official Publications of the European Communities: Luxembourg. Available at http://ecb.jrc.it/existing-chemicals/

A short chain length paraffin (C_{10-12}) with 58% chlorination CP-SH) was not readily biodegraded by activated sludge, under either aerobic or anaerobic conditions, over a 28-day period in an inherent biodegradability (modified Zahn-Wellens) test or a 51-day period in a coupled units test.[24]

How are chemical/physical properties and persistence linked to environmental transport, transfer within and between environmental compartments, degradation and transformation to other chemicals?

The half-life in air of SCCPs is estimated to be between 1.9 and 7.2 days, long enough for significant long-range transport to occur.[25]

Where released to the environment, the compounds are expected to be stable, both microbially and abiotically although partial hydrolysis may be observed. However, SCCPs with low chlorine contents (e.g. <50% wt Cl) may biodegrade slowly in the environment, particularly in the presence of adapted microorganisms. Certain bacteria have also been shown to dechlorinate short chain chlorinated paraffins with high chlorine contents. Therefore, under certain conditions, biodegradation of these compounds might also be expected to occur slowly in the environment.

When released to land, SCCPs should bind strongly to the organic component of soils and be immobile. In the event of release to water, movement from the water column is likely to be rapid with the compounds partitioning to sediments and biota.

Otherwise, they may volatilise to the atmosphere where they are expected to bind strongly to atmospheric particles, and potentially undergo long-range atmospheric transport further increasing environmental exposure. [26]

Bio-concentration or bio-accumulation factor, based on measured values **(unless monitoring data are judged to meet this need)**

SCCPs meet the UNEP POPs criterion for bioaccumulation, as BCFs of over 5,000 have been measured in fish and in the common mussel. [27]

The Environmental Health Criteria report that after 60 days exposure of mussels *(Mytilus edulis)* to a short chain length paraffin with 58% Cl (CP-SH) at measured concentrations of 13 and 130 µg/litre, whole body BCFs were 25, 292 and 12 177, respectively.

[24] United Nations Environment Programme, International Labour Organisation & World Health Organization International Programme on Chemical Safety, Environmental Health Criteria 181, Chlorinated Paraffins

[25] EU RAR 2000

[26] NICNAS SCCP 2004

[27] EU RAR 2000

After exposure of mussels *(Mytilus edulis)* for 147 days to ^{14}C-labelled short chain length chlorinated paraffin with 58% Cl CP-SH) followed by a depuration period of 98 days (measured exposure dose: 2.3 µg/litre), or for 91 days followed by 84 days of depuration (measured exposure dose: 10.1 µg/litre), plateau levels of the chlorinated paraffin in tissues were reached.

Bioconcentration factors (BCFs) at the plateau levels were 40,900 for whole mussel tissue after exposure to 2.35 µg/litre and 24 800 after exposure to 10.1 µg/litre based on wet tissue basis. Of the different organs the digestive glands had the highest BCF values of 226 000 (low exposure) and 104 000 (high exposure). Half-lives for the chlorinated paraffin in whole mussel tissue were 9.2-9.9 days (10.1 µg/litre) and 13.1-19.8 days (2.35 µg/litre)

In female mice, uptake was found to be highest in tissues with high cell turnover/high metabolic activity, e.g., intestinal mucosa, bone marrow, salivary glands, thymus and liver. Exposure of late gestation mice showed transplacental passage and was primarily noted in the liver, brown fat and intestine of the fetuses.

In rats, following administration of an unspecified single dose by gavage of ^{14}C-labelled chlorinated paraffin (C_{10-13};58%chlorination, CP-SH) radioactivity was found in the liver, kidneys, adipose tissue and ovaries. [28]

(d) Monitoring data **(provide summary information and relevant references)**

Humans
SCCPs have also been found in three samples of breast milk taken from women living along the Hudson Straight at levels of 10.6-16.5ng/g lipid. [29]

Chlorinated paraffins have been measured in 24 tissue samples with levels up to 600 µg/kg of C_{10-20} in adipose tissue (median level: 100-190 µg/kg), up to 500 µg/kg in kidney (median level below 90 µg/kg) and up to 1500 µg/kg in liver (median level below 90 µg/kg).[30]

A 2003 Review [31] of SCCPs for the Canadian Environmental Protection Act, 1999 reported concentrations of SCCP (C10–13, 52% chlorine) ranging from 11 to 17 ug/kg in human breast milk in Canada.
Other media monitoring reported in the Canadian 2003 Review of SCCPs include:

Air :

[28] Environmental Health Criteria 181, Chlorinated Paraffins

[29] EU RAR 2000

[30] Environmental Health Criteria 181, Chlorinated Paraffins

[31] Canadian Environmental Protection Act 1999, Follow-up Report on a PSL1 Substance for Which Data Were Insufficient to Conclude Whether the Substance Was "Toxic" to Human Health Chlorinated Paraffins October 2003 Available at http://www.ec.gc.ca/substances/ese/eng/psap/assessment/chlorinated_paraffins_waxes_followup_hc_synopsis_en.pdf

The Canadian 2003 review reports the detection of SCCP (C10–13, 60–70% chlorine) in 24-hour air samples collected daily during a 4-month period in the summer of 1990 in Egbert, Ontario, a "rural site northwest of Toronto." Concentrations ranged from 65 to 924 pg/m3.

Local Fish:
A 1999 analysis of whole fish samples for SCCP (C10–13) detected 2630 ng/g (wet weight) in carp from Hamilton Harbour, 58.8 ng/g (wet weight) in lake trout from Niagara- on-the-Lake and 72.6 ng/g (wet weight) in lake trout from Port Credit.

Sediments:
The concentrations in surface sediment in harbours in Lake Ontario ranged from 5.9 to 290 ng/g dry weight.

Food:
In a market basket survey of 234 ready -to-eat foods, "Chlorowax 500C" was detected once in enriched white bread, at a concentration of 0.13 ug/g.

(e) Exposure in local areas **(provide summary information and relevant references)**

- general

Sewage treatment plant effluent, sediments, water and fish from around Lake Ontario have been analysed for SCCP. Concentrations in water were found in the ng/L range. In fish, 100 ng/g ww has been detected. One of the highest concentrations found was in Fox Lake surface sediment in the Yukon at 250 ng/g.[32]

5.1 Exposure data

- as a result of long-range environmental transport

SCCPs are found in Arctic biota, including seals and beluga whales (with a mean of 142 ng/g wet wt in 6 whales from Kimmirut in 1995), showing that long-range transport can occur.[33] This is confirmed by findings of SCCPs in fish at Ellasjoen, at a latitude of 74oN in the Norwegian Arctic, which is far from any point source. [34]

[32] United Nations Environment Program Regionally Based Assessment of Persistent Toxic Substances, NORTH AMERICAN REGIONAL REPORT, December 2002, Global Environment Facility

[33] Muir, D. Bennie, D. Teixeira, C. Fisk, A. Tomt, G. Stern, G and Whittle, M. (2001), Short chain chlorinated paraffins: Are they persistent and bioaccumulative? (in) In Persistent, Bioaccumulative and Toxic Chemicals II: assessment and new chemicals (ed) Lipnick R.L et al. American Chemical Society: Washington DC
Available at http://www.worldwildlife.org/toxics/pubs/New_POPs_FINAL.pdf

[34] COM010_env_NI-LRTAP (2003), Comments from Norwegioan Pollution Control Authority (Marit Kopangen and Toralf Kaland). 26 March 2003. Submitted to ECB as comments on EU SCCP risk assessment report. Available at http://www.worldwildlife.org/toxics/pubs/New_POPs_FINAL.pdf

Jansson [35] found SCCPs in a range of species including:

- Herring - 1,400 ug/kg in muscle (5.4% fat),1,500 ug/kg in muscle (4.4% fat), 1,600 ug/kg in muscle (3.2% fat)
- Grey Seals - 280 ug/kg lipid, in blubber (74% fat) from Pooled sample in and around Sweden, 1982-198
- Osprey - 530 ug/kg lipid, in muscle

In a NERI examination of a traditional Greenland diet,[36] a subset of samples (blubber and skin from marine mammals collected between 1999 and 2001 was analysed for SCCPs.

Table of Concentrations of Short Chain Chlorinated Paraffins, SCCPs (ng/g wet weight) in marine mammal samples from West Greenland. Samples collected between 1999 and 2001

Species	Tissue	N	Stat	Total C10	Total C11	Total C12	Total C13	∑-SCCPs
Ringed seal	Blubber	6	Mean	4.6	<1.0	2.8	2.6	10.5
			SD	6.3		3.6	3.2	13.1
Harp seal	Blubber	5	Mean	<0.9	<0.9	<0.9	1.1	2.4
			SD				1.4	1.4
Beluga	Blubber	5	Mean	141.9	79.8	26.9	33.6	282.2
			SD	71.2	37.3	14.0	18.4	140.8
Narwhal	Blubber	5	Mean	50.0	24.6	7.6	14.3	96.5
			SD	25.4	11.9	4.5	7.5	49.2
Minke whale	Skin	5	Mean	1.8	0.5	0.7	1.0	4.0
			SD	3.4	0.6	1.0	1.7	6.6

NERI reports that levels were much higher in beluga and narwhal blubber than in seal blubber and minke whale skin. These results confirm previous studies which, reported concentrations of total SCCPs in beluga blubber of 110 to 250 ng/g wet weight. In contrast, in ringed seal blubber, SCCP concentrations were 10-15 times lower in West Greenland than in the eastern Canadian Arctic. In walrus blubber, SCCP concentrations were higher in eastern Greenland (360-490 ng/g wet wt) than in other Arctic marine mammals studied.

A 2005 study [37] investigated of concentrations of congener group patterns of SCCPs and medium-chain chlorinated paraffins (MCCPs) in fish from the North and Baltic

[35] Jansson, B. et al., "Chlorinated and brominated persistent organic compounds in biological samples from the environment", *Environ Toxicol Chem*, 12 (1993): 1163-1174.
Available at http://www.mindfully.org/Plastic/Flame-Retardant-Exposure-PBDE.htm

[36] Paul Johansen, Derek Muir, Gert Asmund & Frank Riget, National Environmental Research Institute Ministry of the Environment. Denmark, Contaminants in the traditional Greenland diet. NERI Technical Report, No. 492 2004 Available at http://www.dmu.dk

[37] Reth M, Zencak Z, & Oehme M, First study of congener group patterns and concentrations of short-

Sea. North Sea dab, cod and flounder were studied. SCCP concentrations ranged between 19 and 286 ng/g liver wet weight (ww) while MCCP concentrations were comparable with a range of 25-260ng/gww. In samples from the Baltic Sea the SCCP congener pattern was similar to that of commercial SCCP mixtures with C[13] congeners being most abundant. In samples from the North Sea a higher relative abundance of C[10] congeners was observed.

In a 2006 [38] study, SCCPs and MCCPs were quantified in liver from Arctic char and seabirds (little auk and kittiwake) collected at Bear Island (European Arctic) as well as in cod from Iceland and Norway. CP concentrations were between 5 and 88 ng/g wet weight (ww) for SCCPs and between 5 and 55 ng/g ww for MCCPs with one exception of 370 ng/g measured in a liver sample from little auk. The SCCP homologue group patterns were compared with those of technical mixtures and of SCCPs present in cod liver from the Baltic Sea. The latter showed a more common SCCP homologue distribution (sum of C(11) and C(12)>60%) in contrast to cod liver from the Northwest of Europe, which had a high abundance of C(10) and C(12) congeners. Seabirds from Bear Island contained an equally distributed SCCP homologue group pattern. In Arctic char, the SCCP distribution was closer to technical products, but with a high proportion (average of 18.9%) of C(10) congeners. A comparison of C(10)/C(12) ratios confirmed the higher abundance of C(10) congeners in samples from higher latitudes. For the first time, MCCPs could be detected in Arctic samples. The average proportion of C(14) congeners was 65.8%. The C(14)/C(15) abundance ratio was similar to technical mixtures. High-chlorinated CPs (Cl(>7)) were also detectable. The average chlorine content of the SCCPs was 61.9% (59.0-63.3%), and that of the MCCPs 55.8%.

In a 2005 study,[39] sediments collected from the North and Baltic Seas during monitoring campaigns in 2001–2003were shown to have SCCP and MCCP concentrations of between 5 and 499 ng/g dry weight. In general, Baltic Sea sediments were more highly contaminated by CPs than the North Sea was. However, concentrations related to the total organic carbon content were on the same order of magnitude due to the higher organic content in the Baltic Sea.

The 2003 review [40] for the Canadian Environmental Protection Act identified concentrations of SCCP in blubber of ringed seal, beluga and walrus from animals in

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and medium-chain chlorinated paraffins in fish from the North and Baltic Sea. *Chemosphere* 2005, vol. 58: 7: 847-854 http://www.ncbi.nlm.nih.gov/entrez

[38] Margot Reth , Anita Ciric , Guttorm N Christensen , Eldbjørg S Heimstad & Michael Oehme Short- and medium-chain chlorinated paraffins in biota from the European Arctic - differences in homologue group patterns. *Sci Total Environ*. 2006 Mar 3. http://www.ncbi.nlm.nih.gov/entrez

[39] Jan Hüttig & Michael Oehme, 2005 Presence of Chlorinated Paraffins in Sediments from the North and Baltic Seas, *Journal of Env. Contamination* Vol 49: 4 pp 449-456
Available at http:// http://www.springerlink.com

[40] Canadian Environmental Protection Act, 1999, Follow-up Report on a PSL1 Substance for Which Data Were Insufficient to Conclude Whether the Substance Was "Toxic" to Human Health Chlorinated Paraffins October 2003

Greenland, the Canadian Arctic and the St. Lawrence River. A mean concentration of 46 100 ng/g (n = 15) was reported for beluga from the St. Lawrence River/Gulf of St. Lawrence and concentrations in ringed seals from Ellesmere Island ranged from 370 to 770 ng/g.

- information regarding bio-availability

(f) National and international risk evaluations, assessments or profiles and labelling information and hazard classifications, as available **(provide summary information and relevant references)**

In 1998, SCCPs were the subject of an International Declaration in which EU countries, Iceland, Norway, and Switzerland shared "the objective of controlling and limiting the risks arising from the dispersive uses of short-chain chlorinated paraffins using appropriate national and/or international procedures". [41]

Subsequently, in March 2003, the LRTAP Working Group reviewed the Draft II dossier of 3 March 2003 on SCCPs and their expert judgment based on the dossier was that SCCPs met the criteria for UNECE POPs.[42]

Chlorinated paraffins are considered a hazardous air pollutant by the Wisconsin's Administration Code and is regulated under Wisconsin's Air Management Program.[43]

(g) Status of the chemical under international conventions

[41] ECE/EB.AIR/57. (1998) Annex II, Executive Body for the Convention on Long-Range Transboundary Air Pollution, Report of the special session 24 June 1998.

[42] COM010_env_NI-LRTAP (2003), Comments from Norwegian Pollution Control Authority (Marit Kopangen and Toralf Kaland). 26 March 2003. Submitted to ECB as comments on EU SCCP risk assessment report.

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