Appendix 2

DPR Copper Antifouling Paint (AFP) Mitigation Recommendations

AB 425 requires that the Department of Pesticide Regulation (DPR), no later than February 1, 2014, determine a leach rate for copper-based antifouling paint used on recreational vessels and make recommendations for appropriate mitigation measures that may be implemented to protect aquatic environments from the effects of exposure. The following list of recommendations is being considered by DPR as part of its current reevaluation of copper AFPs and in response to AB 425 requirements.

Recommendation #1: *Copper AFP registrants reformulate existing products that have leach rates above the leaching threshold set by DPR per AB 425.*

Primary Parties Involved: DPR, U.S. EPA, and copper AFP registrants

Rationale: This mitigation action reduces passive leaching from recreational boat hulls and therefore lowers concentrations of dissolved copper in California marinas. Reformulation will eventually lead to the production and distribution of new products into the marketplace. Note that transition to new formulations may take years to ultimately complete due primarily to constraints associated with boatyard capacity to convert hulls.

Recommendation #2: *Improve the management of in-water hull cleaning practices by relying on best management practices (BMPs) or certification programs to help reduce the amount of copper leaching from boat hulls.*

Primary Parties Involved: Water Boards and in-water hull cleaners

Rationale: Using data from the Earley et al., (2013) passive leaching and in-water hull cleaning study that was conducted under DPR's reevaluation for copper AFPs, DPR calculated that in-water hull cleaning attributes 41-62% of the dissolved copper in coastal marinas depending on the paint type and whether BMPs were used or not. Therefore, management (regulatory or non-regulatory) of in-water hull cleaning could significantly help to lower dissolved copper concentrations in marinas where these activities are common. Data from this study also showed that the use of a specific California Professional Divers Association's BMP employing soft-pile carpet reduces dissolved copper loading by as much as 33% compared to typical non-BMP method. Note that some entities (e.g., Port of San Diego, individual marinas, and the Clean Marina Program) are already experimenting with various forms of restriction on in-water hull cleaning activities.

Recommendation #3: *Explore the possibility of reducing in-water hull cleaning frequency to no more than once per month.*

Primary Parties Involved: DPR, Water Boards, and in-water hull cleaners

Rationale: In some areas, an in-water hull cleaning frequency of three weeks is common in warmer months. A reduction in in-water hull cleaning frequency to once a month results in fewer cleaning events over a three-year period. Such a reduction translates to fewer passive leaching spikes associated with cleaning events. This management practice could potentially be explored in conjunction with Recommendation #2.

Recommendation #4: *As part of reformulation, copper AFP registrants should include painted-hull maintenance information as part of the revised product labels.*

Primary Parties Involved: DPR, U.S. EPA, and copper AFP registrants

Rationale: The aim of this action is to help increase boater awareness that frequent and improper underwater hull cleaning could deteriorate water quality. This manner of outreach will be most effective for boaters who buy AFPs from a retail outlet.

Recommendation #5: *Copper AFP registrants should develop a hull cleaning brochure to be distributed to boaters via boatyards.*

Primary Parties Involved: Copper AFP registrants and boatyards

Rationale: The aim of this recommendation is the same as that for recommendation #2, but it addresses cases where hull painting is done by a boatyard. Boatyard employees can provide these brochures to boat owners when hull painting is completed for their boats.

Recommendation #6: *Increase boater awareness and acceptance of copper AFP alternatives.*

Primary Parties Involved: Boater outreach groups and boating-related agencies (e.g., California Coastal Commission and Department of Parks and Recreation)

Rationale: Dozens of copper AFP alternatives have been formulated and tested for efficacy. Some alternatives, including biocide-free products, are very promising as viable options. Moreover, important product information such as cost to purchase, cost to apply, and maintenance needs and cost have been well-documented. Boaters should be provided with accurate information that could help lead them to select an alternative. Many boater programs and outreach groups exist and could play a role in this campaign.

Recommendation #7: *Foster new and support existing incentive programs to convert copper-painted boat hulls to those painted with alternatives.*

Primary Parties Involved: Dischargers and other TMDL responsible parties.

Rationale: Localized programs currently exist in San Diego Bay and Lower Newport Bay. Early roll out had limited success, but subsequent increases of incentives resulted in greater adoption. As costs associated with alternatives decrease and acceptance of alternatives increase in the future, an even higher level of conversion could be expected. Past incentive programs have been funded by U.S. EPA. The need for these programs is greatest in marinas/harbors where dissolved copper concentrations are high and where TMDLs for copper exist (e.g., Marina del Rey).

Recommendation #8: *Dischargers consider site-specific objectives for copper for marinas or harbors that have extremely high boat density and very poor flushing.*

Primary Parties Involved: Dischargers, TMDL responsible parties, and Water Boards

Rationale: Modeling by DPR suggests that some marina locations (e.g., Marina del Rey) may not achieve the current California Toxics Rule chronic water quality criterion for copper of 3.1 µg/L at all times even with the implementation of copper AFP reformulation and other mitigation approaches outlined in this document. Therefore, dischargers or TMDL responsible parties may consider pursuing site specific objectives (SSOs), which are allowed under the Water Boards' Basin Plans. Moreover, these parties could potentially rely on the Water Effects Ratio approach or on the marine Biotic Ligand Model (if and when it is accepted by U.S. EPA) as the basis for the SSOs. DPR's analysis using the draft marine Biotic Ligand Model for many California coastal marinas suggests that this approach could raise the compliance threshold to a level higher than the current 3.1 ppb criterion.

Reference:

Patrick J. Earley, Brandon L. Swope, Katherine Barbeau, Randelle Bundy, Janessa A. McDonald & Ignacio Rivera-Duarte, Biofouling (2013): Life cycle contributions of copper from vessel painting and maintenance activities, *Biofouling: The Journal of Bioadhesion and Biofilm Research*, DOI: 10.1080/08927014.2013.841891