Copper Antifouling Paint Sub-Workgroup 5/17/07 Meeting Notes

**In-Person Participants:**
- Ely, Terri – DBW
- Kubiak, Rachel – DPR
- Munz, Molly – SWRCB
- Pyatt, Ellen – DPR
- Riopel, Bob – RBOC
- Singhasemanon, Nan – DPR
- Sniderman, Lisa – CCC
- Susman, Stan – Interlux Paint
- Ward, Kim – SWRCB
- Yee, Betty – RWQCB 5

**Phone Participants:**
- Anderson, Colin – International Paint
- Candelaria, Linda – RWQCB 8
- Cihak, Garry – Koehler Kraft Boat Building/Repair
- Cohen, Sahrye – BCDC
- Flick, Ron – DBW/Scripps Institute
- George, Robert – U.S. Navy SPAWAR
- Gonzalez, Jamie – UC Sea Grant Extension Program
- Holman, Karen – Port of San Diego
- Johnson, Leigh – UC Sea Grant Extension Program
- Lee, Fred – G. Fred Lee & Associates
- Looker, Richard – RWQCB 2
- Matuk, Vivian – CCC/DBW
- Moran, Kelly – TDC Environmental
- Riviera, Ignacio – U.S. Navy SPAWAR
- Schottle, Rolf – AMEC
- Wolf, Katy – Institute for Research and Technical Assistance

These meeting notes contain highlights of announcements, discussion topics, and pending action items. Pending action items are tasks that require some type of follow up. These are denoted as “**Action Item**”. A contact information list that contains participants’ agency names, email addresses, and telephone numbers usually accompanies these meeting notes in a separate Adobe file. Special notes from the author occur as italicized text.

**Introductions/Agenda Review:**

Twenty-seven individuals (10 in person and 17 by phone) participated in the twelfth meeting of the Copper Sub-Group. Nan welcomed the participants. There were no changes to the agenda.

**News, Activities, and Developments:**

- **DPR/SWRCB Marina AFP Monitoring Study Update – Nan S., DPR** – Nan gave a quick update on the marina antifouling paint (AFP) monitoring study. The focus of the last two months was mainly on entering and importing thousands of study results into DPR’s Access database. Ellen Pyatt, a DPR Environmental Monitoring Branch graduate student assistant, spent the last few months developing and managing the database. Nan and Ellen started quality control checks and ran some preliminary data analysis. More complex statistical tests and input into the Biotic Ligand Model would be done once the quality control checks are completed.

Data analysis will likely be completed by September since this is the month in which DPR will decide on a more definitely course of action on AFPs. In the original interagency agreement with the State Water Resources Control Board (SWRCB), DPR was supposed to complete the study report by mid-June; however, a contract amendment changed this and a number of other items including removal of sediment collection tasks and adjustments to various budget line items. Although the contract allows until December 2007 for the completion of the study report, Nan hopes to have the report done before then.
The preliminary monitoring results for dissolved copper, Irgarol, and toxicity have been posted on DPR’s Copper Antifouling Paint Sub-Workgroup webpage since the last meeting. Moreover, the results have been updated with recently acquired data.

- **Evaluation and Discussion of Southern California Coastal Water Research Project Report on Copper Input from In-Water Hull Cleaning - Colin Anderson, International Paint** – Colin Anderson, International Paint * Colin gave a short presentation on his and Neal Blossom's (American Chemet) review of the Southern California Coastal Water Research Project's (SCCWRP) technical report titled, "Copper Emissions from Antifouling Paint on Recreational Vessels". This 2003 SCCWRP study and a U.S. Navy study formed the basis for the San Diego Regional Water Quality Control Board's estimation of the relative contribution of copper from passive leaching and underwater hull cleaning in the Shelter Island Yacht Basin (SIYB) Total Maximum Daily Load (TMDL). The SCCWRP report concluded that passive leaching represented the major pathway (95%) of copper emissions from boat hulls into the water column. In contrast to this, the report concluded that hull cleaning activities only represented a small remainder (5%) of the emissions. These conclusions were based on two different copper-coating types: hard vinyl and modified epoxy. [The two presentation files are provided as attachments along with these notes.]

Colin proposed that SCCWRP's calculations over-estimated the amount of copper contribution from leaching and under-estimated the significance of copper contribution from underwater hull cleaning. The SCCWRP calculations assume that all of the dissolved copper released from cleaning only occurs between the beginning of the cleaning event and an hour after the completion of the event. However Colin believed that the data in the report shows that the elevated leach rate due to the cleaning event lasts much longer than an hour after the cleaning event, particularly during the first 3 days, and that the leach rate continues to slowly decrease thereafter, with the steady state passive leach rate not reached until after about 28 days. It is this rate, after the "spike" effects of cleaning are gone, that should represent the passive or steady state leach rate.

On this basis, Colin suggested that if underwater hull cleaning is eliminated and thus removing the regular copper release "spikes" from cleaning events, the emission of copper could be reduced by almost half. Colin also insisted that in-water hull cleaning is not necessary with currently used AFPs. Moreover, in-water hull cleaning actually shortens the useful life of an AFP coating. Leigh Johnson (UC Sea Grant) and several other workgroup participants suggested that investigators from SCCWRP, specifically Ken Schiff - the primary investigator, and underwater hull cleaners be present to help more fully discuss the scientific and technical validity of these statements. Since these were potentially paradigm-shifting conclusions, Nan agreed that this was very good idea and proposed to have the aforementioned parties invited to further explore these claims.

Colin then introduced Garry Cihak of Koehler Kraft Boat Building and Repair (a boatyard located at Shelter Island Yacht Basin in San Diego) to help provide some observations to support his claims. Garry pointed out that boats at his marina have gone 22 - 24 months without being in-water cleaned. Leigh added that UC Sea Grant had surveyed San Diego boaters about 2 years ago and most reported about 2½ years for the life of their coatings. Thus, one can interpret that hull cleaning may not extend the useful life of the coating by much.

Linda Candelaria (Region 8) wondered if copper loading from these boats that are not in-water cleaned has been looked at. Linda also noted that some boats are frequently cleaned in Lower Newport Bay. Garry said that some boats, particularly sailboats do get frequently cleaned. Colin added that hard modified epoxy paints generally have a high copper loading potential. When the surface of these paints is disturbed (e.g., scrubbed by divers), the copper is released.
A participant noted that the averaged frequency of cleaning used in the SIYB Copper TMDL analysis was 14 times per year. This would suggest that the frequency of cleaning, at least in SIYB, is very high and may not even be necessary. Garry added that boaters with newly applied boat paints should wait at least a year before cleaning their hulls. Moreover, Garry was baffled as to why boatyards have been under strict containment regulations to prevent water contamination from hull cleaning on land while hull divers, doing exactly the same hull cleaning but in the water, are not. Kelly stated that paint chips are of concern also, which is why attention is being paid to the sediment load of copper. Furthermore, copper can be resuspended into the water column under certain conditions. Nan reiterated that many of the figures being tossed out for consideration needed to be verified by underwater hull cleaners and perhaps boat owners. **Action Item:** Nan will invite representatives from SCCWRP, underwater hull cleaners, and perhaps Recreational Boaters of California (RBOC) to join the discussion at the July 12th meeting.

Bob Riopel (RBOC) asked whether this is an issue for fresh water as well. Nan said that boats operating in fresh water systems do not need to employ AFPs compared to their counterparts in salt and brackish water systems since significantly less fouling take place in fresh water, particularly hard fouling. Moreover, a larger portion of fresh water boats are kept in dry storage in the winter months or trailerable. Thus, fresh water boats spend less time exposed to fouling organisms.

Nan announced that considering the significance of these claims and in the interest of time, he would like to shelf this item for continued discussion at the next meeting.

- **Shelter Island Yacht Basin (SIYB) Biological Effects Study – Ron Flick, Department of Boating and Waterways** – Ron Flick, an oceanographer with the Scripps Institute and the Department of Boating and Waterways (DBW) provided background and an update on the current results of a biological assessment study being conducted by researchers at SIYB. The idea of conducting such a study was proposed by a number of stakeholder groups many years back. These groups felt that it was important to investigate if impairment of the local biological community could actually be observed and documented. DBW decided to take the lead on funding the research efforts.

The primary objectives of this study were to 1) determine if biological (i.e. macrafauna) gradients exist and do they correlate with copper concentrations; and 2) determine if other environmental and physical changes exist (e.g., chlorophyll, grain size, organic matter content, reduction/oxidation potential).

Water column sampling showed that copper concentrations regularly exceeded 3.1 μg/L or parts per billion (ppb) with many observations between 6 – 8 ppb. The highest concentration was observed at the back of the basin at close to 18 ppb. There was a smooth gradient of lowest to highest levels of copper from the mouth to the back of the basin. Monitoring results suggested that boats were the source of copper.

Sediment samples were also taken. Sediment levels were generally above the National Oceanic and Atmospheric Administration’s (NOAA) sediment quality guidelines Effects Range Low (ERL) of 34 ppm but below the Effects Range Median (ERM) of 270 ppm. Toward the inner areas of the basin, sediment concentrations were often in the range of 100 – 150 ppm. The highest concentration detected was 218 ppm in the back or northwest corner of the basin. Closer to the basin’s mouth, copper sediment levels were around 70 – 80 ppm. There was also a general increase in the reduction/oxidation potential from the mouth to the back of the basin.

The faunal metric of number of species per core provided mixed result with no readily discernable gradient. Ron noted that it would take a closer analysis to confirm any correlations and warned that he is citing directly from the results report. Ron also noted that this first phase of the study did not focus on water column effects, although water column concentrations were quantified, but rather on sediment
levels, physical factors, and community distribution. The second phase of the study will presumably focus more on water column effects.

Kelly caution the interpretation of these data in that sensitive species may have already been excluded in the survey. Kelly also asked about reference sites. Ron said that he did not believe that there were any reference sites. The site that might have received the least amount of influence from the boats would have been the site that was closest to the basin mouth, near the police dock.

Kim Ward (SWRCB) asked Ron whether he had any idea of how many species in SIYB are actually aquatic invasive species (AIS). Ron was not able to provide as estimate, but pointed out that this is a very thought-provoking question. Leigh concurred with Kim on the AIS question and added that bottom dwelling organisms are usually soft-bodied types.

Nan invited Ron to revisit the workgroup after more definitive analysis of the results can be done as well as when phase II data from the study become available.

- **Port of San Diego’s Pollution Prevention Grant Proposal to Evaluate Alternative Coatings to Copper AFPs and SIYB TMDL Related Activities – Karen Holman, Port of San Diego** – Karen Holman introduced herself and provided an update of Port San Diego’s activities relating to AFPs. Of particular interest was the recent grant proposal that the Port made to U.S. EPA for a pollution prevention project that would involve studying the efficacy, costs, and other factors crucial to the selection of alternatives. Karen said that the Port should hear back from U.S. EPA by the end of June whether they would be awarded the grant. The Port will also provide in-kind resources as part of the grant terms.

Karen noted that similar but more limited efforts were launched in the past, most notably UC Sea Grant’s copper AFP alternatives study in 2002 and 2003. However, the Port wanted to have a more up-to-date and current feasibility study considering that new products have entered or are entering the AFP market. The Port also intends to make its findings readily available to boaters and commercial applicators.

Karen announced that if and when the grant is awarded to the Port, a project advisory group would be formed to help guide the work. Karen suggested that many participants of the Copper Sub-Group might be asked to serve on the project advisory group. Nan expressed interest in the workplan, on behalf of the workgroup.

Karen stated that the first year of the two-year project would mainly involve the testing of painted panels to evaluate relative performance. This would be an approach to help screen and narrow down candidate alternative coatings that would later be tested on boat hulls in the later phases of the project. In the end, Karen expected to be able to provide outreach to boaters and commercial applicators and hopefully use the project findings to shift boaters’ preference away from copper AFPs and toward less or non-toxic alternatives.

Lisa Sniderman (California Coastal Commission) asked Nan how this effort related to the feasibility study that DPR, DTSC, and the Port have been working on. Nan said that the Port’s grant proposal was pretty much the same project; however, due to last-minute administrative issues with payment transfers to the Port from the State of California, an alternative funding source had to be identified. U.S. EPA’s Pollution Prevention grant program was the most logical source of alternate funding for the Port at the time. Since State funds were no longer tied up in this potential project, DPR and DTSC were then free to explore the funding of other projects and activities. Despite this, DPR and perhaps DTSC would continue to support the Port in their grant request and subsequent project.
Leigh asked Karen about the types of coatings and paints would be included in the study. Karen said that she would need to consult the project advisory group to eventually define the scope of the study. Leigh provided a brief follow-up on some of the boats that UC Sea Grant had tested in the past with non-copper and non-toxic AFPs. Three boats have had epoxy-type coatings (Aquaply M and CeramKote) for the last 4 ½ years. One boat has gone 8 years with the epoxy coating – Aquaply M.

Kelly brought up her concerns of switching from one toxic coating to another. She cited the Urban Pesticide Pollution Prevention annual monitoring update report, which had documented the widespread surface water detection of pyrethroid pesticide and related toxicity in California. Pyrethroids have been widely adopted as replacement pesticide active ingredients for organophosphates, particularly for urban-use products. In the case of AFPs, Kelly pointed out that she is concerned with zinc pyrithione in particular since it is transchelated in natural waters to copper pyrithione, which is more stable and toxic than its parent compound.

Linda noted that the California Toxics Rule (CTR) standards for zinc are relatively higher than those for copper; however, she also added that she would prefer to not see a switch toward another metal AFP. Nan added that zinc levels in DPR’s study marinas were all below CTR standards.

Karen added that the Port is working with the SDRWQCB to help develop hull-cleaning guidelines, which would be part of the implementation plan for the SIYB TMDL. Karen believes that the SDRWQCB had yet to start the “compliance clock” for copper load reduction under the TMDL implementation plan.

- **Other AFP-Related Updates, Items, & Announcements – Group and Nan S., DPR**

  Nan raised a couple of recent boating/pesticides related issues to the workgroup. One was the question of whether or not coatings that have been traditionally considered non-toxic need to be registered with U.S. EPA and DPR as a pesticide product. Rachel Kubiak (DPR Registration Branch) briefly highlighted the product-specific factors that determined the need for registration. The California Food and Agricultural Code section 12753(b) defines a pesticide as any substance, or mixture of substances which is intended to be used for defoliating plants, regulating plant growth, or for preventing, destroying, repelling, or mitigating any pest, as defined in section 12754.5, which may infest or be detrimental to vegetation, man, animals, or households, or be present in any agricultural or nonagricultural environment. Also, a product that may not necessarily have a toxic effect on a pest organism may still be recognized as a pesticide depending on the types of claims made on the product’s label. Thus, DPR’s Product Compliance Branch and U.S. EPA Region IX have been in communication regarding non-toxic AFP products and the need for federal and state registration. At the time of the meeting, U.S. EPA Region IX determined that feedback from U.S. EPA Headquarters back in Washington, D.C. was needed.

  Nan felt that this was an important determination since products that have been traditionally considered as non-toxic would have to through somewhat lengthy federal and California registration processes before they could be legally available for use. Nan will pass on any decisions made on this to the workgroup.

  Nan also touched on enforcement and product use issues that originated from the San Diego County Agricultural Commissioners (SD CAC) regarding the use of sodium hypochlorite products in boat hull-liners. There were concerns on whether such use is allowed and also if there were any significant environmental issues associated with the release of treated water from the hull liners. Nan said that he consulted with DPR Registration Branch databases and scientists and found that 1) there are currently 11 active products that are approved for use for boat bottoms in California; 2) These are all liquid formulations; 3) residual chlorine must be at 0 parts per million before the liner can be opened and the treated water can be released.
Hypochlorite when added to water primarily breakdown down to hypochlorous acid and chlorine. Some of the chlorine gas escapes into the atmosphere. Both chlorine and hypochlorous acid are reactive in water and these molecules are the ones that are reactive to ligands and marine organisms. This is why the label language directs the user to let the chlorine level drop to 0 parts per million before water in the liner can be released. The eventual break down product of sodium hypochlorite is sodium and chloride, both of which are abundant in sea water. Nan will continue to work with SD CAC on this topic.

Linda announced that the San Ana Regional Water Quality Control Board has completed the sampling portion of its marina metals and toxicity monitoring study for Lower Newport Bay. Moreover, she has completed a draft study report. Linda hopes to be able to present study findings at the next meeting.

Leigh announced that UC Sea Grant would be conducting a series of AIS seminars over the next few months.

**Other Items/Next Meeting/Adjourn:**

The next Copper Sub-Group meetings will be held on Thursday, July 12, 2007. The meeting agenda will be sent out in early July.

Meeting notes prepared by: Nan Singhasemanon (DPR)