

# Comments on the findings re short-chain chlorinated paraffins in the Yarra mouth sediments



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A recent media release by the Victorian National Parks Association has detailed findings of chlorinated paraffin hydrocarbons (CPs) in sediments, crabs and mussels sampled by Greenpeace Australia in the Yarra Mouth sediments and analysed in Germany.

Chlorinated paraffins are a class of hydrocarbons that have carbon chain lengths varying from 10 to >18. Short-chain chlorinated hydrocarbons (SCCPs) have 10-13 carbon atoms, medium chain chlorinated paraffins (MCCPs) have 14-17 and long chain compounds (LCCPs) have >18 carbon atoms. SCCPs are being considered for addition to the Stockholm Convention list of persistent organic pollutants (POPs) on the basis that they are highly toxic, accumulate in biota and are not readily degraded in the environment. SCCPs are more water soluble than MCCPs or LCCPs, and are more rapidly bioaccumulated.

Toxicity data for SCCPs show acute effects to daphnids at 18 µg/L and chronic effects at 10 µg/L (Environment Canada, 1993). Algae are less sensitive while toxicity to some fish species and to mussels occurred at 9 µg/L. No data are available for sediment toxicity, with the implication that it is the water exposure route that is significant. The toxicities of MCCPs and LCCPs were in most instances an order of magnitude less than that for SCCPs.

Environment Canada in 1993 estimated a tolerable daily intake (TDI) for humans of 6 µg/kg body weight/day for MCCPs, and 71 µg/kg/day for LCCPs, with no data for SCCPs. More recently, the International Programme on Chemical Safety (IPCS, 1996) estimated a TDI for SCCPs of 100 µg/kg body weight/day with the same values for MCCPs and LCCPs.

NICNAS (2004) reported predicted environmental concentrations (PNECs) for SCCPs in river sediments based on European usage to be 5600 µg/kg. Based on overseas calculations a predicted no effects concentration (PNEC) in sediments was found to be 820 µg/kg, making the PEC/PNEC ratio or hazard quotient in excess of 1 in sediments, indicating a probable risk to benthic organisms.

The results reported by Greenpeace on Yarra River sediment samples showed highest values for C14-C16 paraffins, i.e. mainly MCCPs in sediments, while analysis of crab samples show highest concentrations of C10-C13 paraffins and less in the C11-C16. Mussel samples concentrated C14-C16 paraffins. Based on the NICNAS calculations of PEC/PNEC ratios, the hazard quotient estimated for the C10-C13 SCCPs would be below 1, and greater than 1 in one sample for C14-17 MCCPs.

The concentration of SCCPs found in the Yarra River mussels is near 0.34 µg/g total tissue, so based on the TDI value above, and a mussel wet weight of 15 g, at least 1300 mussels could be safely eaten per day by an adult. Based on total CPs, some 78 mussels could be consumed per day. For crabs, based on a crab wet weight of 50 g, 7 crabs could be safely consumed per day. This would imply no major hazard to human health, from either of these species.

In terms of dredging impacts, the SCCP contaminants in the sediments are likely to have an impact on benthic organisms at some sites, as was the case for some of the other sediment contaminants. There is potential for release of soluble SCCPs during the dredging process, and there may be a case for undertaking elutriate tests on some of the SCCP contaminated

sediments to determine how significant releases might be. Nevertheless, given that these compounds are reasonably hydrophobic and more so with the higher chain lengths, it is unlikely that outside a mixing zone that elevated concentrations would be detected. If the proposed dredging practices are to deal with contaminated surface sediments first and cover them with cleaner material, then I foresee no major need to alter the proposed program on the basis of these findings.

The measurements do however highlight a deficiency in Australian data and the EPA might be encouraged to undertake other measurements for SCCPs to determine the geographic extent of the contamination. It is my understanding that the sites sampled in this study were in close proximity to a chemical factory, so the concentrations might well be fairly localised.

### **References**

Environment Canada (1993). Chlorinated paraffins. Priority Substances List Assessment Report

IPCS, 1996). Chlorinated paraffins, Environmental health criteria 181. International Programme on Chemical Safety Report, United Nations Environment Programme.

NICNAS (2004). Environmental exposure assessment of short chain chlorinated paraffins (SCCPs) in Australia. National Industrial Chemicals Notification and Assessment Scheme Report, Department of Health and Ageing, Canberra

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