

INITIAL STATEMENT OF REASONS AND PUBLIC REPORT  
DEPARTMENT OF PESTICIDE REGULATION

Title 3. California Code of Regulations  
Adopt Section 6190  
Copper-Based Antifouling Paint and Coating Products

This is the Initial Statement of Reasons required by Government Code section 11346.2 and the public report specified in section 6110 of Title 3, California Code of Regulations (3 CCR). Section 6110 meets the requirement of Title 14, CCR section 15252 and Public Resources Code section 21080.5 pertaining to state regulatory programs certified under the California Environmental Quality Act.

SUMMARY OF PROPOSED ACTION/PESTICIDE REGULATORY PROGRAM  
ACTIVITIES AFFECTED

The Department of Pesticide Regulation (DPR) proposes to adopt 3 CCR section 6190. The pesticide regulatory program activities that will be affected by this proposal are those pertaining to the registration of copper-based antifouling paint and coating (referred to as copper-based AFP) products. In summary, the proposed action requires registrants of all new copper-based AFP products to submit estimated daily mean copper release rate (also referred to as leach rate) data as a requirement for registration. In addition, effective July 1, 2018, the proposed action establishes a maximum allowable copper leach rate for copper-based AFP products registered in California for use on recreational vessels and states that currently registered products exceeding the leach rate will be subject to cancellation. This proposed action also defines "recreational vessel" and "commercial vessel."

SPECIFIC PURPOSE AND FACTUAL BASIS

**Background**

DPR protects human health and the environment by regulating pesticide sales and use and by fostering reduced-risk pest management. DPR's strict oversight includes: product evaluation and registration; statewide licensing of commercial and private pesticide applicators, pest control businesses, dealers, and advisers; environmental monitoring; and residue testing of fresh produce. This statutory scheme is set forth primarily in Food and Agricultural Code (FAC) Divisions 6 and 7.

Pesticides must be registered (licensed for sale and use) with the U.S. Environmental Protection Agency (U.S. EPA) before they can be registered in California. DPR's preregistration evaluation is in addition to, and complements, U.S. EPA's evaluation. Before a pesticide can be sold or used, both agencies require data on a product's toxicology and chemistry--how it behaves in the environment; its effectiveness against targeted pests and the hazards it poses to nontarget organisms; its effect on fish and wildlife; and its degree of worker exposure.

DPR continues to evaluate pesticides after they are registered. DPR's continuous evaluation program includes evaluating potential adverse effects resulting from the use of pesticide products and monitoring surface water for compliance with aquatic benchmarks.

### **Surface Water Monitoring to Assess Impacts from Antifouling Paint and Coating Products**

Certain chemicals, such as copper and zinc, act as antifouling pesticides and are added to paints and coatings to create AFP products. AFP products are applied to the underwater surfaces of boats and ships (vessels) to protect against the settling and growth of barnacles, mussels, algae, and other aquatic fouling organisms on vessel surfaces. AFP products are considered pesticides; therefore, they must be registered by DPR.

In the late 1980s, the U.S. Congress restricted the use of AFPs containing the pesticide active ingredient tributyltin (TBT) because of its high toxicity to aquatic organisms. By the late 1990s, TBT AFPs were no longer registered by DPR and the AFP marketplace became dominated by copper-based products, which were the only effective alternatives for broad-spectrum control of aquatic fouling organisms (i.e., both hard and soft fouling organisms) at that time. Copper-based AFP products typically contain copper oxide, copper hydroxide, or cuprous thiocyanate as active ingredients. In recent years, non-copper active ingredients such as zinc pyrithione, tralopyril, Irgarol<sup>®</sup>, and Sea-Nine<sup>™</sup> began appearing in copper-based AFP products as "booster biocides" or as sole active ingredients in a small number of non-copper products.

In 2006, DPR initiated a study to sample water and sediment from 23 marinas in California to assess the geographical scope and severity of pollution stemming from the use of AFP products containing copper, zinc, and Irgarol<sup>®</sup>. During this multi-regional scientific investigation of AFP pollution across freshwater, brackish water, and saltwater marinas in California, DPR found that dissolved copper concentrations in saltwater and brackish water marinas often exceeded the U.S. EPA's California Toxics Rule (CTR) copper water quality standards set forth in Title 40 Code of Federal Regulations section 131.38. Specifically, DPR detected dissolved copper concentrations exceeding the CTR chronic water quality standard of 3.1 micrograms per liter ( $\mu\text{g/L}$ ) in more than half of these water samples, and exceeding the CTR acute water quality standard of 4.8  $\mu\text{g/L}$  in about one third of these water samples. DPR also observed toxicity to aquatic test organisms in some marina samples that was likely caused by high dissolved copper concentrations.

Based on the results of the study, DPR concluded that copper-based AFP products applied to recreational vessels are likely a major source of dissolved copper in salt and brackish water marinas, particularly during dry weather periods. In addition, DPR found that the main pathway of copper contamination in marinas appears to be from passive leaching of copper-painted recreational vessel hulls and in-water hull cleaning of copper-painted recreational vessels. The results from the study are described in DPR's 2009 report, *Monitoring for Indicators of Antifouling Paint Pollution in California Marinas*.

## **Copper-Based Antifouling Paint or Coating Product Use in California**

In California, non-copper AFPs are often adequate for use on soft fouling organisms (e.g., algae, bacteria, and slime) that are more pervasive pests in freshwater environments. However, recreational vessel owners in brackish water and saltwater marinas commonly apply, or hire professionals to apply, copper-based AFPs to their vessel hulls to prevent hard fouling organisms such as barnacles, mollusks, and tubeworms, that are more pervasive pests in saline environments.

Boatyards prepare vessels for painting by removing excess fouling and loose coating, and then sanding areas of loose, blistering, or peeling paint. After applying an epoxy primer, applicators typically use a hand-held roller brush to apply copper-based AFP to the vessel hull. Due to natural weathering and wearing, copper-based AFPs are generally re-applied every two to three years resulting in multiple layers of paint. Over time, applicators might need to completely strip the accumulated paint from the vessel hull before new paint can be applied.

During the lifecycle of the copper-based AFP, recreational vessel owners in coastal marinas typically hire in-water hull cleaners to maintain the integrity of the boat, increase speed, decrease fuel consumption, and ensure aesthetics. Hull cleaners use tools ranging from abrasive metal wool pads to soft-pile carpet at frequencies as much as every 2 to 3 weeks during the summer. When vessels coated with copper-based AFPs are cleaned by in-water hull cleaners, a spike in copper release occurs after each cleaning event. If hull cleaners use abrasive tools and aggressive techniques, spikes in dissolved and particulate copper immediately occur in the water surrounding the vessel. More significantly, the paint surface is so forcefully disturbed that elevated leaching of dissolved copper can continue to occur for weeks after the cleaning event. These cleaning practices can ultimately lead to increased dissolved copper concentrations in saltwater marinas.

Since saltwater marinas are purposely constructed to shelter vessels from currents and waves, they are prone to poor flushing, resulting in greater potential for the build-up of contaminants. In fact, high dissolved copper concentrations are frequently observed in California saltwater marinas, particularly in larger, poorly-flushed marinas that are situated in warmer waters where fouling pressures tend to be high. Since coastal marinas in California are some of the largest in the U.S., this may explain why dissolved copper concentrations in other states are not as elevated as they are in California.

## **DPR Reevaluation of Copper-Based Antifouling Paint Products**

Based on frequent detections of dissolved copper concentrations above CTR standards in California saltwater marinas and the findings described in the 2009 DPR report, DPR placed copper AFP products containing the active ingredients copper oxide, copper hydroxide, and cuprous thiocyanate into reevaluation in 2010. When a pesticide enters the reevaluation process, DPR reviews existing data and has the authority to require new data to determine the nature or the extent of the potential hazard and identify appropriate mitigation measures, if needed. Pursuant to the reevaluation, DPR required copper-based AFP registrants to generate and submit

specific data including each product's paint type (e.g., ablative, epoxy, and vinyl) and copper leach rate.

Specifically, DPR required registrants of copper-based AFPs to submit an estimated copper leach rate for each product calculated using the International Organization for Standardization (ISO) method 10890:2010, as well as the supporting data used for the calculation including product-specific safety data sheet, technical data sheet, and confidential statement of formulation. Although the most accurate method for determining actual environmental (i.e., in-water) leach rates of copper AFPs is the U.S. Navy's Dome method, limitations associated with logistics and high costs make this method impractical to conduct for a large number of AFP products. The ISO method is a calculation method that can be easily used to estimate the environmental leach rate since it takes into account the physico-chemical properties of copper AFP products without the need for an involved and expensive study. The leach rate generated by the ISO method, however, tends to be consistently higher than the actual environmental leach rate generated by the Dome method for the same product. Therefore, to facilitate comparison of ISO leach rates to actual environmental leach rate, which are typically used in environmental risk assessments, loading estimates, and establishment of regulatory leach rate limits, a scientifically reliable conversion factor is needed.

To address this need, Finnie (2014) proposed the conversion factor of 2.9 be used as a multiplier to convert from the actual environmental leach rate to the ISO method leach rate. The technical basis for the 2.9 conversion factor proposed in Finnie (2014) can actually be traced to an older published experimental study (Finnie 2006) that evaluated how leach rates generated from several different measurement and calculation techniques compare to the actual environmental leach rate as determined by the Dome method. Thus, for all currently registered copper-based AFP products and any new copper-based AFPs submitted for registration, DPR verifies the ISO leach rate calculation submitted by the registrant and uses a correction factor of 2.9 to calculate a daily mean copper leach rate that is more representative of real-world conditions.

In addition to the above information, registrants were also asked to suggest mitigation strategies to reduce copper pollution, conduct a study to determine the impact of in-water hull cleaning activities on copper concentrations in California marinas, and provide monitoring data to evaluate compliance with CTR standards.

### **Related Legislation (Copper Leach Rate and Mitigation Recommendations)**

Assembly Bill (AB) 425 (Chapter 587, Statutes of 2013) required DPR "to determine a leach rate for copper-based AFPs used on recreational vessels and to make recommendations for appropriate mitigation measures that may be implemented to protect aquatic environments from the effects of exposure to that paint if it is registered as a pesticide." To comply with AB 425, DPR selected two maximum allowable copper leach rates and made a number of mitigation recommendations.

DPR selected two copper leach rates using the Marine Antifoulant Model to Predict Environmental Concentrations (MAM-PEC). MAM-PEC is a model used by scientists and regulators worldwide to predict environmental concentrations of AFP products in a variety of

marine environments. Using MAM-PEC, DPR proposed the following maximum allowable copper leach rates: 13.4 micrograms per square centimeter per day ( $\mu\text{g}/\text{cm}^2/\text{day}$ ) with a prohibition on in-water hull cleaning and 9.5  $\mu\text{g}/\text{cm}^2/\text{day}$  with the condition that in-water hull cleaners follow the California Professional Divers Association's (CPDA's) best management practice (BMP) method with soft-pile carpet and limit in-water hull cleaning to no more frequently than once per month. Pursuant to AB 425, DPR also suggested several potential mitigation measures that could be implemented with the assistance of other regulatory agencies or voluntary compliance with the boating community.

DPR presented the proposed copper leach rates to registrants; federal, state, and local government agencies; and other stakeholders at several meetings. After discussions with stakeholders and accounting for the enforcement challenges of setting two leach rates based on hull cleaning practices, DPR determined that establishing one maximum allowable leach rate, at the more conservative, lower level of 9.5  $\mu\text{g}/\text{cm}^2/\text{day}$  for recreational vessel copper-based AFP products, would be the most effective way to reduce copper contamination in surface waters.

DPR determined that establishing two different leach rates in regulation depending on cleaning practices was infeasible for statewide implementation because DPR does not have jurisdiction over the activities of in-water hull cleaners and does not have the authority to regulate the type and frequency of in-water hull cleaning practices. Absent this authority, DPR met with U.S. EPA to explore the possibility of U.S. EPA incorporating hull cleaning best management practices (BMPs) on product labels, but U.S. EPA was not receptive to these label changes. Without label language to inform users of the BMPs specific to their product or any other readily identifiable way for hull cleaners and enforcement personnel to determine which vessels would be subject to the 9.5  $\mu\text{g}/\text{cm}^2/\text{day}$  or 13.4  $\mu\text{g}/\text{cm}^2/\text{day}$  cleaning practices, DPR determined that the more conservative, lower leach rate limit of 9.5  $\mu\text{g}/\text{cm}^2/\text{day}$  should apply to all recreational vessels, regardless of cleaning practices.

### **Proposal for New Registration Requirement and Maximum Allowable Copper Leach Rate**

DPR is proposing to adopt section 6190 to address copper contamination in surface water from copper-based AFPs. Proposed subsection (a) requires registrants of all new copper-based AFP products submitted for registration to submit product-specific copper leach rate data calculated using ISO method 10890:2010. DPR anticipates the requirement for registrants to submit estimated daily mean copper leach rate data would become effective January 1, 2018, in accordance with Government Code section 11343.4(a).

Although DPR determined that recreational vessels are likely a major source of dissolved copper in saltwater marinas, DPR is requiring leach rate data for all new copper-based AFP products regardless of designated use site. DPR will continue monitoring for copper contamination and evaluate compliance with CTR standards. If, in the future, additional mitigation measures are necessary to address water quality concerns, DPR will have leach rate data for all copper-based AFP products, including those used on commercial vessels, to determine the nature or extent of potential exposures.

For new products submitted for registration, DPR will continue to verify the ISO calculation submitted by the registrant. As previously mentioned, since the ISO calculation tends to overestimate the actual environmental release of copper, proposed subsection (b) states that DPR will use a correction factor of 2.9 to calculate an adjusted daily mean copper leach rate. This adjustment will also allow DPR to evaluate product leach rates against DPR's actual environmental leach rate limit of 9.5  $\mu\text{g}/\text{cm}^2/\text{day}$ .

As mentioned above, studies show that high dissolved copper concentrations in California's coastal marinas are mainly attributed to recreational vessels coated with copper-based AFPs. Proposed subsection (c) establishes that the maximum allowable copper leach rate that will apply to copper-based AFP products labeled to allow use on recreational vessels in California. Proposed subsection (c) also provides definitions for the terms "recreational vessel" and "commercial vessel." "Recreational vessel" is defined as any vessel manufactured or used primarily for pleasure or leased, rented, or chartered to a person for the person's pleasure, and/or used as a residence. "Commercial vessel" is defined as any private, commercial, government, or military marine vessel that does not otherwise meet the definition of recreational vessel, including, but not limited to, passenger ferries; excursion vessels; tugboats; ocean-going tugboats; towboats; push-boats; crew and supply vessels; work boats; pilot vessels; supply boats; fishing vessels; research vessels; U.S. Coast Guard vessels; hovercraft; emergency response harbor craft; and barge vessels.

Effective July 1, 2018, proposed subsection (c)(1) will prohibit the registration of any new copper-based AFP product that is labeled to allow use on recreational vessels in California if it exceeds the adjusted daily mean copper release rate of 9.5  $\mu\text{g}/\text{cm}^2/\text{day}$ , as calculated by DPR. Effective July 1, 2018, proposed subsection (c)(2) specifies that any currently registered copper-based AFP product that exceeds the adjusted daily mean copper release rate of 9.5  $\mu\text{g}/\text{cm}^2/\text{day}$ , as calculated by DPR, and is labeled to allow use on a recreational vessel in California will be subject to cancellation pursuant to FAC section 12825. The delay in effective date for these two provisions would provide registrants impacted by the regulation with additional time to submit label modifications to U.S. EPA and DPR, if desired.

This regulation is necessary to ensure that all copper-based AFP products allowed for use on recreational vessels comply with a copper leach rate requirement that is intended to reduce the amount of copper in surface water and increase protection to aquatic organisms from potential adverse impacts.

Although DPR does not have jurisdiction over the activities of in-water hull cleaners, it is currently coordinating with the State and Regional Water Boards (or collectively Water Boards) to ensure this type of discharge is managed so that DPR's copper leach rate limit can achieve its intended impact. The Water Boards regulate dischargers of copper in coastal marinas using the U.S. EPA's Clean Water Act regulatory tool known as Total Maximum Daily Loads (TMDLs) one water body at a time. Although the first established copper TMDL in San Diego appeared to result in a small reduction in copper loading in the Shelter Island Yacht Basin (through copper alternative incentives, diver certification, and other mitigation efforts), stakeholders expressed concern that additional reduction of copper loads will be difficult to attain without assistance from DPR.

Therefore, in addition to the proposed rulemaking, DPR will also be actively engaged in promoting and implementing voluntary mitigation recommendations such as:

- Encourage boat owners and in-water hull cleaners to use BMPs or certification programs to reduce the amount of copper leaching from boat hulls.
- Encourage copper AFP registrants to develop hull cleaning brochures to be distributed to boaters via boatyards and painted-hull maintenance information to be distributed with paint purchases.
- Increase boater awareness and acceptance of copper AFP alternatives.
- Foster new and support existing incentive programs to convert copper-painted boat hulls to those painted with alternatives.

By requiring copper leach rate data for all new copper-based AFP products submitted for registration and adopting a maximum allowable copper leach rate limit for copper-based AFP products registered for use on recreational vessels, DPR expects nearly all of California's saltwater marinas to come into compliance with the CTR's protective chronic copper saltwater standard of 3.1 µg/L. Dissolved copper concentrations in the largest saltwater marinas may occasionally exceed the CTR chronic criterion. However, a significant reduction in copper loading is expected to occur as a result of this proposed regulation, along with an increase in the protection of aquatic organisms in all California marinas.

This overall approach is consistent with DPR's mandates per FAC sections 11501 and 14102, and 3 CCR section 6158.

#### CONSULTATION WITH OTHER AGENCIES

DPR met with the Water Boards on several occasions during the development of the text on the proposed regulations and consulted with them on potential management of in-water hull cleaning activities and the determination of the leach rate.

#### ALTERNATIVES TO THE PROPOSED REGULATORY ACTION [GOVERNMENT CODE SECTION 11346.2(b)(4)]

DPR has not identified any feasible alternatives to the proposed regulatory action that would achieve the purpose of the regulation with less possible adverse economic impacts, including any impacts on small businesses, and invites the submission of suggested alternatives.

#### ECONOMIC IMPACT ON BUSINESSES [GOVERNMENT CODE SECTION 11346.2(b)(5)(A)]

This proposed regulatory action will not have a significant adverse economic impact on business.

Generating the registration data required by this proposed regulation should not have a significant adverse economic impact on businesses because it is a calculation that does not require any laboratory testing. If registrants of copper-based AFP products for recreational

vessels do not meet the maximum allowable copper leach rate specified in the regulation, they have the option of limiting the use of their product to non-recreational vessels.

Copper-based AFPs will still be allowed for sale in California. However, products labeled for use (or not prohibiting use) on recreational vessels must meet the copper leach rate limit specified in the proposed regulations. Businesses using copper-based AFPs on recreational vessels would not be impacted because there are currently registered and available copper-based AFPs that are in compliance with the proposed leach rate, as well as non-copper AFP options.

#### ECONOMIC IMPACT ASSESSMENT PURSUANT TO SECTION 11346.3(b)

**Creation or Elimination of Jobs with the State of California:** DPR has determined that the proposed action would not create or eliminate jobs in California because the additional registration requirement imposed can be handled by existing staff of impacted registrants as part of standard business operations. It would not impact those using AFPs on recreational vessels because there are many copper-based AFPs already in compliance with the proposed leach rate.

**Creation of New Business or the Elimination of Existing Businesses with the State of California:** Although new types of AFP could be developed, DPR has determined that this regulatory action is unlikely to result in the creation of new businesses or the elimination of existing businesses. Copper-based AFPs in compliance with the proposed maximum leach rate for AFP products are currently available for use on recreational vessels.

**The Expansion of Businesses Currently Doing Business within the State of California:** DPR has determined that this proposal is unlikely to result in an expansion of business. The required calculated daily mean copper release rate data, using the ISO method, can be performed by existing staff as part of standard business practices, and the overall demand for AFPs products will likely be unchanged.

**The Benefits of the Regulation to the Health and Welfare of California Residents, Worker Safety, and the State's Environment:** Adopting a maximum allowable copper leach rate limit for AFP products used on recreational vessels will protect the environment by reducing the potential for adverse impacts to aquatic organisms in California marinas.

#### EFFORTS TO AVOID CONFLICT OR DUPLICATION OF FEDERAL REGULATIONS

The proposed action does not duplicate or conflict with federal regulations because there are no federal regulations within the Code of Federal Regulations that address this issue. In fact, this proposed action is intended to help saltwater marinas come into compliance with federal water quality standards for California.

#### DOCUMENTS RELIED UPON

1. Singhasemanon, N., E. Pyatt, and N. Bacey. June 2009. Monitoring for Indicators of Antifouling Paint Pollution in California Marinas. Department of Pesticide Regulation. Environmental Monitoring Branch. Surface Water Protection Program. Study Report.



2. Duncan, D. January 30, 2014. Determination of Maximum Allowable Leach Rate and Mitigation Recommendations for Copper Antifouling Paints Per AB 425. Department of Pesticide Regulation. Environmental Monitoring Branch. Memorandum.
3. Singhasemanon, N. and X. Zhang. January 31, 2014. Modeling to Determine the Maximum Allowable Leach Rate for Copper-Based Antifouling Products in California Marinas. Department of Pesticide Regulation. Environmental Monitoring Branch.
4. Patrick J. Earley et al., Life Cycle Contributions of Copper from Vessel Painting and Maintenance Activities. 2013. *Biofouling: The Journal of Bioadhesion and Biofilm Research*.
5. International Organization for Standardization: Paints and Varnishes—Modelling of Biocide Release Rate from Antifouling Paints by Mass-Balance Calculation. ISO 10890:2010.
6. Finnie, A. 2014. Comparison of Biocide Release Rates Estimates Using the CEPE and ISO Mass-Balance Calculation Methods. Publication of the European Council of Paints, Printing Inks and Artist's Colors Industry.
7. Finnie, A. 2006. Improved Estimates of Environmental Copper Release Rates from Antifouling Products. *Biofouling: The Journal of Bioadhesion and Biofilm Research*. Volume 22, Issue 5.
8. Bowes, G.W. May 24, 2016. Review for the Department of Pesticide Regulation Methodology for Establishing Maximum Allowable Leach Rates for Copper Antifouling Paint Pesticide Products. State Water Resources Control Board. Cal/EPA Scientific Peer Review Program. Memorandum.
9. Zhang, X. July 19, 2016. Response to External Scientific Peer Review Comments on DPR's Determination of the Maximum Allowable Leach Rate for Copper Antifouling Products. Department of Pesticide Regulation. Environmental Monitoring Branch. Memorandum.
10. Hanger, A. August 3, 2016. Economic and Fiscal Impacts of Proposed Copper-Based Antifouling Paint Product Regulations. Pesticide Registration Branch. Memorandum.