



Department of Pesticide Regulation



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Director

MEMORANDUM

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TO: Douglas Y. Okumura, Assistant Director
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FROM: John S. Sanders, Ph.D., Chief *Original signed by*
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SUBJECT: BACKGROUND ON COPPER ANTIFOULING PAINT ISSUES AND
EVALUATION OF THE DEPARTMENT OF PESTICIDE REGULATION'S
OPTIONS

ISSUE

For many years, the San Diego Regional Water Quality Control Board (SDRWQCB) has documented elevated water column concentrations of copper at a large recreational boat basin in northern San Diego Bay known as the Shelter Island Yacht Basin (SIYB). Concentrations found there frequently exceeded California water quality standards established for the protection of aquatic life. A survey of eight other San Diego area marinas also revealed high levels of copper. Water column data from water bodies outside of San Diego Bay have been more limited. Available data from these water bodies showed that marina sediments contain elevated levels of copper that may threaten benthic organisms.

High dissolved copper levels at SIYB prompted SDRWQCB to list the basin on the Clean Water Act (CWA) 303(d) list of impaired water bodies. The listing led to the development of a Total Maximum Daily Load (TMDL) for copper, in which SDRWQCB made the determination that copper-based antifouling paint (AFP) pesticides were the primary source of copper pollution in the basin. SDRWQCB recently approved the resolution to incorporate the TMDL and its implementation plan into the Basin Plan. The State Water Resources Control Board and the Office of Administrative Law are currently considering approval of these regulations.

BACKGROUND

In 1988, the Department of Pesticide Regulation (DPR) established regulations to limit the use of tributyltin (TBT) AFPs because of documented adverse affects to aquatic organisms. Copper-based AFPs, which were also popular at the time, became the dominant class of AFPs in California. Today, cuprous oxide is the most popular active ingredient in copper AFP products with over 160 products registered in California. The other two copper active ingredients currently used in AFPs (cuprous thiocyanate and copper hydroxide) are formulated into 14 products.



Shelter Island Yacht Basin Copper Total Maximum Daily Load and Implementation Plan

In 1996, SDRWQCB placed SIYB on CWA 303(d) list for impaired water bodies. There are approximately ten popular recreational marinas and yacht clubs located in SIYB that harbor approximately 2,200 boats. Marina sampling conducted by SDRWQCB and others at SIYB over many years demonstrated that copper levels there exceed the California Toxics Rule (CTR) standards of 3.1 µg/L (chronic) and 4.8 µg/L (acute) by two to threefold, with concentrations as high as 12.0 µg/L. The U.S. Environmental Protection Agency (EPA) established these standards in California in 2000 for the protection of aquatic life. CTR serves as legally applicable numeric water quality objectives (WQOs) for dissolved copper in California.

Shortly after SIYB was placed on the CWA 303(d) list, SDRWQCB began developing a TMDL for copper. The purpose of a TMDL is to restore beneficial uses and to meet the water quality objectives in a water body. After several years of TMDL development and periodic public reviews, the SDRWQCB generated the SIYB Copper TMDL and the associated implementation plan. In February 2005, SDRWQCB adopted a resolution to amend the SIYB Copper TMDL and implementation plan into the SDRWQCB Basin Plan.

In the TMDL, SDRWQCB determined that the use of copper AFP pesticides on recreational boats moored at SIYB led to the exceedances of the aforementioned numeric copper WQOs. High dissolved copper concentrations at SIYB also violated the narrative WQOs for toxicity and pesticides as defined in the SDRWQCB Basin Plan.

Elevated copper levels in SIYB have been associated with effects on the biota at SIYB in several studies. Phytoplankton species that are sensitive to copper were found to be absent from SIYB while copper tolerant species were present. A decrease in species diversity at SIYB that paralleled an increase in copper levels from the Basin's entrance towards the moored vessels has also been documented. Mussels transplanted to SIYB rapidly accumulated copper to a degree that was proportional to levels in the water column. In 2000, a water column sample taken from SIYB caused developmental toxicity in tests on the mussel *Mytilus edulis*.

High copper concentrations at SIYB also threaten sediment quality and may potentially adversely impact benthic life. Sediment concentrations of copper at SIYB have been shown to regularly exceed sediment quality guidelines (SQGs) developed by the National Oceanic and Atmospheric Administration (NOAA). These SQG values are commonly used to rank pollutants and sites of concern. Unlike WQOs, SQGs are not enforceable standards. From 1993 to 1994, toxicity tests performed on sediment samples from SIYB showed toxicity to sea urchin larvae and amphipods although the specific cause of this toxicity was never identified.

SDRWQCB additionally determined that at SIYB, 93% of the copper in the basin was attributed to the passive leaching of copper-based AFP pesticides that have been applied to boat hulls. Copper released from underwater hull cleaning contributed 5%. All other sources in SIYB only accounted for 2% of the total copper load. SDRWQCB relied considerably on leaching and underwater hull cleaning emission studies conducted by the U.S. Navy and a DPR contractor to estimate loading from copper AFPs.

The TMDL implementation plan outlined strategies and management practices available to dischargers and potential regulatory actions available to SDRWQCB. Together these activities reportedly can reduce copper loading by 76% from the current level. The Port of San Diego, SIYB marina operators, persons owning boats moored at SIYB, SIYB underwater hull cleaners, and the City of San Diego are responsible as dischargers to meet this goal. Copper load reductions are required over a 17-year staged compliance schedule. The first stage consists of an initial two-year orientation period that involves boater education to increase market demand for alternatives and commercial demonstrations of alternative AFPs. This will allow commercial applicators and underwater hull cleaners to develop expertise and acquire special equipment needed for the application and maintenance of alternative AFPs. During the subsequent 15 years, the implementation plan requires dischargers to demonstrate incremental reductions of copper loads.

The implementation plan also outlined coordination with governmental agencies having legal authority over the use of copper AFPs, namely U.S. EPA, DPR, and the county agricultural commissioners. SDRWQCB stated that it would work cooperatively with these agencies to investigate copper-based AFPs and develop recommended use practices or restrictions designed to reduce or eliminate the impact of copper AFPs on surface water quality.

Marina Sampling Data Outside of Shelter Island Yacht Basin

Water column surveys of seven other San Diego Bay marinas in 2004 also revealed elevated levels of copper that were above CTR values. Copper concentrations in the channel samples taken in the same survey were considerably lower than those in the marina samples. The survey results showed that (1) in San Diego Bay, elevated dissolved copper levels are not unique to SIYB and (2) copper sources are likely to be from within marinas.

A review of available statewide monitoring data north of San Diego Bay showed that there is very little data on water column concentrations of copper in marinas. There have been, however, several investigations of copper in marina sediment. Studies in the 1990s, particularly those conducted by the Bay Protection and Toxic Cleanup Program, NOAA, and the Southern California Coastal Water Research Project frequently revealed elevated levels of copper in the sediments of marinas along the California coast, as far north as Humboldt Bay, at levels above NOAA's SQGs. At some of the sites studied by the Bay Protection and Toxic Cleanup Program,

sediment levels of copper have been correlated to toxicity to benthic test organisms. In 2003, a study conducted by the Bay Conservation and Development Council showed that copper concentrations from all of the sediment samples taken at four San Francisco Bay marinas also exceeded NOAA's SQGs.

Upcoming Total Maximum Daily Loads and Monitoring Involving Copper Antifouling Paints

AFPs are also thought to be significant sources of copper in Marina del Rey (harboring approximately 6,000 boats) and Newport Bay (harboring approximately 10,000 boats). Both the Los Angeles Regional Water Quality Control Board and the Santa Ana Regional Water Quality Control Board expect to complete a draft metals TMDL for Marina Del Rey and Newport Bay, respectively, later this year. Both Regional Boards are likely to move quickly to conduct monitoring surveys in these areas.

More copper data will be gathered from several marina areas along the Southern California Coast. Under a SDRWQCB directive to all harbor authorities in their jurisdiction, monitoring will take place in Dana Point Harbor, Del Mar Boat Basin at the Marine Corps Base at Camp Pendleton, Oceanside Harbor, Mission Bay, and San Diego Bay. Measurements of pollutants, including dissolved copper, are required in this monitoring program, which is expected to begin in July 2005. Moreover, a total of six toxic marina water samples will be tested to identify the cause of the toxicity using Toxicity Identification Evaluation techniques.

Restrictions Outside of California

Three European nations currently have restrictions on copper AFP use. The Swedish government banned the use of copper AFPs along its Eastern Coast and placed use restrictions along its Western Coast. In Denmark, use restrictions exist on copper AFPs depending on each product's cuprous oxide leaching rate and the size of vessel to be painted. In the Netherlands, a ban on copper AFPs has been in place on recreational boats since 1999.

The Biocidal Products Directive (implemented in March 2000) directed the European Commission to review all pesticide products including AFPs sold in the European Union. Pesticide producers/formulators who want their products to be sold in European Union countries must comply with the various data submittal requirements of this directive. This comprehensive review is still taking place.

In the U.S., copper AFP pollution has been investigated in Chesapeake Bay in Maryland, Port Canaveral and Indian River Lagoon in Florida, and in Washington State. However, no regulations restricting the use of copper AFPs currently exist in the U.S.

Possible Changes in California Toxics Rule Values

In December 2003, U.S. EPA issued the *Draft Update of Ambient Water Quality Criteria for Copper (EPA-822-R-03-026)*. In this document, U.S. EPA proposed revising saltwater water quality criteria for dissolved copper to levels that are more stringent than the current values. Should these revised criteria be adopted and eventually promulgated in a revised CTR, they would decline from 3.1 µg/L (chronic) and 4.8 µg/L (acute) to 1.9 µg/L and 3.1 µg/L, respectively. Lower WQOs could lead to more marinas and water bodies being listed on the CWA 303(d) list and more TMDLs.

In the same document, U.S. EPA also proposed a new approach known as the Biotic Ligand Model (BLM) for the development of freshwater water quality criteria for copper. It also noted that a saltwater BLM is currently in development. A saltwater BLM could be used to establish future copper standards. It is not clear whether BLM-generated criteria will be higher or lower than the current ones.

Senate Bill 315

In 2001, Senate Bill 315 created the San Diego Advisory Committee for Environmentally Superior Antifouling Paints. DPR had an advisory but nonvoting role. The goal of the committee was to advise the University of California as they prepared a report that (1) identifies nontoxic alternatives, (2) compares the costs of these alternatives to the cost of using traditional copper-based AFPs, and (3) identifies economic incentives that will increase the use of less toxic alternatives.

Although nontoxic alternatives were not readily available at the time, the report identified epoxy and silicone AFPs as two potential nontoxic alternatives. Economic analysis determined that when coupled with appropriate management practices (e.g., more frequent cleaning, slip liners), these alternatives were more cost-effective than traditional copper AFPs in the long term. The report also found that a 66% and 100% reduction in copper AFP use could likely be achieved in San Diego Bay in 10 and 15 years, respectively.

These reductions are possible if two key policy/regulatory events occur. One is an announcement of a future ban on the use of copper-based AFPs in San Diego Bay; otherwise, boaters will not have a significant incentive to stop using copper AFPs. The second is a requirement that owners of new boats use nontoxic AFPs and that owners of boats currently painted with copper AFPs switch to nontoxic AFPs when their boats require repainting. A viable commercial demonstration plan (for both commercial applicators and underwater hull cleaners) and an effective boater education program must also be in place for a transition to less toxic alternatives to be successful.

SDRWQCB incorporated many of the findings and recommendations developed in the Senate Bill 315 report into the SIYB Copper TMDL Implementation Plan.

Copper Antifouling Paint Sub-Workgroup

To better understand the extent of copper AFP pollution in California, DPR established the Copper AFP Sub-Workgroup forum in March 2004, under the NonPoint Source Interagency Coordinating Committee's Marina and Recreational Boating Workgroup. This forum, which is well-attended by representatives from resources and regulatory agencies, works to: (1) identify existing studies and information, (2) seek opportunities to collaborate on current and future studies, (3) share and disseminate data and information with participating entities, and (4) facilitate the evaluation of mitigation options by DPR and Regional Boards.

The workgroup compiled a bibliography of aquatic copper studies. Furthermore, it identified and summarized 25 monitoring studies that have generated copper data potentially relevant to the evaluation of copper AFP pollution in California. The frequent exchange of information among participants has been an invaluable aspect of the workgroup. The Copper AFP Sub-Workgroup is currently active and continues to discuss issues relevant to the assessment of copper AFP pollution.

U.S. Environmental Protection Agency Cuprous Oxide Reregistration

U.S. EPA recently began the process to review cuprous oxide as part of its Federal Insecticide, Fungicide, and Rodenticide Act reregistration requirements. DPR staff is coordinating with U.S. EPA on how to best collaborate on this review. DPR staff intends to provide U.S. EPA with relevant information and monitoring data. U.S. EPA plans on having a registration eligibility decision made by August 2006, on cuprous oxide. This decision will summarize U.S. EPA's risk assessment and outline any risk reduction measures required for the continued registration and use of copper AFPs.

In June 2005, the agency initiated a series of meetings with registrants and other key parties to better quantify use information. DPR is participating in these meetings. There may also be opportunities for DPR to discuss issues directly with U.S. EPA during reregistration.

Request for Department of Pesticide Regulation Regulatory Action

In a letter to DPR's Director, dated February 15, 2005, the San Diego Unified Port District (District) made a formal request to DPR to initiate a review of the registration of copper AFPs. The District asked that DPR consider elevated levels of copper in marinas from copper AFP use as a statewide problem. If DPR implements statewide regulations, much of the discharger requirements under the

SIYB Copper TMDL will be rendered unnecessary. The District is one of the dischargers named in the TMDL.

In another letter, dated April 6, 2005, the legal representatives of the owners of the Kona Kai Marina (one of the marina operators of SIYB) asked DPR to cancel currently registered copper AFPs. This letter also presented a compilation of copper data from various surface water bodies in California. The letter's author wanted to show that copper pollution from AFP use is occurring statewide. However, much of the data were not specific to marina sites, boatyards, or sites with high boat traffic.

DISCUSSION

Staff presents seven possible courses of action below along with their pros and cons. These actions are arranged to reflect an order of increasing severity. Thus, the list begins with the option of no action and ends with the option of suspension/cancellation.

Option 1: Take no regulatory action. Defer to TMDLs to address problems on a site-specific basis.

- Pros:
 - DPR can take regulatory action when more evidence surfaces.
 - Option consumes the least resources in the short term.
- Cons:
 - Option may result in challenges from San Diego area stakeholders if they contend that we are not carrying out our mandates described in various environmental protection sections in the Food and Agricultural Code (e.g., sections 11501, 12824, and 14102) in spite of available data.
 - DPR may receive criticism for having inconsistent responses when water quality criteria are exceeded, but significant adverse effects have not necessarily been determined. For example, DPR placed diazinon and chlorpyrifos products into reevaluation under similar circumstances.
 - Option may result in a push from some stakeholders for a legislative solution.
 - Copper loading at levels that threaten aquatic life will continue.

Option 2: Place copper AFP pesticide products into reevaluation. Such products include those that contain copper oxide, copper hydroxide, and copper thiosulfate.

- Pros:
 - Frequent detections of dissolved copper at concentrations above WQOs in San Diego Bay marinas can be used to justify the reevaluation of copper AFPs.
 - Option fills in data gaps before more significant regulatory decisions are made.
 - Option is consistent with DPR's handling of recent cases (i.e., diazinon, chlorpyrifos) where water quality criteria were exceeded, but significant adverse effects have not necessarily been determined.
 - Option increases public and AFP-user awareness that traditional use of copper AFPs may be deleterious to the aquatic environment.
 - Option allows users to plan to use less toxic alternatives when they need to repaint their hulls.
 - Option prompts AFP manufacturers to consider producing and marketing less toxic alternatives.
- Cons:
 - Option may take a long time for information to be generated.
 - Copper loading at levels that threaten aquatic life will continue.

Option 3: Place all AFP products into reevaluation. In addition to copper AFPs, these reevaluations would cover other AFP active ingredients, including zinc-based AFPs and Irgarol. These two active ingredients have also been detected in coastal waters.

- Pros:
 - Option could reveal more environmentally problematic AFPs.
 - Option helps avoid a potential market shift to equally problematic replacement AFPs.
 - Option attempts to fill in data gaps before more significant regulatory decisions are considered.
 - Option signals to the public and users that many AFPs may be problematic.
 - Option prompts the AFP manufacturers to consider producing and marketing less toxic alternatives.
 - Option allows users to plan to use less toxic alternatives when they need to repaint their hulls.

- Cons:
 - Insufficient monitoring data on zinc, Irgarol, and other noncopper based AFPs exists in California to indicate that they threaten aquatic environments.
 - A broader reevaluation will require significantly more time and resources than a reevaluation of copper AFPs alone.
 - Copper loading at levels that threaten aquatic life will continue.

Option 4: Establish regional use limitations (similar to those for TBT) for San Diego Bay. Current TBT regulations pertain to boats with hulls shorter than 82 feet in length, which would practically encompass all recreational vessels, but exempt military and larger commercial vessels. Moreover, TBT regulations also place limitations on the leaching rates of TBT AFP products.

- Pros:
 - Frequent detections of dissolved copper at concentrations above WQOs in San Diego Bay marinas could justify limiting the use copper AFPs locally.
 - Option limits use where there is the most data to support regulatory action.
 - Option greatly increases the likelihood of SIYB TMDL compliance and minimizes the need for discharger actions.
 - Option could significantly reduce exceedances of WQOs for copper in San Diego Bay marinas and the need for SDRWQCB to identify and regulate dischargers San Diego Bay.
 - Option ends the potential for a legislative solution.
 - Navy fleet, Coast Guard fleet, and vessels longer than 82 feet will still have access to copper AFPs.
- Cons:
 - Boats are mobile and can go outside of San Diego Bay (e.g., Mission Bay) to have AFPs applied.
 - Boat owners may chose to moor outside of San Diego Bay (affecting marinas in the Bay economically).
 - Option will create an expectation that DPR will expand use limitations if new data from other areas (e.g., Newport Bay, Marina del Rey) reveal that dissolved copper concentrations are higher than the CTR values.
 - Alternative AFP products that are effective, economical, and less toxic than copper are not currently available.
 - Commercial applicators and underwater hull cleaners may not have enough time to properly train and equip for application and maintenance of alternatives if transition occurs too quickly.

- If dealers cannot sell their existing stocks of copper AFPs, they may be affected economically.
- Option will likely be expensive and difficult to enforce.

Option 5: Condition the registration of copper AFP products to limit the amount sold in California. A sales cap could include features that gradually decrease the sales limit and provide time-delayed implementation.

- Pros:
 - The reduced availability of copper AFPs would translate to lower overall use in the state.
 - Option could immediately increase the price of copper AFP products and make them less attractive to users.
 - A decreasing sales cap would make copper AFP products even more expensive over time.
 - Lower profitability will prompt AFP manufacturers to consider research and production of less toxic alternatives.
 - A time-delayed sales cap would allow time for the market and applicators to prepare for and deal with a reduction in supply and an increase in the use of alternatives.
 - Option would not require rulemaking.
- Cons:
 - The lack of monitoring data outside of San Diego Bay currently limits DPR's ability to justify sales limitation on copper AFPs on a statewide basis.
 - Option may not lead to a significant reduction of copper concentrations in problem areas (particularly in the short-term).
 - The price of copper AFP products may not reach a level that is high enough to compel users to use an alternative.
 - A build up of inventory prior to the effective date of the sales cap may temporarily negate the intended effects of a cap.
 - It is difficult to determine the level of sales limitation that will be needed to generate the desired reduction in use and copper concentrations.
 - Option will also limit military and commercial uses.
 - Option may result in challenges from registrants if they contend that DPR acted on data that may not be representative of the entire State.

Option 6: Establish use limitations (similar to those for TBT) for California. Current TBT regulations pertain to boats with hulls shorter than 82 feet in length, which would practically encompass all recreational vessels, but exempt military and commercial shipping vessels. Moreover, TBT regulations also place limitations on the leaching rates of TBT AFP products.

- Pros:
 - Option reduces the need for future copper-AFP related TMDLs in California.
 - Option could significantly reduce exceedances of WQOs in California marinas.
 - Option ends the potential for a legislative solution.
 - Navy fleet, Coast Guard fleet, and vessels longer than 82 feet will still have access to copper AFPs.

- Cons:
 - The lack of monitoring data outside of San Diego Bay currently limits DPR's ability to justify use limitation on copper AFPs on a statewide basis.
 - Option could have major economic impact on registrants.
 - Option may result in challenges from registrants if they contend that DPR acted on data that may not be representative of the entire State.
 - Alternative AFP products that are effective, economical, and less toxic than copper are not currently available.
 - Commercial applicators and underwater hull cleaners may not have enough time to properly train and equip for application and maintenance of alternatives if transition occurs too quickly.
 - Another problematic AFP (Irgarol or zinc-based) may end up dominating the AFP market in the future if transition to alternatives occurs too quickly.
 - If dealers cannot sell their existing stocks of copper AFPs, they may be affected economically.
 - Could increase the State's susceptibility and distribution of aquatic invasive species, if replacement AFPs are not as effective as cuprous oxide.

Option 7: Cancel/Suspend Copper AFP Products

- Pros:
 - Option reduces the need for future copper-AFP related TMDLs in California.
 - Option could significantly reduce exceedances of WQO in San Diego Bay marinas.
 - Option ends the potential for a legislative solution.
 - Easiest and cheapest option to enforce in the long run compared to other regulatory options.

- Cons:
 - The lack of monitoring data outside of San Diego Bay currently limits DPR's ability to justify cancellation/suspension of copper AFPs.
 - Option could have major economic impact on registrants.
 - Option may result in challenges from registrants if they contend that DPR acted on data that may not be representative of the entire State.
 - Navy fleet, Coast Guard fleet, and commercial vessels will not have access to copper AFPs in California.
 - Alternative AFP products that are effective, economical, and less toxic than copper are not currently available.
 - Commercial applicators and underwater hull cleaners may not have enough time to properly train and equip for application and maintenance of alternatives if transition occurs too quickly.
 - Another problematic AFP (Irgarol or zinc-based) may end up dominating the AFP market in the future if transition to less toxic alternatives occurs too quickly.
 - If dealers cannot sell their existing stocks of copper AFPs, they may be affected economically.
 - Could increase the State's susceptibility and distribution of aquatic invasive species, if replacement AFPs are not as effective as cuprous oxide.

TIME FACTOR

There is no immediate time constraint.

RECOMMENDATION

Based on currently available data, DPR should, at the minimum, initiate option 2 and place copper AFP pesticide products into reevaluation. WQOs have been regularly exceeded in San Diego Bay and copper AFPs are the likely cause. DPR reevaluated diazinon and chlorpyrifos based on detections of surface water data that were above the relevant WQOs.

Reevaluation will allow DPR to collect data from registrants to help determine what (if any) additional regulation is needed. Informational needs include: (1) reformulation or other mitigation possibilities (which will allowed the continued use of copper AFPs), (2) water column and sediment copper data from less-studied areas of the state, (3) water column and sediment toxicity testing in SIYB or other marinas, (4) site-specific WQO studies at SIYB or other marinas, and (5) bioassessment of aquatic and benthic communities in SIYB or other marinas. DPR may choose to engage in some of these activities ourselves or work with collaborators.

A formal reevaluation will also send an important message to stakeholders that DPR is concerned with the potential environmental effects from the present use of copper AFPs. This

will accomplish the following: (1) make current users of copper AFPs consider less toxic alternatives when their boats need to be repainted, (2) make buyers of new boats consider less toxic alternatives for their initial AFP application, (3) send a signal to the AFP market that more viable alternatives to copper AFP are needed; and (4) make commercial applicators and underwater hull cleaners plan for necessary training and purchase new equipment needed for applications and maintenance of alternative AFPs. These measures are necessary for any potential transition to less toxic AFPs to occur smoothly.

A broader reevaluation of AFPs (option 3) would achieve a similar affect as the reevaluation of copper AFPs alone. Moreover, option 3 could reveal more AFPs that may be environmentally problematic. DPR can also use this information to ensure that these products do not become prevalent AFPs in the market place in the future. Recall that copper became the most popular active ingredient in AFPs as the market replacement for TBT. Option 3 is more time-consuming and resource intensive than option 2.

DPR may also implement options 4, 5, or 6 in place of or in conjunction with reevaluation. If DPR considers the exceedances of CTR values in SIYB and San Diego Bay to be sufficiently compelling, then option 4 (establish use limitations for San Diego Bay) is possible. Use limitations could be implemented through use requirements, use restrictions, or both. However, the mobile nature of the sources would make it very difficult to ensure that boaters do not seek applications outside of San Diego Bay and then return to moor. Some may also choose to moor in unregulated adjacent areas, which could affect San Diego Bay marinas economically.

If DPR finds the existing statewide evidence to be sufficiently compelling, then option 5 (establish statewide sales limitation by conditioning product registration), option 6 (establish statewide use limitations via regulations), and option 7 (cancellation/suspension) may be appropriate. However, option 7 is not recommended since an immediate use prohibition could actually result in a wide range of negative economic and environmental impacts.

Options 5 and 6 offer more flexibility than option 7 and would allow for some use to continue. The major differences between options 5 and 6 are that: (1) one involves rulemaking and the other does not, (2) one limits sale and the other limits use, and (3) one has to be supplemented by label change or additional regulations to allow for vessel size exemptions (important if military and commercial uses of copper AFPs are to continue) and the other does not.

DPR could plan to revisit options 4 through 7 again in 2006, when more information that can be used to support more significant actions becomes available. Such information include:

- Potential reevaluation studies
- Potential DPR-coordinated investigations

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- Marina del Rey Draft Toxics TMDL
- Newport Bay Draft Metals TMDL
- Probable 2006 CWA 303(d) listing for copper
- U.S. EPA registration eligibility decision on cuprous oxide

The Copper AFP Sub-Workgroup will continue to serve as the forum to track these activities and identify any new developments.

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