IPEN
for a toxics-free future

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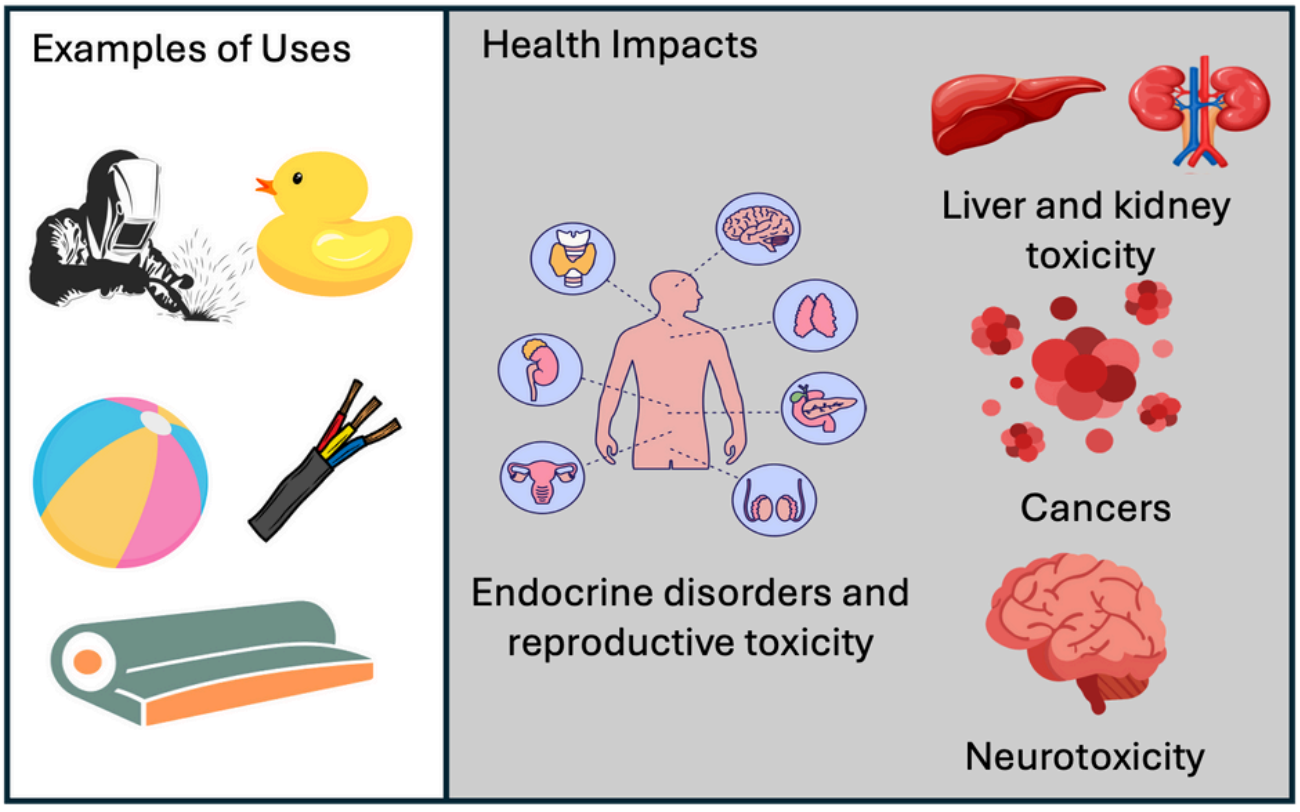
GUIDE TO NEW POPs: MEDIUM-CHAIN CHLORINATED PARAFFINS

Introduction

The POPs Review Committee has recommended three new chemicals be listed for global elimination at the 2025 Stockholm Convention COP: chlorpyrifos, medium-chain chlorinated paraffins (MCCPs), and long-chain perfluorocarboxylic acids (LC-PFCAs). IPEN's guides briefly describe why each of these hazardous chemicals should be globally banned, without exemptions.

What are MCCPs?

Chlorinated paraffins (CPs), also known as polychlorinated n-alkanes, are a large group of high production volume industrial chemicals that are often classified into subgroups according to their carbon chain length. Medium-chain chlorinated paraffins (MCCPs) have a chain-length of C14-C17 and are used in metal working fluids and as flame retardants, plasticizers, and additives in plastics. Since short-chained chlorinated paraffins (SCCPs) were listed in Annex A of the Stockholm Convention for global elimination in 2017, MCCPs have become hazardous (sometimes called “regrettable”) substitutes used to replace SCCPs. Production of MCCPs now exceeds that of SCCPs.



Health and environmental consequences

MCCPs are ubiquitous pollutants in the global environment and found in fish, birds, mammals, and humans, including in remote regions. They are found in many household products that can result in human exposures including hand blenders, **toys**, ovens, cable sheathing, adhesives, as well as in food. Studies have also shown a wide range of **human health impacts,** including that MCCPs adversely affect the liver, kidney, and the thyroid gland. MCCPs are frequently measured in higher concentrations than SCCPs in the environment and a recent study found that MCCPs were the most abundant of the CP groups measured in human breast milk.

MCCPs fulfill the criteria for listing

MCCPs are widely found in **marine Arctic biota**, including mussels, fish, seabirds, seals, whales, and polar bears, providing strong evidence that **MCCPs undergo long-range transport** to remote regions and are transported far from where they are used. This has been further evidenced by findings of relatively high concentrations in Arctic fish.

Multiple studies have also shown that **MCCPs are persistent** in the environment and degrade slowly. This is also supported by their presence in sediment cores from the 1940s and 1950s, which demonstrate that MCCPs persist in sediment over decades.

Several studies have shown that **MCCPs bioaccumulate**, that is, levels of MCCPs build up in living beings.

MCCPs are toxic to aquatic invertebrate organisms and impair reproduction in earthworms. In rainbow trout, exposure to MCCPs was associated with behavioural impacts and harmful effects on the liver and thyroid. Studies of prenatal effects on rabbits and rats showed reduced fetal body weight. MCCPs also affected postnatal development, with exposures resulting in reduced pup body weight and survival. Moreover, MCCPs adversely affect the liver, kidney, and the thyroid gland.

MCCPs are POPs and have been found to be likely, as a result of their long-range environmental transport, to lead to significant adverse human health and environmental effects such that global action was warranted. They should therefore be listed in Annex A for global elimination with no or very limited exemptions.

Proposed action from the POPRC

The POPRC recommend listing MCCPs in Annex A. In addition to calling for the listing, the draft decision also includes:

1. A note on chemical identity
2. A note on what are and are not considered unintentional trace contaminants
3. A list of potential exemptions

Below we review these three points and provide recommendations for the upcoming negotiations, including how to ensure traceability of these POPs.

Chemical Identity

There are different ways of identifying MCCPs. They can for example be identified by chain-length, by average chlorination level, and by chemical formula. During the evaluation process, submissions by the EU and Switzerland suggested that the identity of MCCPs would be best defined by using the chemical formula instead of the average chlorination level. IPEN agrees that this would be the most suitable way to define the chemical identity because:

- These are the substances that have been identified as POPs by the POPRC (as noted in note [viii] of the recommendation).
- It would make implementation and monitoring significantly more effective.
- It would provide the best protection for human health and the environment from what is often the dominant group of MCCPs found in environmental and biomonitoring samples.
- It would make it easier for industries to consistently implement the same rules globally.

Defining MCCPs by the chemical formula would provide better protection of human health and the environment from POPs because commercial mixtures will contain high levels of the MCCPs that have higher number of chlorine atoms (and have been identified as POPs) than average chlorination levels would suggest. Identifying them only based on average chlorination level would therefore mean that mixtures with high concentrations of POPs would still be allowed on the market. It is also the approach that would be most suitable, since MCCPs with a C14 chain length (which have been identified as POPs by the POPRC) are often among the most common MCCPs in environmental samples (e.g. Reth et al. 2006 and Du et al. 2019). Therefore, while the note [viii] in POPRCs recommendation helps to provide some clarity, it would be more straightforward to list the chemical formulas of the MCCPs that have been found to be POPs as the chemical identity of the MCCPs.

The substances that have been identified as POPs are listed in [viii]. These chemical formulas should be listed in the decision-table.

Concentration limit for unintentional trace contaminant

Chlorinated paraffins are a type of mixture known as UVCBs (unknown or variable composition, complex reaction products or biological materials). In practice, this means that mixtures of SCCPs or LCCPs can contain MCCPs and vice versa. However, manufacturers can control the concentrations of MCCPs through careful selection of alkane feedstocks as starting material. For chemicals under the Stockholm Convention, there is a general note regarding unintentional trace contaminants (note 1 Annex A) stating that:

> "*Except as otherwise specified in this Convention, quantities of a chemical occurring as unintentional trace contaminants in products and articles shall not be considered to be listed in this Annex.*"

However, given that chlorinated paraffins are UVCBs, the line between what is an unintentional trace contaminant and what is not may not always be clear. To distinguish between when the note above should apply and when it should not, POPRC included a recommendation, as outlined in Part [XIII] paragraph 2 clarifying that MCCPs should not be considered unintentional trace contaminants if they are above three percent per weight in substances or mixtures.

IPEN supports defining what is considered an unintentional trace contaminant in mixtures, but the concentration limit should be lowered to 1% and the intention to decrease this concentration limit over time should be retained.

There is also a suggestion to include a time-limited exemption for the concentration limit. This request is unsuitable as it would lead to high continued exposures under the guise of "unintentional contamination" and should therefore be removed from the decision.

Moreover, in paragraph 4, the recommendation also includes steps to ensure traceability (further described below). IPEN strongly supports those suggested steps.

Parties should retain paragraph 2 and 4 of Part [XIII] but remove part 3 and decrease the percentage for unintentional trace contamination from 3 to 1% per weight. No exemptions should be granted for this concentration limit.

Exemptions

Alternatives to MCCPs for all applications are available, economically feasible, and widely in commercial use. Still, the POPRC recommendation in 2023 includes a long list of proposed exemptions, including several vague, broad categories as outlined below. Overall, these broad and vague exemptions will lead to continued exposure and associated health impacts of these toxic chemicals. Recent research has also highlighted that these exemptions will create **large volumes of hazardous wastes** in coming years.

Below we describe these proposed exemptions and show why they should not be allowed.

PVC for use in wires and cables in the construction sector
This is a large sector and the typical content of MCCPs in these types of applications is 10-15%. While the Risk Management Evaluation (RME) notes that there is no single chemical that can be used as a drop-in alternative, there is no requirement for drop-in alternatives under the Convention and this should not be seen as a valid argument for providing such a broad exemption. This is especially true since alternative formulations have been commercially available since 2017. **KEMI** evaluated alternatives for MCCPs in PVC in electrical and electronic equipment and noted that "…MCCPs can be substituted, and technical feasible alternatives can be found."

Furthermore, **KEMI** calculated that the quantifiable costs for restricting use of MCCPs would be €0.004 per kilogram of electrical and electronic equipment and noted that "Clearly, the day-to-day fluctuations in currency exchange rates and the prices of raw materials are far more important than this cost."

Alternatives are available and feasible. Exemptions are therefore not justified for this application.

PVC for calendared films in the packaging field, excluding food packaging
The RME notes that "Further insight into this specific use category in China (e.g. regarding the technical and economic feasibility of alternatives, volumes of use in this sector etc.), has not been possible from the data gathered in the development of this document." POPRC found in their Risk Management Evaluation (**UNEP-POPS-POPRC.19-9-Add.1**) that technically feasible alternative substances or technologies are available for PVC.

Exemptions for this application are not justified.

PVC for rubber and plastic insulation materials
The RME notes that "Further insight into this specific use category in China (e.g. regarding the technical and economic feasibility of alternatives, volumes of use in this sector etc.), has not been possible from the data gathered in the development of this document." Moreover, **Chen et al (2024)** note that foam insulation materials in the future will be a major source of MCCPs due to release from wastes. POPRC found in their Risk Management Evaluation (**UNEP-POPS-POPRC.19-9-Add.1**) that technically feasible alternative substances or technologies are available for PVC.

Exemptions for this application are not justified.

Adhesives and sealants for waterproof coatings and anti-corrosion coatings
The RME notes that "Further insight into this specific use category in China (e.g. regarding the technical and economic feasibility of alternatives, volumes of use in this sector etc.), has not been possible from the data gathered in the development of this document." **A report from 2011** showed that industries were voluntarily phasing out the use MCCPs in coatings, due to the environmental and health concerns, indicating wide availability of alternatives since more than a decade back.

Exemptions for this application are not justified.

Adhesives sealants and tape for the aerospace and defence applications
The submissions from the aerospace industry were more narrowly defined than what is reflected in this list, and it is unclear why the authors have chosen to expand the recommendation beyond what has been requested.

There are already alternatives that would be suitable for these applications and neither the narrow requested exemptions nor the broader exemptions are justified.

Metalworking fluids in professional or industrial settings with collection systems, until 2036, limited to use as extreme temperature and pressure additives for metal working fluids used in heavy duty processes for the production and repair of metal alloy components such as those used in (…list of examples)
The proposed exemption for "heavy duty processes" for metal working fluids is ill-defined and unjustified. CP-free alternatives are available and in use for aerospace, defense, automotive, medical, and other manufacturing applications requiring extreme pressure and temperatures. Bio-based metal working and cutting fluids provide **an effective and safer alternative** to the use of chlorinated paraffins for use in stainless steel, titanium, platinum, and aircraft aluminum applications. For example, use of non-chlorinated metal working fluids for machining of titanium alloys to make parts for all aircraft, aluminium, alloys of titanium, and stainless steel (see, for example, **CheMetall, The Fabricator** and **Aerospace Manufacturing and Design**)

Alternatives to MCCPs for all applications are available, economically feasible, and widely in commercial use. MCCPs should therefore be listed in Annex A without specific exemptions.

Traceability

IPEN supports the traceability note in paragraph 4 of Part [XIII], as this would improve implementation. However, to ensure that products, articles in use, and wastes containing these POPs can be identified and managed throughout the full life cycle, it important that the note also include a reference to importers and exporters, in addition to manufacturers, so that the note reads:

> "Each party shall require that manufacturers, importers and exporters of chlorinated paraffins products within their jurisdiction disclose information on the concentration of C14-C17 polychlorinated alkanes in these products…"

Moreover, should any exemptions be granted for the listed substance, these should be accompanied with a reference to traceability through an additional note. This could be achieved through adding similar text, as was used in the listing for hexabromocyclodecane, which could then read:

> "Each Party that has registered for an exemption pursuant to Article 4 for the production and use of MCCPs shall take necessary measures to ensure that products, articles and wastes containing these congeners can be easily identified by labelling or other means throughout its life cycle."