

SCCWRP Annual Report 2003-04

Copper emissions from antifouling paint on recreational vessels

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ABSTRACT

Trace metals, especially copper, are commonly occurring contaminants in harbors and marinas. One source of copper to these environs is copper-based antifouling coatings used on vessel hulls. The objective of this study was to measure dissolved copper contributions from recreational vessel antifouling coatings for both passive leaching and hull cleaning activities. To accomplish this goal, three coating formulations including hard vinyl, modified epoxy, and a biocide-free bottom paint were applied on fiberglass panels and placed in a harbor environment. *In situ* measurements of passive leaching were made using a recirculating dome system. Monthly average flux rates of dissolved copper for the hard vinyl and modified epoxy coatings were 3.7 and 4.3 $\mu\text{g}/\text{cm}^2/\text{d}$, respectively, while the flux rate for the biocide-free coating was 0.2 $\mu\text{g}/\text{cm}^2/\text{d}$. The highest passive flux rates were measured initially after cleaning activities and rapidly decreased to a baseline rate within 3 d, regardless of copper-based coating formulation. Hull cleaning activities generated between 8.6 and 3.8 μg dissolved copper/ cm^2/event for the modified epoxy and hard vinyl coatings, respectively. Aggressive cleaning using an abrasive product doubled the copper emissions from the modified epoxy coating, but produced negligible change in the hard vinyl coating. When compared on a mass basis, roughly 95% of copper is emitted during passive leaching compared to hull cleaning activities over a monthly time period for a typical 9.1 m power boat.

Full Text

ftp://ftp.sccwrp.org/pub/download/DOCUMENTS/AnnualReports/2003_04AnnualReport/ar04-schiff_pg41-49.pdf