# Chlorinated Paraffins

TIER 1
POSSIBLE CONCERN

MEG SEDLAK,
San Francisco Estuary Institute
[meg@sfei.org]

## Quick Summary

Chlorinated paraffins (CPs) are chlorine-containing compounds related to paraffin wax that are primarily used as lubricants and coolants in the metal forming and cutting industries. CPs accumulate in biota; however, concentrations observed to date in Bay seals, fish, and birds are very low. CPs are exceedingly difficult to analyze; toxicity and occurrence data are sparse. As a result, they are classified as Tier 1.

## What Are They?

- CPs are chlorine-containing compounds related to paraffin wax. They are grouped into three classes: short-chained (carbon chain length between 10 and 13, SCCP); medium-chained (between 14 and 17, MCCP) and long-chained (greater than 17, LCCP).
- CPs are classified as highly persistent in the environment, bioaccumulative (accumulating in biota), and toxic to aquatic organisms (Environment Canada 2008, USEPA 2009). SCCPs are believed to be more toxic to aquatic organisms than MCCPs and LCCPs.

## What Are They Used For?

- CPs have been used as lubricants in metal forming and cutting industries since the 1930s. They are also used as a plasticizer and as a flame retardant in plastics. Minor uses include paints, rubber formulation, adhesives and sealants.
- In 2009, the estimated annual use of CPs was more than 150 million pounds per year in the US. MCCPs have the largest use in North America. Production of CPs in China was almost 600 million pounds in 2002 (Bayen et al. 2006) and production in India appears to be growing as well.

## How Are They Getting Into the Bay?

- It is not known how CPs enter the Bay; however, it is likely that wastewater treatment plant effluent is one pathway.
- The largest source of CPs to wastewater treatment plants is spent metal-cutting fluids and wash-off from metal-forming equipment and surfaces, followed by the leaching of CPs from polyvinyl chloride processes and products, rubber, adhesives, and paints (Environment Canada 2008).
- Landfill leachate is also a suspected source of CPs (Environment Canada 2008).

## What Happens to Them in the Bay?

- CPs are viscous oils or solids. They have a strong tendency to adsorb to soil and sediment particles and to bioaccumulate (Bayen et al. 2006). They are very stable compounds.
- In a limited study of Bay biota, CPs were measured at very low concentrations in harbor seal blubber and bird eggs. CPs were not detected in sport fish.

**Concentrations observed in Bay biota are substantially lower than elsewhere and well below available effect thresholds**

## Is There a Risk of Harm in the Bay?

- Limited toxicological information exists; however, the concentrations observed in the Bay are substantially lower than elsewhere and low relative to other legacy pollutants (Santos et al. 2006, Houde et al. 2008, and Bayen et al. 2006).
- CPs are known to cause narcosis and liver lesions (Cooley et al. 2001). Concentrations in Bay biota, however, are well below available effect thresholds.

## Management

- CPs were a high production volume chemical (produced or imported in excess of 1 million pounds per year) in the late 1990s. Only one US firm produces CPs (Dover Chemical ). As part of a settlement agreement with USEPA, Dover ceased production of SCCPs. SCCPs are also being phased out in Europe. MCCPs and LLCPs, however, remain widely used.
- SCCPs are a priority hazardous substances in the European Union and their use is restricted to less than 0.1% in metal working solutions and leather tanning operations. SCCPs are classified as compounds of very high concern under REACH (PAGE 19).