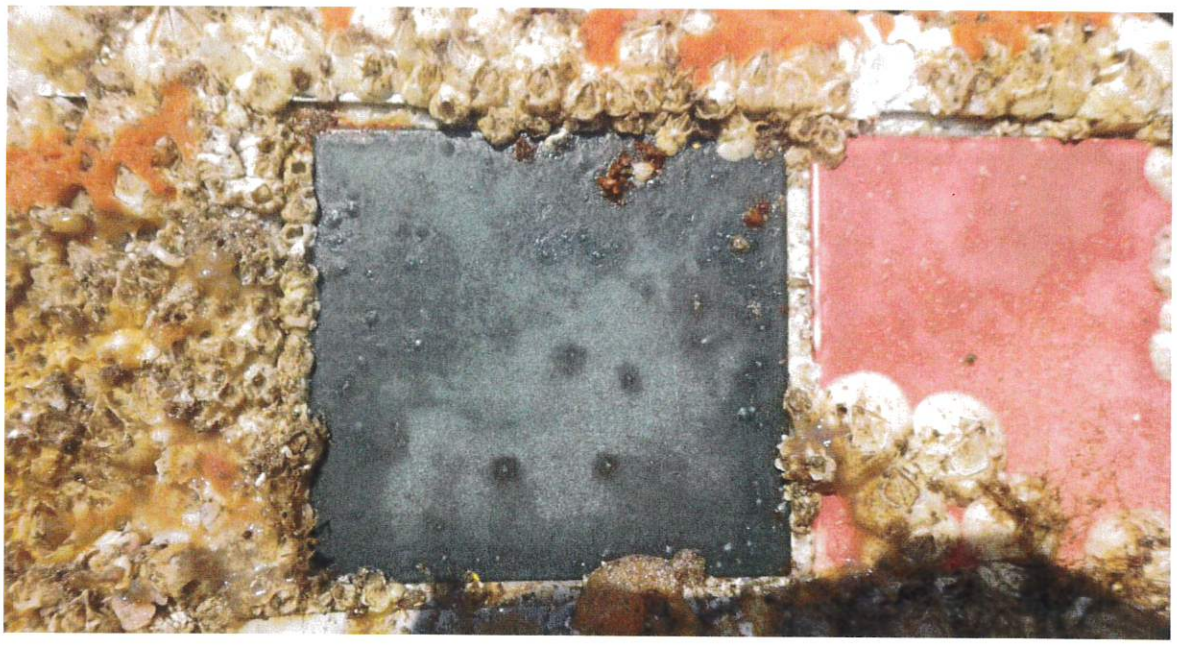
PML | Applications Ltd

Marine Matters

Copper Loss from a Coppercoat Antifouling System over Time

Report V7



Reference:	PMA 257
Client:	Coppercoat
Date:	June 2019
Prepared by:	PML Applications Ltd

Solutions for
Sustainable Seas

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PML Applications is your gateway to accessing the latest in marine research that will benefit your business, especially in ballast water management, biofouling, survey work and satellite remote sensing.

Through our parent company Plymouth Marine Laboratory (a world renowned marine research organisation with over 500 global partners) PML Applications has access to cutting edge marine technology and knowledge, enabling our experts to provide you with independent and impartial advice, assessments, surveys and testing.

Operating in a complex, and often extreme, environment presents numerous challenges, the implications of which can be costly to operators and to the environment itself. We provide services, expertise and guidance to a diverse range of commercial customers and through greater understanding of the marine environment both time and money can be saved.

Specialties

Biofouling, Ballast Water, Ballast Water Treatment Systems, Marine Surveys, Marine Environment Assessment, Remote Sensing, Earth Observation, Harmful Algal Blooms.

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1 Executive Summary

Coppercoat has requested PML Applications Ltd to re-analyse some thickness data describing their antifouling paint from panels deployed in a high energy marine environment for 5 years.

The aim of this work is to calculate the loss of copper to the marine environment over time and make a comparison of this loss rate to another more conventional antifouling coating system.

The Coppercoat paint resulted one of the best performing antifouling systems tested with a mean total loss of thickness of 12.894µm for the whole duration of the experiment.

We bring here for comparison an anonymous Self-polishing AFC which had an estimated loss rate of 0.099µm/day (181.07µm in total) against a rate of 0.0071µm/day for Coppercoat.

From these results we estimate that during the 5 years exposure in the marine environment copper loss totalled to 2600µg/cm² which translates into a copper loss rate of **1.42µg/cm²/day**.

In terms of mean volume loss over the five year period, Coppercoat showed a loss of around 4.3% in terms of coating thickness. In contrast the standard SPC coating lost between 90 – 100% of the copper containing topcoat.

From water velocity measurements taken at the deployment site during the test we have assessed that the *average peak tidal* velocity near the pods was approximately 3.5 knots or **1.8 m/s.** In comparison, commercial ships generally steam at around 17 – 23 knots or 8.74 - 11.83 m/s.

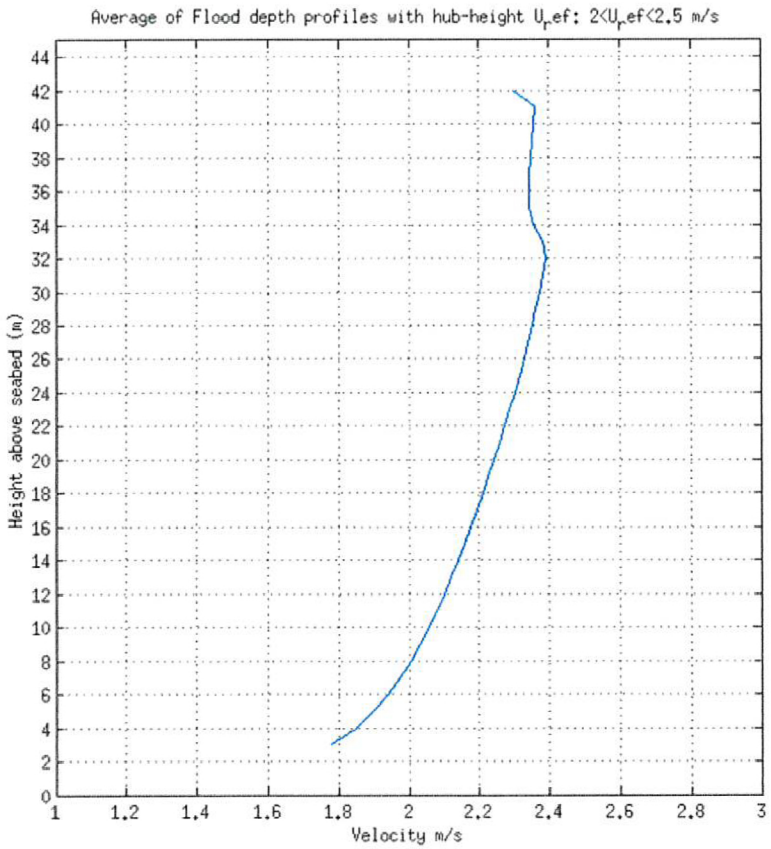

Figure 4: Plot showing the average velocity of water movement with height above the seabed at the tidal site.

Commercial ships generally steam at around 17 – 23 knots or 8.74 - 11.83 m/s. The water near the pods was approximately 3.5 knots or 1.8 m/s. Unfortunately, we do not have access to the tidal velocity throughout the whole tidal cycle. However, based on *average peak velocity* (which is an acknowledged overestimate) we can estimate that the coatings have been subject to an equivalent trip of 283,824km at a speed of 3.5 knots over the five year period.

distance (m) = speed (m/s) x time (s)

where:
speed = 1.8 m/s average peak water velocity (155,520 m/day)
time = 5 years of experiment running (1825 days)
distance = 283,824,000 m (283,824 km)

It is beyond the scope of this report to improve the accuracy of this figure, but with more resource it might be possible to collect data to more accurately define the tidal velocity throughout the whole tidal cycle and get closer to an "equivalent distance" travelled by the coatings.

When comparing coating longevity predictions between the shipping industry and high energy environments, it is important to consider that although the water velocity is generally slower at tidal sites, the wash out rate of any biocides and wear down rate of the coatings is also likely to be influenced by mechanical scouring of water borne debris.